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THE TAXATION OF BUSINESS INCOME IN SWEDEN

A report prepared for the
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by

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Peter Birch Sørensen

Chapter 1
INTRODUCTION AND SUMMARY

This report evaluates the income tax burden on alternative forms of business organization in Sweden, accounting for taxes collected at the firm level as well as taxes levied on the individual owners. Its main purpose is to investigate the extent to which the tax system discriminates between alternative organizational forms. In line with its mandate, the report does not propose any changes in current tax laws.

The report focuses on the following organizational forms: *widely held public corporations* (noterade aktiebolag), *widely held private corporations* (onoterade aktiebolag), *closely held corporations* (fåmansföretag) subject to the so-called 3:12 rules for owner-managed companies, and *sole proprietorships* (enskilda näringsidkare). Since the tax rules for partnerships (handelsbolag) are similar to those for sole proprietorships, except for the taxation of capital gains, the partnership form is also implicitly covered by the analysis in Chapters 4 and 5.

The quantitative analysis in the report focuses on small firms. These firms are typically organized as proprietorships, partnerships or closely held corporations dominated by one or a few shareholders. A comparison of the tax burden on proprietorships and closely held companies is therefore of special interest when evaluating the tax climate for small firms. However, to evaluate the competitive position of small relative to large firms, it is also of interest to study how the income of a small proprietorship or a closely held company would have been taxed if it had been subject to the tax rules for widely held companies with many owners. Even though a small firm is rarely organized as a widely held corporation, it is thus relevant to ask how it would have been taxed under the tax rules applying to the large firms with which it may have to compete. Moreover, an entrepreneur may wish to change the organizational form of his firm as it grows, and differences in the tax rules for the different forms of business may induce him to accelerate or postpone the time when the organizational change is made.

Chapter 2 of the report provides an overview of the economic importance and characteristics of alternative organizational forms. Measured by the number of firms, the sole proprietorship is the most common legal framework for doing business in Sweden, followed by the closely held corporation. In terms of turnover and wage bill, the widely held private corporation is the dominant organizational form, but this type of firm is typically owned by other companies, including public corporations. Among firms with individual personal owners, the closely held corporation is therefore the most important organizational form in terms of turnover, wage bill and number of employees.

Proprietorships, partnerships and closed corporations share some common economic characteristics. The owners of these firms typically perform a role as risk-bearers as well as management decision-makers. They therefore bear all of the economic consequences of their decisions. The social benefit of this way of organizing a business is that entrepreneurs have the strongest possible incentive to ensure that the firm is run efficiently. On the other hand, since they typically have to invest most if not all of their wealth in a single firm, the owners of proprietorships and closed corporations cannot spread their risks by diversifying their portfolios. This tends to increase their cost of risk-bearing and may cause too little investment in risky projects from society's point of view. Moreover, the quality of management decisions may suffer to the extent that the owners of these firms have to be recruited among individuals with sufficient levels of wealth and willingness to bear risks, rather than among those with the highest management skills.

The social benefits associated with the organizational form of a widely held public corporation derive from the potential for improved quality of decision-making through the professionalization of management, and from improved spreading of risks via the public trading of shares that allows shareholders to reap the gains from portfolio diversification. However, because of the separation of management and risk-bearing functions, and because managers and shareholders may have conflicting interests, shareholders need to monitor the management, and some efficiency may be lost in so far as shareholders cannot ensure that managers always seek to maximise the value of the firm.

By shifting from a proprietorship to a closed corporation, thus moving from unlimited to limited liability, an entrepreneur may in principle reduce his risk, but in practice the firm's creditors will

typically require the owner to pledge personal assets as he shifts to limited liability. Depending on the specific circumstances of the firm and its owners, the differences in the legal characteristics of proprietorships and corporations may nevertheless imply that the individual entrepreneur has a clear preference for one organizational form over the other.

The balance of costs and benefits associated with the different organizational forms will differ across different business sectors, and it will often change significantly over the life cycle of the individual firm. In the start-up phase the cost-benefit calculus will almost always favour the organizational form of proprietorships, partnerships or closed corporations. But when the firm is growing over time, the scale and complexity of its operations may reach a point where the widely held private or public corporation becomes the most attractive organizational structure.

Differences in the effective tax burden on the various organizational forms may cause a loss of economic efficiency by inducing entrepreneurs to organize their firms in a different way than they would have done in the absence of tax. There is ample empirical evidence from other countries (including Norway) that non-neutralities in the tax system tend to distort the choice of organizational form, sometimes significantly so.

Chapter 3 describes the current rules for taxation of business income in Sweden, based on the tax code for 2007. Since some business income is taxed as labour income, the description includes the rules for calculating the personal labour income tax and the social security tax. The chapter also covers the tax treatment of capital gains and losses on business assets and on shares.

Under the Swedish dual income tax the income distributed from a sole proprietorship is split into an imputed return to the firm's net equity and a residual profit. The imputed return is taxed as capital income at a flat rate of 30 percent, while the residual profit is subject to social security tax and progressive labour income tax. Profits retained in the business and allocated to the so-called expansion fund are taxed at the 28 percent rate also applied to corporate income.

So-called qualified shareholders in closely held companies are likewise subject to income splitting rules (the 3:12 rules) to prevent labour income from being transformed into lightly taxed capital

income. To be deemed a qualified shareholder, a controlling shareholder (controlling at least 50 percent of the voting shares together with at most three other owners) must work in his company to a significant degree. Dividends and realized capital gains on qualified shares are taxed at a reduced capital income tax rate of 20 percent in so far as their sum does not exceed an imputed 'normal dividend' (normalutdelningen). Dividends and capital gains above this limit are subject to personal labour income tax (but not to social security tax), although there is a cap on the amount of capital gain that can be taxed as labour income.[1] The normal dividend includes an imputed return to the basis value of shares, and provided the qualified shareholder has received a sufficiently large wage income from his company during the previous year, it also includes a so-called wage-based allowance amounting to 25 percent of the company's wage bill plus another 25 percent of wage payments above a certain threshold.

In 2007 the imputed rate of return on qualified shares was 12.54 percent, whereas the imputed return on the net equity of sole proprietors was only 8.54 percent.

Widely held private and public corporations are subject to identical corporate income tax rules, but whereas the dividends and capital gains on shares in widely held listed companies are taxed at the standard 30 percent capital income tax rate under the personal income tax, dividends and gains on shares in widely held unlisted companies are taxed at a reduced rate of 25 percent.

Chapter 3 identifies optimal strategies for proprietors and shareholders who wish to distribute income from their firm in a way that minimises the total tax liability of the firm and its owner(s). In particular, it points out that it is never profitable for a qualified shareholder to pay himself a dividend in excess of the normal dividend, since the sum of the corporation tax and the progressive personal labour income tax on such excess dividends exceeds the sum of the social security tax and the personal labour income tax imposed on wage income from the company. Hence a tax-minimising qualified shareholder will always wish to distribute income above the normal dividend in the form of management wages or salaries from the company.

When estimating the relative tax burden on labour income and capital income, one must account for the fact that a rise in the taxpayer's labour income may entitle him to additional social security

[1] The cap is a permanent rule. In addition, under the transitional rules prevailing until 2010, only half of the capital gain in excess of the normal dividend can be taxed as labour income.

benefits. The value of these additional benefits should be deducted from the social security contribution when estimating the effective marginal tax rate levied on the taxpayer. The appendix to Chapter 3 estimates that up to an assessed labour income of about 370,000 kronor, the social security tax is roughly offset by the additional social security rights generated by a rise in income, whereas it does indeed become a genuine tax when income increases above this level. When evaluating the estimated effective tax rates presented in this report, it is important to keep in mind that the social security tax is only assumed to 'kick in' when the assessed personal labour income exceeds 370,000 kronor. Since this estimate is quite rough and subject to considerable uncertainty, there is also some uncertainty regarding the 'true' level of the effective income tax burden. However, this uncertainty applies equally to the estimated tax burden on *all* organizational forms in the cases where shareholders are assumed to receive labour income from their company. Hence the uncertainty regarding the genuine tax component in the social security tax does not imply any systematic bias in the estimated *differences* in the tax burden on the various organizational forms.

Another potential source of inaccuracy in the estimated effective tax rates on business income is that the write-down of assets undertaken for the purpose of calculating taxable profit may deviate from the true economic depreciation, so taxable profit may be a biased measure of the true income from the firm. This report assumes that taxable profits correspond to the actual economic profits of firms. Since depreciation for tax purposes often tends to exceed the true economic depreciation, this assumption may generate an upward bias in the estimated average level of taxation of business income. Yet again it does not generate a bias in the estimated *differences* in the tax burden on alternative organizational forms, since they are all subject to the same rules for the valuation of business assets.

Based on the tax rules described in Chapter 3, **Chapter 4** estimates average and marginal effective tax rates on investment by the four types of business organization considered. The *average* effective tax rate (AETR) measures the *total* tax burden relative to the firm's total income, whereas the *marginal* effective tax rate (METR) indicates the tax burden on the *last unit* of investment that only just yields the market's minimum required return. A high AETR on investment within a particular organizational form will discourage use of that form, whereas a high METR will reduce the optimal scale of activity within a given organizational form, once that form has been chosen.

Table 1.1 summarises the benchmark estimates of *marginal* effective tax rates. For investment financed by debt, all organizational forms face the same METR equal to the 30 percent capital income tax rate on interest. For investment financed by equity, whether in the form of retained earnings or new equity, sole proprietorships have a lower METR than widely held companies, since the latter are subject to double taxation. Because of the rather high imputed rate of return on new equity, closely held companies have the lowest METR for investment financed in this way. On the other hand, because capital gains on shares in closely held companies are taxed as labour income, investment financed by the retained profits of such companies faces the highest METR. However, this high marginal tax burden may be escaped if qualified shareholders withdraw profits as wages and reinject them as new equity rather than retaining them in the business. Under such a financing strategy, closely held companies face the lowest METR among all organizational forms.

Table 1.1. Estimated Marginal Effective Tax Rates (%)

Mode of finance	Sole proprietorship	Closely held corporation	Widely held private corporation	Widely held public corporation
New equity	25.0	9.3	46.0	49.6
Retained earnings	28.0	53.0	39.5	41.8
Debt	30.0	30.0	30.0	30.0

Source: Own calculations, based on Appendix 4.2 and the assumptions summarised in Table 4.1 of Chapter 4.

According to the analysis in Chapter 4, the METR on investment by closely held companies is quite sensitive to the wage-based allowance included in the normal dividend that gets taxed as capital income. The sensitivity is particularly high in cases where the company's investment induces changes in the wage bill paid to employees. At the margin the wage-based allowance generates a significant disincentive to adopt labour-saving technologies and a strong incentive to introduce labour-intensive technology. In this way the newly introduced wage-based allowance could cause serious distortions to the technological choices made by closely held companies.

Since some business income is taxed progressively as labour income, the *average* effective tax rate (AETR) generally depends on the total level of business income. Table 1.2 summarises estimates

from Chapter 4 of the AETR on entrepreneurs with annual business profits ranging from half a million kronor to two million kronor. When shareholders are able to withdraw income from their companies either as wages or as dividends with the purpose of minimising the tax burden on distributions, the benchmark estimates suggest that the AETR on income from corporations is lower than that on income from sole proprietorships, since a larger fraction of the income from proprietorships tends to be subject to the progressive labour income tax. However, due to the double taxation of corporate equity income, this result may be reversed for firms with high ratios of equity to annual profits. If such firms are organized as sole proprietorships, a large part of their income will be single-taxed as capital income, whereas a large fraction will be double-taxed as dividends if these firms are organized as corporations.

Table 1.2. Estimated Average Effective Tax Rates (%). Basic scenario for a going concern[1]

Pre-tax business profit (kronor)[2]	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
500,000	22.5	22.9	24.2	46.0	24.7	49.6
1,000,000	41.8	33.2	34.5	46.0	36.3	49.6
1,500,000	49.1	40.2	38.3	46.0	40.7	49.6
2,000,000	52.7	44.0	40.2	46.0	43.0	49.6

1. Assumptions: equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.
2. Pre-tax business income after interest but before deduction for wage payments to owners.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

The estimates in Table 1.2 suggest that the AETRs for closely held companies and for widely held private companies are at roughly the same level, although there is a tendency for the AETR on closely held companies to be higher at high levels of profit where the progressive labour income tax on the marginal income carries a larger weight.

The analysis in Chapter 4 does not explicitly allow for uncertainty about the rate of return on a business venture. For a given average level of income, a risk-averse entrepreneur will prefer a 'safer' income stream with a lower degree of volatility. **Chapter 5** analyses whether the tax rules for the different forms of business organization are especially favourable to activities with either relatively high or relatively low riskiness. To the extent that the answer is affirmative, the tax system may distort the choice of organizational form as well as the amount and pattern of risk-taking.

The degree of riskiness is measured by the volatility of business income. Chapter 5 estimates the risk premium that must be subtracted from the average level of a volatile income stream to make it fully comparable to a safe income stream with no volatility. The estimated risk premia are used to calculate the Risk-adjusted Average Effective Tax Rate (RAETR) on different forms of business organization. The RAETR is quite analogous to the concept of the AETR, except that tax payments and pre-tax income have been adjusted for risk through subtraction of the appropriate risk premia. Thus the RAETR measures the fraction of total risk-adjusted income that is paid in tax. Because it adjusts for differences in risk, one may directly compare the RAETR on alternative income streams with different degrees of volatility.

Table 1.3 shows the RAETRs on the various organizational forms in the benchmark scenario considered in Chapter 5. Assuming a degree of risk aversion in the medium range of available empirical estimates, this scenario compares the disposable income from a risk-free income stream to the risk-adjusted after-tax income obtainable from two alternative income streams involving a 'medium' and a 'high' degree of risk, respectively. The average levels of the risky income streams are chosen such that the risk-adjusted level of pre-tax income is 500,000 kronor per year for all income flows. Because of the required risk premium, the average level of *actual* income in the highly risky income stream in the bottom of Table 1.3 is 1,000,000 kronor.

The RAETRs reported in Table 1.3 indicate that the risk-adjusted tax burden on sole proprietorships and closely held corporations is roughly the same and that it varies very little with the degree of riskiness. According to the analysis in Chapter 5, the *actual* (unadjusted) average tax burden on risky income streams is higher for proprietors than for qualified shareholders, since the former group is more affected by the progressivity of the labour income tax, but the stronger tax

progressivity also implies a greater reduction in the volatility of disposable income for proprietors than for qualified shareholders. The net result of these offsetting factors is that the two groups face roughly the same average tax burden in risk-adjusted terms.

Table 1.3. Risk-adjusted Average Effective Tax Rates under alternative organizational forms. Benchmark scenario for a going concern[1]

Degree of riskiness	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk	22.5	22.9	24.2	46.0	24.7	49.6
Medium risk	22.9	22.5	26.4	46.0	26.6	49.6
High risk	22.5	23.4	33.9	48.8	34.4	52.6

1. Assumptions: Equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent. The risk-adjusted level of pre-tax income is 500,000 kronor per year for all income flows.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3 and the assumptions summarised in Table 5.1 of Chapter 5.

Table 1.3 also suggests that the tax system discriminates against ownership of shares in widely held corporations even in the case where shareholders can reduce their average tax burden by receiving part of the income from the company in the form of wages and salaries. In particular, the lack of progressive taxation of the marginal income from widely held companies means that the tax system causes a relatively small reduction in the volatility of after-tax income. This implies a relatively high RAETR on highly fluctuating income streams from widely held corporations.

According to the analysis in Chapter 5 these results are not very dependent on the degree of risk aversion as long as one considers business ventures with a medium degree of risk. However, when entrepreneurs are highly risk averse, the analysis strongly indicates that a closely held corporation is the most attractive organizational framework for highly risky activities. The reason is that the tax

regime for qualified shareholders combines a relatively low average tax burden with substantial protection against income fluctuations due to progressive tax on the marginal income from very risky investments. The analysis in Chapter 5 also indicates that the tax rules for sole proprietors are more favourable to highly risky activities than are the tax rules for widely held corporations.

Chapters 4 and 5 focus on the taxation of firms that are already well established as 'going concerns'. However, the start-up of new business firms is an important source of innovation and economic growth. **Chapter 6** therefore presents estimates of the effective tax burden on new start-up firms and considers whether the tax system makes some forms of business organization more attractive than others as a legal framework for the establishment of new firms.

Since new firms often make losses during their first years of operation, and since they are frequently sold by the initial owner after having proved their viability, the tax treatment of losses and capital gains are especially important for young expanding firms. Moreover, new start-up firms face substantial business risks, including the risk of bankruptcy, and while some amount of business loss is often unavoidable during the first years of operation, the positive profits expected in the more distant and unpredictable future often occur with much greater uncertainty.

To capture these characteristics, Chapter 6 describes the following stylized scenario for a new firm: At first, it goes through a start-up phase during which it makes gradually declining losses and faces some risk of bankruptcy. If the firm survives the start-up phase, it enters an expansion phase where it makes positive and gradually increasing profits which are reinvested in the firm. After a number of years, the firm is then sold by the initial owner who makes a capital gain that depends on the current size of the firm's cash flow. By allowing alternative assumptions on the probability of bankruptcy and the level and steepness of the firm's earnings profile, this stylized scenario can encompass a wide range of business ventures with different degrees of profitability and riskiness.

Based on a set of benchmark parameter values, Chapter 6 uses this model of a new start-up firm to calculate the expected average levels of its pre-tax and after-tax cash flows as well as their degree of volatility under alternative forms of business organization. Following a procedure similar to the

one used in Chapter 5, the uncertain cash flows are adjusted for risk by subtracting appropriate risk premia to make all flows fully comparable to a safe cash flow.

In this way the chapter arrives at the estimated effective tax rates summarised in Table 1.4, where the Average Effective Tax Rate (AETR) and the Risk-adjusted Average Effective Tax Rate (RAETR) are equivalent to the corresponding measures introduced in chapters 4 and 5, except that the effective tax rates are now calculated from the discounted present value of the relevant cash flows to account for the fact that the positive and negative cash flows for a start-up firm occur at different points in time.

The AETR measures the expected average tax burden across failing and successful start-up firms. This is the relevant measure of tax from the perspective of a risk-neutral entrepreneur who focuses only on the average expected net earnings without caring about their volatility. The RAETR measures the expected tax payments as well as the expected pre-tax cash flows in risk-adjusted terms, assuming a 'medium' degree of risk aversion. For entrepreneurs averse to risk, this is the more relevant measure of tax burden. The RAETR is seen to be systematically higher than the AETR. As Chapter 6 explains, this will always be the case when the new firm starts out by making losses and when these losses accrue with a higher degree of certainty than the positive profits expected further into the future.

Table 1.4. Estimated average effective tax rates (%) on a start-up firm. Benchmark scenario[1]

	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
AETR[2]	55.4	31.8	24.3	27.3	27.6	32.0
RAETR[3]	60.1	34.5	26.3	29.6	30.0	34.7

1. Based on the assumptions summarised in Table 6.1 of Chapter 6.
2. Average Effective Tax Rate. Assumes risk neutrality.
3. Risk-Adjusted Average Effective Tax Rate. Assumes 'medium' degree of risk aversion.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

In the benchmark scenario underlying Table 1.4, the tax burden on new firms started up by sole proprietors is much higher than the burden on firms established by qualified shareholders. There are three reasons for this. First, for the proprietor a larger part of the capital gain from the sale of the firm is taxed at the high marginal rate applying to labour income rather than at the low marginal rate applying to capital income, since the imputed rate of return to equity is higher for qualified shareholders than for proprietors, and since the qualified shareholder may include a wage-based allowance in his imputed return. Second, the qualified shareholder only pays a 20 percent tax on his capital income, whereas the proprietor must pay the standard 30 rate of tax on his capital income. Third, and most important, while the proprietor is liable to social security tax as well as personal labour income tax on the part of his capital gain categorised as labour income, the qualified shareholder only pays personal labour income tax on that part of his capital gain which exceeds his imputed return to equity.

For widely held public corporations that are not able to distribute part of their income as wages to shareholders, the RAETR in Table 1.4 is roughly similar to that imposed on closely held companies. However, when widely held companies can distribute part of their income as wages to shareholders with the purpose of minimising the total tax burden on the firm and its owners – as assumed in the third and the fifth column of Table 1.4 – the effective tax rates levied on these companies is even lower than the corresponding tax rates for qualified shareholders. The explanation is that all of the capital gain made on the sale of shares in widely held companies is taxed as capital income (at a rate of 25 percent for unlisted shares and 30 percent for listed shares), thus escaping the progressivity of the labour income tax.

Chapter 6 undertakes extensive sensitivity analysis to test the robustness of the results in Table 1.4 to changes in the circumstances of the firm. The main findings are as follows:

A higher risk of bankruptcy combined with a higher expected profitability in case the firm survives systematically increases the risk-adjusted tax burden on all organizational forms. The rise in the RAETR on sole proprietors and qualified shareholders is particularly large, since these taxpayers are hit by the progressivity of the labour income tax as their level of earnings increases. The risk-adjusted tax burden also increases modestly for all organizational forms as the entrepreneur's degree of risk aversion goes up. However, varying the assumptions regarding the degree of riskiness

or the degree of risk aversion does not change the conclusion that sole proprietors face a significantly higher tax burden than the other organizational forms, and that widely held private start-up companies are treated quite favourably by the tax code.

When the firm's profitability during the expansion phase goes up, generating a higher capital gain when the firm is sold, the RAETR for sole proprietors also increases as they are hit harder by the progressive labour income tax on (most of) their gain. By contrast, when the size of the capital gain rises above a certain level, a further rise in the gain actually reduces the RAETR on qualified shareholders, since a growing fraction of their gain gets taxed as capital income, due to the cap on the amount of their gain that can be taxed as labour income. For this reason the risk-adjusted tax burden on qualified shareholders becomes just as low as the burden on shareholders in widely held companies when the level of profitability and capital gain is high.

A higher level of initial loss during the start-up phase also reduces the RAETR on qualified shareholders, on the realistic assumption that it is associated with a larger initial injection of equity. Because of the high imputed rate of return on the equity of a qualified shareholder, a larger equity base means that a larger share of his capital gain gets taxed at the low capital income tax rate. By contrast, the RAETR on the other organizational forms is not very sensitive to variations in the initial losses and the associated variations in the initial equity base and in the firm's earnings profile.

The estimated effective tax rates on closely held companies are based on the permanent rules for the the taxation of capital gains on qualified shares that will prevail after 2009. Under these rules all of the gain in excess of the imputed normal dividend is taxed as labour income, while the capital income component of the gain is taxed at a reduced rate of 20 percent. Under the temporary rules prevailing until the end of 2009, only half of the gain in excess of the normal dividend is taxed as labour income, while the other half is subject to the standard 30 percent tax rate on capital income. Both sets of rules are modified by the cap of 4,590,000 kronor (in 2007) on the amount of capital gain that can be taxed as labour income during a six-year period. All gains above the cap are taxed at the standard 30 percent capital income tax rate. In the case of large capital gains this cap means that the division of the gain into a labour income component and a capital income component will be the same under the current temporary rules and under the permanent rules, and hence the

effective tax burden will also be the same. However, for gains of smaller size, the temporary rules will often be more favourable, because the fraction of the gain subject to progressive labour income tax tends to be smaller under these rules.

The benchmark scenario in Chapter 6 assumes that the assets sold by the sole proprietor at the end of the expansion phase do not include business real estate. When capital gains on such assets are realized by a sole proprietor, they are taxed as capital income, and only 90 percent of the nominal gain is included in the proprietor's capital income tax base. As a result of this favourable tax treatment, the tax burden on proprietors falls substantially as the share of real estate in total business assets increases. Indeed, when this share comes close to one, the RAETR on sole proprietorships falls below that on closely held companies and becomes roughly equal to the RAETR on widely held companies. This suggests that a sole proprietorship (or a partnership) could be an attractive organizational form for businesses specializing in real estate investment.

Overall, the analysis in Chapter 6 shows that when capital gains constitute an important part of the return to entrepreneurship, the tax burden on sole proprietorships is generally quite high, whereas the burden on widely held companies is relatively light, with the burden on closely held companies falling somewhere in between. In most circumstances the tax system appears to favour the widely held private company as an organizational framework for starting up a new business. However, for proprietorships and partnerships specializing in real estate investment, and for closely held companies generating large capital gains to their shareholders, the effective tax burden tends to be just as low as that on widely held private companies.

Conclusions

The main findings in this report may be summed up as follows: For *going business concerns* whose owners can take out labour income as well as capital income from the firm, the average tax burden tends to be higher for sole proprietorships than for corporations when no allowance is made for the way the tax system affects the volatility of disposable income. Without any such allowance, the average tax burden on closely and widely held corporations is roughly similar for the levels of business income considered in this report (up to 2,000,000 kronor per year).

These conclusions for going business concerns are modified once one adjusts for the way the tax system affects the riskiness of after-tax income. In particular, while sole proprietors tend to pay a higher amount of tax for average levels of income above 500,000 kronor, the tax system also implies a greater reduction of the volatility of net income for this group. Further, because proprietors and qualified shareholders are subject to progressive tax on their marginal income, their after-tax income is less volatile than that accruing to the owners of widely held companies. Measured in risk-adjusted terms, proprietors and qualified shareholders appear to face a roughly similar average tax burden somewhat below the burden levied on widely held corporations.

In the case of *new start-up firms* where the reward to entrepreneurship often takes the form of a capital gain when the initial owner sells the business, proprietorships generally face a much higher tax burden than corporations regardless of whether the burden is measured in unadjusted or in risk-adjusted terms. The main reason is that proprietors are liable to social security tax as well as progressive personal labour income tax on capital gains in excess of the imputed return to equity, unless the gain stems from the sale of real estate. A start-up firm subject to the tax rules for widely held corporations faces the lowest tax burden. The unadjusted and risk-adjusted tax burdens on a start-up firm organized as a closely held corporation are somewhat higher, but still far below those on proprietorships. Thus the different treatment of capital gains appears to be an important source of tax discrimination across organizational forms.

It may seem surprising that whereas the progressivity of the labour income tax reduces the risk-adjusted tax burden on a *going concern* organized as a proprietorship, it also raises the risk-adjusted tax burden on *new firms* started up by sole proprietors. The explanation is that the relatively strong progressivity of the tax imposed on proprietors exacerbates the asymmetric tax treatment of new start-up firms: if the firm goes bankrupt, the entrepreneur must typically bear all of his loss himself, but if the firm is successful, he must share his gain with the government, and the share of the gain paid in tax is larger the stronger the progressivity of the tax system.

Finally, it should be noted that the owners of widely held companies may have better opportunities for diversifying their risk than proprietors and owners of closely held companies. Shareholders in widely held companies may therefore require a lower risk premium. To isolate the effects of the tax system, the analysis in chapters 5 and 6 nevertheless assumes the same required risk premium for

all organizational forms, but to the extent that widely held companies actually face lower costs of raising risk capital, the risk-adjusted effective tax rates estimated in chapters 5 and 6 will tend to overstate the risk-adjusted tax burden for these companies. This should be kept in mind when one evaluates the relative tax burden on alternative organizational forms.

Chapter 2

ECONOMIC CHARACTERISTICS OF ALTERNATIVE FORMS OF BUSINESS ORGANIZATION

The purpose of this report is to evaluate the tax burden on alternative forms of business organization in Sweden. As a background, this chapter provides an overview of the economic importance and characteristics of alternative organizational forms. It also discusses some evidence on the impact of taxation on the choice of legal framework for doing business.

2.1. The economic importance of alternative organizational forms

Business activity in Sweden may be carried out within one of the following organizational forms: 1) *Widely held public corporations* (noterade aktiebolag) where the shares are listed on a recognized stock exchange and where no shareholders qualify for treatment under the so-called 3:12 rules of the tax code, 2) *widely held private corporations* (onoterade aktiebolag) where no shareholders are subject to the 3:12 rules but where the shares are not listed on the stock exchange, 3) *closely held corporations* (fåmansföretag) which are unlisted and where (some of) the owners are subject to the 3:12 rules, 4) *sole proprietorships* (enskilda näringsidkare), 5) *partnerships* (handelsbolag), and 6) *economic associations* (ekonomiska föreningar).

Corporations and economic associations are separate legal entities subject to corporation tax. If the owners of an economic association have equal voting rights regardless of the size of their ownership share, and if the association is open to new members, it is considered to be a cooperative. It may then deduct distributed profits from its taxable income, implying that distributed profits are taxed only once in the hands of the owners. Other economic associations are taxed in the same way as corporations and are thus subject to double taxation, since profits are liable to corporation tax at the same time as the dividends and realized capital gains on shares in the firm are subject to personal income tax at the individual shareholder level.

Table 2.1. The economic importance of alternative forms of business organization in Sweden, 2005

Type of firm	Number of firms	Turnover (million kronor)	Wage bill (million kronor)	Number of employees[1]
Widely held public corporations (noterade aktiebolag)	339	158,377	16,663	79,725
Widely held private corporations (onoterade aktiebolag)	96,638	4,218,370	448,064	1,491,231
Closely held corporations (fåmansföretag)	190,981	1,143,356	180,418	692,719
Sole proprietorships (enskilda näringsidkare)	735,917	181,602	8,381	49,017
Partnerships (handelsbolag)	90,881	119,248	9,500	40,822
Economic associations (ekonomiska föreningar)	27,444	107,002	11,131	50,279
Total	1,142,200	5,927,956	674,159	

1. Number of persons employed. The figures have not been converted into full time equivalents.

Source: Data provided by the Swedish Ministry of Finance, taken from the FRIDA database.

The two types of widely held corporations are subject to the same corporate tax rules, but whereas the dividends and capital gains on shares in widely held listed companies are taxed at the standard 30 percent capital income tax rate under the personal income tax, dividends and gains on shares in widely held unlisted companies are taxed at a reduced rate of 25 percent. The dividends and capital gains on shares in closely held corporations with 'active' owners are subject to the special 3:12 rules that seek to prevent highly taxed labour income from being transformed into lightly taxed capital income. The tax rules for corporations are described in detail in Chapter 3.

Sole proprietorships and partnerships are not treated as independent legal persons. Instead, the income of these firms is attributed to the owners and added to their income from other sources before being subject to personal income tax. In addition, proprietors and partners are liable to social security tax on that part of their income which is deemed to be labour income. Chapter 3 explains the tax rules for sole proprietors in detail.

Table 2.1 presents indicators of the economic activity accounted for by the six alternative forms of business organization, and Table 2.2 measures the corresponding figures in percent of the totals for all organizational forms. While sole proprietorships make up almost two thirds of all firms, they only account for about 3 percent of total turnover and a little more than 1 percent of the total wage bill of all firms included in the table. Widely held private corporations are seen to be the most important organizational form in terms of economic activity, accounting for more than 70 percent of total turnover and for two thirds of the total wage bill. Closely held companies are the second most important organizational form, with around one fifth of total turnover and one fourth of total wage payments.

It should be stressed that the great majority of widely held private corporations are owned by other companies, so if economic activity were measured on a consolidated group basis, the relative importance of private corporations would be much smaller whereas that of public corporations would be much greater than shown in the tables. In particular, of all the dividends subject to personal income tax, only 3 percent were paid out by widely held private companies in 2005. This should be kept in mind when one evaluates the importance of the special tax rules for the dividends and capital gains from this type of corporation.

Table 2.2. Distribution of economic activity across alternative forms of business organization in Sweden, 2005

Type of firm	Percent of total number of firms	Percent of total turnover	Percent of total wage bill
Widely held public corporations (noterade aktiebolag)	0.03	2.7	2.5
Widely held private corporations (onoterade aktiebolag)	8.5	71.2	66.5
Closely held corporations (fåmansföretag)	16.7	19.3	26.8
Sole proprietorships (enskilda näringsidkare)	64.4	3.1	1.2
Partnerships (handelsbolag)	8.0	2.0	1.4
Economic associations (ekonomiska föreningar)	2.4	1.8	1.7
Total	100	100	100

Source: Data provided by the Swedish Ministry of Finance, taken from the FRIDA database.

2.2. Economic characteristics of alternative forms of business organization[2]

A main purpose of this report is to identify non-neutralities in the tax treatment of different forms of business organization. To understand how such non-neutralities may distort entrepreneurial choices of organizational form, one must consider the main economic characteristics of the different legal frameworks for doing business and the trade-offs involved in choosing between them. This section provides a brief discussion of these issues.

The discussion will focus on sole proprietorships, closely held private corporations ('closed corporations', for brevity), and widely held public corporations ('public corporations'). The arguments relating to sole proprietorships carry over with only slight modifications to partnerships, and since widely held private corporations are frequently owned by public corporations, our discussion of the latter organizational form is also relevant for the former one.

The crucial economic characteristic of *proprietorships* is that the functions of risk-bearing and management decision-making are performed by the same person. The proprietor's remuneration is the business income left over after all payments to other factors of production. As long as he is able to meet all his obligations, he thus carries all of the income risk associated with his business activity. The proprietor also makes all the management decisions affecting the firm's net income. Since all of the wealth effects of management decision-making are felt by the proprietor himself, there is no incentive and monitoring problem arising from conflicts of interest between the manager and the owners of the firm. Moreover, because the proprietor is working for himself, he may be more productive than if he were working for an employer. These characteristics are often seen as the main social benefits associated with proprietorships.

At the same time proprietorships tend to involve two types of social costs. First, by investing (a large part of) his wealth in a single firm, the proprietor 'puts all of his eggs in one basket'. Hence he foregoes the portfolio diversification and the resulting spreading of risk from which he might have gained if he had invested his wealth in the capital market. In this way proprietorships raise the cost of risk-bearing and probably lead to less investment in projects with uncertain returns. Second, the quality of management decisions may suffer to the extent that proprietors have to be recruited

[2] This section draws on Hagen and Sørensen (1998).

among individuals with sufficient levels of wealth and willingness to bear risks, rather than among those with the highest management skills.

Formally, the switch from the organizational form of proprietorship to that of a *closely held private corporation* involves a switch from unlimited to limited liability. Since part of the income risk is thereby shifted from equity-holders to debt-holders, the allocation of risk may be improved if debt-holders are in a better position than the firm's equity-holder(s) to diversify their risks. However, if a proprietorship is transformed into a closed corporation, the firm's debt-holders usually will not passively accept the increase in the riskiness of their claims implied by the shift to limited liability. For example, it is quite common that the shareholders of small corporations must pledge personal assets to obtain bank credit, just as a sole proprietor must typically do. In such cases the allocation of risk is improved only in so far as the switch to the corporate ownership form is associated with a splitting of the firm's equity among several shareholders. However, such a risk-sharing could also be achieved by a change from sole proprietorship to the partnership form.

Just as a shift from proprietorship to a closed corporation will hardly imply substantial improvements in risk allocation, it is also unlikely to improve the quality of management unless the transition to corporate status happens to be associated with the appointment of professional managers.

From an economic viewpoint, proprietorships and closed corporations would therefore seem to be rather similar organizational forms, since the functions of risk-bearing and decision-making are usually performed by the owners of the firm under both forms of organization. In some cases legal and practical considerations may nevertheless lead to a clear preference for one organizational form over another. For example, the fact that the legal rights and obligations of the holders of debt and equity tend to be more well-defined and regulated will sometimes be seen as an advantage of the corporate form of organization, as will the fact that this legal form may facilitate a transfer of (part of) the ownership of the firm. On the other hand, there may be cases where the owner(s) of the firm prefer the non-corporate ownership form to gain the greater flexibility implied by less regulation of rights and obligations.

The social benefits associated with the organizational form of a *widely held public corporation* derive from the potential for improved quality of decision-making through the professionalization of management and from improved spreading of risks via the public trading of shares that allows shareholders to reap the gains from portfolio diversification. However, because of the separation of management and risk-bearing functions, and since managers and shareholders may have conflicting interests, shareholders need to monitor the management to make sure that their interests are served. This may involve some costs, just as some efficiency may be lost in so far as shareholders cannot ensure that managers always seek to maximise the market value of the firm.

The balance of costs and benefits associated with the different organizational forms will differ across different sectors of the economy. In sectors where economies of scale are important, efficient production will often require complex large-scale operations, high aggregate risks and large amounts of wealth, thereby increasing the benefits that investors may obtain from portfolio diversification and from the ability to hire managers with specialized knowledge. These circumstances favour the organizational form of a public corporation, while proprietorships and closed corporations are likely to be more important in sectors that are not characterized by large economies of scale and do not require highly specialized management skills and big aggregate risks.

The balance of costs and benefits associated with different ownership structures could also change significantly over the life cycle of the individual firm. In the start-up phase the cost-benefit calculus will almost always favour the organizational form of proprietorships, partnerships or closed corporations, but when the firm is growing over time, the scale and complexity of its operations may reach a point where public corporation becomes the most attractive organizational structure.

2.3. Tax distortions to the choice of organizational form: empirical evidence

To see how the tax system interferes with the balancing of costs and benefits of alternative organizational forms, suppose a particular firm could earn a profit Y if it conducts business in noncorporate form, whereas it could earn a profit of $Y+g$ if it organized itself as a corporation. The gain from incorporation, g, could be either positive or negative, depending on the particular

characteristics of the firm at the current stage in its life cycle. In the absence of taxation, the firm would clearly choose to incorporate if $g>0$ and to stay unincorporated if $g<0$.

However, suppose the owner of a noncorporate firm is subject to a personal tax rate of t^p whereas the corporate tax system implies that a shareholder is subject to a total effective tax rate of t^c, accounting for the corporation tax plus any personal tax on dividends and capital gains. The owner will then choose to incorporate if the resulting after-tax profit $(Y+g)(1- t^c)$ exceeds the after-tax profit $Y(1- t^p)$ obtainable under the noncorporate organizational form. This will be the case if

$$\frac{g}{Y} > \frac{t^c - t^p}{1 - t^c}$$

The magnitude on the right hand side of this inequality measures the size of the tax distortion to the choice of organizational form. If it is positive, say, because the corporate tax system implies double taxation of corporate equity income, some firms with positive profits ($Y>0$) will choose not to incorporate even though the social benefits from incorporation (g) are positive. At the same time some firms with negative profits ($Y<0$) will choose the corporate organizational form for tax reasons (to take advantage of deductions for tax losses against a higher tax rate) even though they could have made greater profits in a tax-free world by staying unincorporated (that is, even though for these firms $g<0$).

According to these observations, the extent to which the choice of organizational form is distorted by the tax system depends on how the (positive or negative) net gain from incorporation (g in our notation) is distributed across firms. If this gain is close to zero for a lot of firms, that is, if the alternative organizational forms are close substitutes, we see from the inequality above that even a small tax differential between corporate and noncorporate firms ($t^c- t^p$) may induce many firms to switch to another organizational form purely for tax reasons. By contrast, one can imagine that once a firm reaches a certain stage of development, the benefits of incorporation change from being clearly negative to being significantly positive (implying that only few firms will ever be in a situation where g is close to zero). In that case tax non-neutralities will not have any major impact on the choice of organizational form.

The distribution of the non-tax benefits from incorporation (g) is not directly observable, but the (positive or negative) tax penalty on incorporation appearing on the right hand side of the inequality

above *is* in principle observable. In two empirical studies, Gordon and MacKie-Mason (1994, 1997) exploited U.S. data to estimate how the allocation of reported assets and income between corporate and noncorporate firms responded to this tax penalty. From these estimates it is possible to quantify the aggregate loss of economic efficiency generated by the non-neutral tax treatment of corporate versus noncorporate firms in the United States. Based on data for the period 1959-1986, the authors estimated the average efficiency loss to amount to 16 per cent of total business tax revenue; for the shorter period 1970-1986 the deadweight loss was estimated to be 9 per cent of revenue. From these estimates Gordon and MacKie-Mason concluded that nontax factors appear to dominate the choice of organizational form. At the same time it seems fair to conclude from these studies that tax discrimination across organizational forms implies a non-negligible deadweight loss.

Using U.S. time series data for the corporate share of the private capital stock between 1900 and 1939, Goolsbee (1998) found a roughly similar tax effect on the choice of organizational form as Gordon and MacKie-Mason. However, in a more recent article, Goolsbee (2004) argued that the earlier U.S. studies might have had problems identifying the impact of taxes on organizational form, in part because the variation in tax rates over time has been limited, and partly because tax rate changes have been associated with many other changes in the tax code that were not accounted for in the earlier studies. To allow for more variation in tax rates, Goolsbee (2004) used cross-section data for the retail trade sector in U.S. states in 1992. His study suggested that the impact of taxes on the rate of incorporation is 4-15 times as large as that found in the earlier studies referred to above.

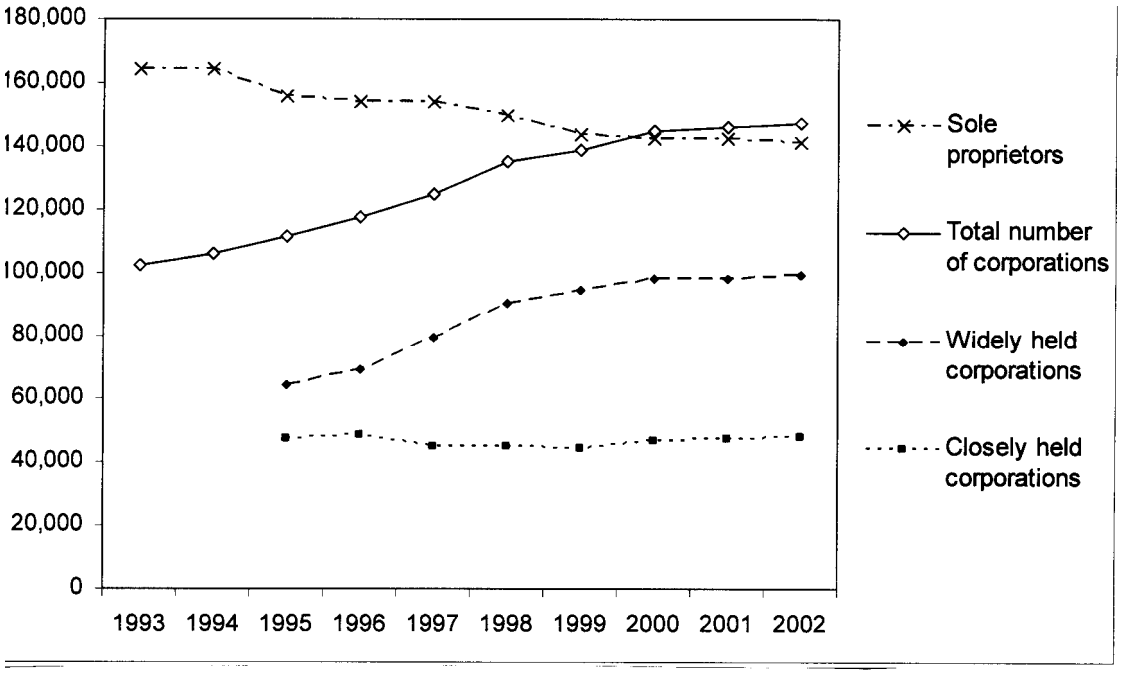
Crawford and Freedman (2008) document the recent increase in incorporation levels in the UK following the reduction of corporate tax rates. This also supports the suggestion that the impact of taxation on legal form is strong.

A recent cross-country study by de Mooij and Nicodème (2007) likewise indicates that differences in tax rates can cause substantial income shifting between the corporate and the non-corporate sector. Using data for 1997-2003 for 17 European countries, they estimate that between 12 percent and 21 percent of corporate tax revenue can be attributed to income shifting from the personal to the corporate income tax base. They find that income shifting induced by the rising gap between

personal and corporate tax rates has raised the corporate tax-to-GDP ratio by some 0.25 percentage points since the early 1990s.[3]

In another interesting recent study, Thoresen and Alstadsæter (2008) use a unique set of new panel data from Norway observing more than 100,000 owners of small businesses and their organizational form in the period from 1993 through 2003. During this period the number of owners of widely held corporations increased substantially relative to the number of owners of other forms of business, as illustrated in Figure 2.1. As the authors explain, this is exactly what one would expect, since the Norwegian dual income tax system prevailing during that period implied that owner-managers of small firms could escape the progressivity of the labour income tax by converting their firm into a widely held company.[4]

Figure 2.1. Number of owners of small businesses in various organizational forms in Norway, 1993-2003



Source: Thoresen and Alstadsæter (2008), Figure 1.

[3] Notice, however, that income shifting between the non-corporate and corporate sectors need not always take place via a change in organizational form.

[4] The tax avoidance through changes in organizational form was a main motivation for the Norwegian tax reform taking effect from 2006. Sørensen (2005) provides a description and analysis of that reform.

Specifically, Thoresen and Alstadsæter (2008) find that sole proprietors and 'active' owners of closely held companies with a high imputed labour income had a higher probability of moving into widely held corporations. They also find that business owners who shifted into another organizational form experienced higher growth of after-tax income than otherwise similar owners who did not change their organizational form. Overall, these findings suggest that Norwegian owners of small businesses have avoided taxes by finding new organizational forms for their business activities.

Since legal institutions and tax laws differ substantially across countries, the results from the foreign empirical studies mentioned above do not necessarily carry over to the Swedish context. These studies nevertheless suggest that different tax burdens on different organizational forms could also cause a loss of economic efficiency in Sweden by inducing entrepreneurs to choose a different legal framework for doing business than they would otherwise have opted for.

2.4. Summary

Measured by the number of firms, the sole proprietorship is the most common legal framework for doing business in Sweden, followed by the closely held corporation subject to the 3:12 tax rules for owner-managed companies. In terms of turnover and wage bill, the widely held private corporation is the dominant organizational form, but this type of firm is typically owned by other companies, including public corporations. Among firms with individual personal owners, the closely held corporation is therefore the most important organizational form measured by turnover, wage bill and number of employees.

Proprietorships, partnerships and closed corporations share some common economic characteristics. In these firms the functions of risk-bearing and management decision-making are typically performed by the owner(s) who therefore bear all of the economic consequences of their decisions. The social benefit of this way of organizing a business is that entrepreneurs have the strongest possible incentive to make the 'right' decisions that maximise their wealth. On the other hand, since they typically have to invest most if not all of their wealth in a single firm, the owners of proprietorships and closed corporations cannot spread their risks by diversifying their portfolios.

This tends to increase their cost of risk-bearing and may lead to too little investment in risky projects from society's point of view. Moreover, the quality of management decisions may suffer to the extent that the owners of these firms have to be recruited among individuals with sufficient levels of wealth and willingness to bear risks, rather than among those with the highest management skills.

The social benefits associated with the organizational form of a widely held public corporation derive from the potential for improved quality of decision-making through the professionalization of management and from improved spreading of risks via the public trading of shares that allows shareholders to reap the gains from portfolio diversification. However, because of the separation of management and risk-bearing functions, and since managers and shareholders may have conflicting interests, shareholders need to monitor the management, and some efficiency may be lost in so far as shareholders cannot ensure that managers always seek to maximise the value of the firm.

By shifting from a proprietorship to a closed corporation, thus moving from unlimited to limited liability, an entrepreneur may in principle reduce his risk, but in practice the firm's creditors will typically require the owner to pledge personal assets as he shifts to limited liability. Depending on the specific circumstances of the firm and its owners, the differences in the legal characteristics of proprietorships and corporations may nevertheless imply that the individual entrepreneur has a clear preference for one organizational form over the other.

The balance of costs and benefits associated with the different organizational forms will differ across different sectors and often changes significantly over the life cycle of the individual firm. In the start-up phase the cost-benefit calculus will almost always favour the organizational form of proprietorships, partnerships or closed corporations, but when the firm is growing over time, the scale and complexity of its operations may reach a point where the widely held private or public corporation becomes the most attractive organizational structure.

Differences in the effective tax burden on the different organizational forms may cause a loss of economic efficiency by inducing entrepreneurs to organize their firms in a different way than they would have done in the absence of tax. There is ample empirical evidence from other countries

(including Norway) that non-neutralities in the tax system tend to distort the choice of organizational form, sometimes significantly so.

Chapter 3
THE CURRENT RULES FOR TAXATION OF BUSINESS INCOME

3.1. Definition of alternative organizational forms

This chapter lays the foundation for the analysis in the subsequent chapters by outlining the rules for the taxation of alternative forms of business organization in Sweden as of 2007. In line with the mandate for the report, the chapter focuses on the following organizational forms: 1) *Widely held public corporations* where the shares are listed on a recognized stock exchange and where no shareholders qualify for treatment under the so-called 3:12 rules, 2) *widely held private corporations* where no shareholders are subject to the 3:12 rules but where the shares are not listed on the stock exchange, 3) *closely held corporations* which are unlisted and where (some of) the owners are subject to the 3:12 rules, and 4) *sole proprietorships*.

3.2. The taxation of income from widely held public corporations

Widely held public corporations are subject to a classical corporate tax regime. At first, the taxable profits of the company are subject to the corporate income tax rate of 28 percent. When the after-tax profit is distributed as a dividend to an individual shareholder liable to Swedish personal income tax, the dividend is taxed as capital income at the capital income tax rate of 30 percent. Furthermore, when a personal shareholder realizes a capital gain by selling his share, the full nominal gain is also taxed as capital income at 30 percent, regardless of the length of the holding period.

A realized capital loss on a listed share may be deducted against gains on other listed or unlisted shares realized during the same year. If a net loss remains, the shareholder may deduct 70 percent of the remaining loss against any other capital income. If total net capital income calculated in this way becomes negative, the taxpayer is entitled to a tax credit equal to the 30 percent capital income

tax rate times the deficit recorded on his capital income tax account, provided the deficit does not exceed 100,000 kronor. If the deficit on the taxpayer's capital income tax account exceeds 100,000 kronor, he is only entitled to a tax credit of 0.7x30 percent of the excess amount, so in this case only 0.7x70 percent = 49 percent of the marginal loss is deductible.

As a consequence of the double taxation of distributed profits, the total corporate and personal tax burden on a krona of dividends is 28 percent + (1-0.28) x 30 percent = 49.6 percent. The effective tax burden on income accruing to the shareholder as a capital gain will be lower than this percentage to the extent that he defers his personal tax liability by postponing the realization of the gain.[5]

3.3. The taxation of income from widely held private corporations

The taxable profits of widely held private (i.e. unlisted) corporations are subject to the 28 percent corporate income tax rate.

Individual holders of shares in unlisted corporations were previously allowed to deduct an imputed return on the basis value of their shares from their taxable dividends, but this rule was abolished in 2006. At the same time the personal tax rate on dividends and realized capital gains on shares in widely held private corporations was reduced from the ordinary 30 percent capital income tax rate to 25 percent.

If a shareholder realizes a capital loss on an unlisted share, he may deduct 5/6 of the loss against realized gains on other listed or unlisted shares. 70 percent of any remaining net loss may be deducted against other capital income. If capital income calculated in this way becomes negative, the taxpayer is entitled to a tax credit equal to the 30 percent capital income tax rate times the deficit recorded on his capital income tax account, provided the deficit does not exceed 100,000 kronor. In this situation the taxpayer may thus effectively deduct (5/6)x70 percent = 58.3 percent of his marginal capital loss. If the deficit on the taxpayer's capital income tax account exceeds 100,000

[5] Appendix 4.2 provides a formula for the effective tax rate on accrued capital gains, accounting for the benefit from tax deferral.

kronor, he is only entitled to a tax credit of 0.7x30 percent of the excess amount, so in this case only (5/6)x0.7x70 percent = 40.8 percent of the marginal loss is deductible.

These rules imply that the total corporate and personal tax burden on a krona of dividends distributed from a widely held private corporation is 28 percent + (1-0.28) x 25 percent = 46 percent. Again, the effective tax burden on income accruing as a capital gain will be lower than this percentage to the extent that the shareholder defers the realization of the gain.

3.4. The taxation of income from closely held corporations (the 3:12 rules)

Holders of shares in closely held corporations often take active part in the management of the company. If these active shareholders (possibly together with closely related persons) hold a controlling share in the company, they may be able to determine whether their income from the company takes the form of labour income (say, management salaries) or capital income (dividends and capital gains on shares). For individuals subject to the Swedish central government income tax, the total marginal tax burden on labour income exceeds the combined corporate and capital income tax on dividends and realized capital gains on shares. Active shareholders in closely held corporations therefore have a tax incentive to transform labour income into dividends or capital gains when their labour income exceeds the threshold triggering central government income tax.

The purpose of the so-called 3:12 rules is to prevent such income shifting. The 3:12 rules apply to the owners of so-called qualified shares (kvalificerade andelar) in companies with few owners (fåmansföretag).

As a main rule, a company is considered to have few owners if more than 50 percent of the voting shares in the company are controlled by at most four shareholders. However, if the number of shareholders controlling more than 50 percent of the votes exceeds four, a company is still considered to have few owners if (some of) the owners or their close relatives have been active to a significant degree in the company itself or in another company with few owners that it controls.

This rule is intended to ensure that corporations with many owners who all work in the company become subject to the 3:12 rules.[6]

To be deemed a qualified shareholder in a company with few owners, the shareholder must be active in the company to a significant degree so that his activity has a significant influence on the income generated by the company. The tax code does not provide a more precise definition of the concept of an 'active' shareholder, but Swedish case law has established certain guidelines for the delineation of active shareholders.

When the holder of a qualified share receives a dividend from the company, the 3:12 rules require that the dividend be split into a capital income component and a labour income component. Dividends below the limit for the so-called normal dividend (normalutdelning) are taxed as capital income, but at a reduced rate of 20 percent,[7] while dividends exceeding the 'normal' level are taxed as labour income. If the limit for the normal dividend exceeds the actual dividend, the difference – which will be referred to as the Unutilized Distribution Potential (UDP)[8] – may be carried forward with interest and utilized in a later year.

The limit for the normal dividend is calculated as the sum of the following three components: 1) An imputed return on the purchase price of the share, 2) The sum of all UDP amounts from previous years, carried forward with interest, and 3) An additional amount based on the company's wage bill, henceforth termed the Wage-Based Allowance (WBA).

The rate of return imputed to the purchase price of the share (component 1 above) equals the average interest rate on long-term government bonds (statslåneräntan) plus a deemed risk premium of nine percentage points. In 2007, the imputed rate of return was 12.54 percent. By contrast, the interest rate at which UDP amounts are carried forward (uppräkningsräntan) is set equal to the government bond rate with the addition of three percentage points, amounting to 6.54 percent in 2007.

[6] The rules for taxation of dividends and capital gains on shares in closely held corporations are popularly referred to as the "3:12 rules" since they were previously incorporated in paragraph 3:12 in the Swedish state income tax code.
[7] Technically the reduction in the effective tax rate is implemented by including only 2/3 of the dividend in the capital income tax base subject to the ordinary 30 percent tax rate.
[8] In Swedish the UDP is sometimes referred to as "sparat utdelningsutrymme" or "sparat gränsbelopp".

The total WBA available to the company's qualified shareholders equals 25 percent of the company's total wage bill plus 25 percent of that part of the wage bill which exceeds 2,670,000 kronor (60 inkomstbasbelopp, 2006 level). The base for the calculation of the WBA is the cash wage bill recorded during the previous tax year, including the wages and salaries of the company's qualified shareholders. The WBA of the individual qualified shareholder equals his ownership share in the company multiplied by the total WBA. The WBA is granted only if, in the year before the tax year, the qualified shareholder received a wage from the company exceeding the minimum of 667,500 kronor (15 inkomstbasbelopp, 2006 level) and the sum of 267,000 kronor and 5 percent of the wage bill.

A numerical example may illustrate these rules for calculating the limit for the normal dividend. Consider a qualified shareholder who has acquired his share at a price of 1,000,000 kronor. Suppose that the shareholder's accumulated UDP amount was 100,000 kronor at the end of the previous year; that the company's total wage bill is 3,000,000 kronor; that the shareholder owns half of the shares in the company, and that his wage or salary income from the company exceeds the limit qualifying for the WBA. His normal dividend for the current year (2007) is then calculated as follows:

1. Imputed return on the acquisition price of shares: 0.1254 x 1,000,000 = 125,400 kronor
2. UDP carried forward from previous years: (1+0.0654) x 100,000 = 106,540 kronor
3. WBA: 0.5 x [0.25 x 3,000,000 + 0.25 x (3,000,000 – 2,670,000)] = 416,250 kronor
4. Normal dividend: 1. + 2. + 3. = 648,190 kronor

In the above example, any current dividend income below 648,190 kronor will be taxed as capital income at the reduced rate of 20 percent, while dividends above this limit will be taxed progressively as labour income. If the current dividend received by the shareholder is, say, 500,000 kronor, his UDP for the current year will be 648,190 – 500,000 = 148,190 kronor which will be carried forward with interest to the following year.

The rules described above imply that the total corporate and personal tax burden on distributed profits below the limit for the normal dividend is 28 percent + (1-0.28) x 20 percent = 42.4 percent.

As an alternative to the above rules for calculating the amount of dividend income subject to the reduced capital income tax rate of 20 percent, a qualified shareholder can opt for a simplified scheme under which any dividend up to a limit given by the UDP plus 89,000 kronor (2 inkomstbasbelopp, 2006 level) is always taxed at 20 percent, while dividends in excess of this limit are taxed as labour income.

When a shareholder realizes a capital gain on a qualified share, the gain is taxed as capital income at a reduced rate of 20 percent in so far as it does not exceed the shareholder's accumulated UDP. After 2009 gains above this limit will be taxed progressively as labour income, but during the period 2007-2009 only half of the gain in excess of the total UDP will be taxed as labour income, whereas the other half will be taxed as capital income at the standard 30 percent rate.

The maximum annual amount of capital gain that can be taxed as labour income during a six-year period is 100 inkomstbasbelopp, amounting to 4,590,000 kronor in 2007. If the excess of the capital gain over the UDP is larger than this limit, the remaining gain is taxed as capital income at the standard 30 percent capital income tax rate.

If a shareholder realizes a capital loss on a qualified share, he may deduct 2/3 of the loss against realized gains on other listed or unlisted shares. 70 percent of any remaining net loss may be deducted against other capital income. If capital income calculated in this way becomes negative, the taxpayer is entitled to a tax credit equal to the 30 percent capital income tax rate times the deficit recorded on his capital income tax account, provided the deficit does not exceed 100,000 kronor. In this case the taxpayer may thus effectively deduct (2/3)x70 percent = 46.7 percent of his marginal capital loss. If the deficit on the taxpayer’s capital income tax account exceeds 100,000 kronor, he is only entitled to a tax credit of 0.7x30 percent of the excess amount, so in this case only (2/3)x0.7x70 percent = 32.7 percent of the marginal loss is deductible.

3.5. The taxation of sole proprietors

The business income earned by sole proprietors is subject to social security tax and personal income tax. However, sole proprietors may opt to have income retained in the business taxed at the

corporate income tax rate. They may also opt to have the income withdrawn from their business split into a capital income component and a labour income component. If a proprietor does not choose any of these options, all of his business income will be subject to social security tax, and all of the remaining amount will be taxed progressively as labour income.

The optional rule for allocation of retained business income to a so-called expansion fund (expansionsfond) is intended to ensure a neutral tax treatment of retained profits across incorporated and unincorporated firms. When a proprietor adds to the equity of his business by retaining profits, he may add a corresponding amount to the expansion fund in the firm's tax accounts. The addition to the expansion fund will then be taxed at the 28 percent corporate tax rate and will be deductible from the amount of business income subject to social security tax and personal income tax. The allocation to the expansion fund in any given year cannot exceed the taxable business income for that year, and the accumulated after-tax allocation to the expansion fund cannot exceed the firm's net equity.[9] When the proprietor withdraws income from the expansion fund, the pre-tax amount withdrawn is added to his personal income tax base for that year, and a credit equal to the 28 percent tax already paid on that income is granted against his personal income tax bill.

The income withdrawn from the business in any given year equals that year's total business income minus that year's addition (positive or negative) to the expansion fund. Under the optional rules for so-called positive interest allocation (positiv räntefördelning), the income withdrawn from the business is split into capital income and labour income. The capital income component is calculated as an imputed return to an asset base recorded at the end of the previous year and defined as business assets minus the sum of business debt and the accumulated after-tax allocation to the expansion fund. By taking advantage of allocations to the expansion fund, the proprietor thus reduces the fraction of business income that may be taxed as capital income. The imputed rate of return equals the average interest rate on long-term government bonds (statslåneräntan) plus a deemed risk premium of 5 percentage points, amounting to an imputed return of 8.54 percent in 2007. The imputed return is taxed at the ordinary 30 percent capital income tax rate. Any withdrawn income exceeding the imputed return is subject to social security tax and the progressive personal tax on labour income.

[9] Given the 28 percent tax rate applied to allocations to the expansion fund, this means that the accumulated pre-tax allocation to the fund cannot exceed 1/(1-0.28) = 1.3889 times the firm's net equity.

If the income withdrawn from the business is smaller than the imputed return, the difference (the Unutilized Distribution Potential, UDP) is carried forward and added to the amount of income that may be taxed as capital income during the following year. Further, the UDP is added to the asset base for calculating the imputed return for the following year. In this way the UDP amounts are effectively carried forward with an interest rate equal to the imputed rate of return.[10]

For administrative reasons, the rules for positive interest allocation may be applied only when the proprietor's net asset base exceeds 50,000 kronor.

While the rules for positive interest allocation are optional, the application of the rules for so-called negative interest allocation (negativ ränteFördelning) are mandatory whenever the proprietor's recorded net business equity (business assets minus business liabilities) falls below minus 50,000 kronor. A negative asset base below this limit is taken to indicate that the proprietor has shifted non-business debt into the business sphere to exploit the fact that interest on business debt is deductible against taxable business income which may be subject to progressive taxation at the margin. In this case an imputed interest on the negative net equity base is added to taxable business income, and a corresponding amount is deducted from the proprietor's 'private' capital income tax base. The imputed interest rate equals the interest rate on long-term government bonds plus 1 percentage point. In principle, negative interest allocation thus prevents the proprietor from transforming heavily taxed labour income into lightly taxed capital income.

When a proprietor realizes a capital gain on a business asset, the gain is in general taxed as ordinary business income.[11] This rule also applies when the proprietor goes out of business by selling his firm or liquidating its assets. In this case any amounts accumulated in the firm's expansion fund are treated as income withdrawn from the business and taxed accordingly. If a proprietor realizes a capital loss at the time he goes out of business, he may deduct 70 percent of the loss against his taxable capital income.

[10] This is in contrast to the 3:12 rules under which the UDP is carried forward with an interest rate that differs from the imputed rate of return (see section 3.4).
[11] As a main rule, the taxable capital gain is calculated as the sales price minus the written-down value of the asset in the firm's tax accounts.

While these rules for the tax treatment of capital gains and losses on business assets apply in the general case, there are special rules for gains and losses on real estate used for business purposes (näringsfastighet). When a gain on such an asset is realized, it is considered to be capital income, but only 90 percent of the gain is included in the capital income tax base, so the effective tax rate on the (nominal) gain is 0.9 x 30 percent = 27 percent. When a loss on business real estate is realized, 63 percent of the loss may be deducted from the proprietor's capital income tax base. At the time of realization, any previous depreciation for tax purposes in excess of the actual decline in the value of the asset must be added to the proprietor's ordinary business income and taxed as such; at the same time a corresponding amount is deducted from the taxable capital gain.

With a few exceptions relating to the calculation of taxable capital gains, the above tax rules for sole proprietors also apply to partnerships (handelsbolag).

3.6. The treatment of business losses

As a main rule for all organizational forms, business losses may be carried forward indefinitely (although without interest) and deducted against future income from the same business.

In general, business losses are not deductible against other income during the same year. However, during the first five years after having started up his business, a sole proprietor may deduct business losses up to a maximum of 100,000 kronor per year against income from another business or against his labour income during the same year. Losses above this limit can be carried forward and deducted against future income from the same business.

When a sole proprietor records a business loss during the year he goes out of business, he may deduct 70 percent of the loss against his taxable capital income during the following two years.

3.7. Facilities for income averaging

As a means of smoothing their taxable profits over time, incorporated firms may allocate up to 25 percent of their annual profit to a so-called periodisation fund free of tax. Any amounts set aside must be added back to taxable profits no later than six years after they have been deducted. Moreover, for incorporated firms the amounts allocated to the periodisation fund are carried forward with an (after-tax) interest rate equal to 72 percent of the ten-year government bond rate, so for these firms the periodisation funds involve no tax credit.

Sole proprietors may set aside up to 30 percent of their business income (before allocation to the expansion fund) in a periodisation fund. Again, these funds must be added back to taxable profit no later than six years after they have been deducted, but no interest rate is added, so for sole proprietors the periodisation funds do imply a tax credit that reduces their effective tax rate in present value terms.

3.8. The taxation of earned income

For shareholders subject to the 3:12 rules and for sole proprietors, distributed profits (and realized capital gains on shares) above the limit deemed to be capital income are subject to the progressive personal labour income tax. Sole proprietors must also pay a 30.71 percent social security contribution (egenavgift) on distributed business profits in excess of their capital income. For wage income the social security contribution rate (arbetsgivaravgift) is 32.42 percent.

The 2007 rules for the taxation of labour income are described in detail in Appendix 3.1. The first column in Table 3.1 summarises the effective marginal personal tax rates at different income levels under the current personal tax schedule, and the second column states the total marginal effective tax rates when the social security tax applying to wage income is also accounted for. The numbers shown are based on the local government income tax rate in an average municipality.

As explained in more detail in Appendix 3.1, Swedish taxpayers earn additional social security rights when they raise their labour income, as long as their income after deduction for social

security contributions does not exceed a maximum limit of about 370,400 kronor (8.07 inkomstbasbelopp, 2007 level). When income rises above this level, the taxpayer earns no additional social security entitlements. As a rough approximation, the calculations in this report therefore assume that the element of genuine tax in the social security contributions is zero for incomes below 370,400 kronor, whereas incomes above this level face the full social security tax rate of 32.42 percent (30.71 percent for income from self-employment) at the margin. This explains why Table 3.1 records a jump in the effective marginal tax rate at an (assessed) income level of 370,400 kronor. Under Swedish tax law, the taxpayer's assessed income (taxerad inkomst) is defined as his income after deduction for the social security contribution, while the 'gross income' recorded in Table 3.1 measures income before deduction for social security contribution (the employer's total labour cost). Note that all tax rates in the table are measured in percent of gross income.

Table 3.1. Effective marginal tax rates in the Swedish tax schedule for wage income, 2007

Income[1]		Effective personal marginal tax rate (%)[4]	Effective marginal tax rate including social security tax (%)[5]
Gross income[2]	Assessed income (taxerad inkomst)[3]		
0 - 42,100	0 – 31,800	0	0
42,100 – 145,100	31,800 – 109,600	19.1	19.1
145,100 – 435,100	109,600 – 328,600	23.9	23.9
435,100 – 490,500	328,600 – 370,400	39.0	39.0
490,500 – 647,000	370,400 – 488,600	39.0	63.5
647,000 -	488,600 -	42.7	67.2

1. Figures are rounded to the nearest 100 kronor.
2. Income before deduction for social security contribution.
3. Income after deduction for social security contribution. The relationship between assessed income (Y^A) and gross income (Y^G) is $Y^G = (1+s)\ Y^A$, where s is the tax-exclusive social security contribution rate which is 32.42 percent in 2007. The corresponding tax-inclusive social security contribution rate is 32.42/(1+0.3242) = 24.48 percent.
4. Based on the average local government income tax rate of 31.6 percent of assessed income. The tax rates are expressed in percent of gross income.
5. Tax rates measured in percent of gross income. The marginal effective social security tax rate is assumed to be zero for gross income levels below 490,500 kronor and 24.48 percent (tax-inclusive rate) for incomes above that level.

Source: Own calculations based on Beräkningskonventioner 2007. En rapport från Skatteekonomiska enheten på Finansdepartementet.

For active shareholders in closely held corporations the tax schedule in Table 3.1 implies an incentive to withdraw income from the company in the form of wages or salaries rather than dividends or capital gains as long as the total amount of gross income withdrawn does not exceed 490,500 kronor, since the total marginal tax rate on labour income is less than or equal to 39.0 percent up to this level, whereas section 3.4 showed that the total corporate and personal tax burden on 'normal' dividends is 42.4 percent. Active shareholders wishing to withdraw more than 490,500 kronor (before tax) will want to withdraw the exceeding amount as dividend income, up to the limit given by the normal dividend. The reason is that gross labour income above 490,500 kronor is taxed at a marginal rate of at least 63.5 percent (see Table 3.1), compared to the 42.4 percent total tax on normal dividends. If the active shareholder wishes to withdraw a gross income exceeding 490,500 plus the normal dividend, the excess amount will be subject to a total marginal effective tax rate of 63.4 percent if it takes the form of wage income, whereas the combined corporate and personal marginal tax burden will be 65.2 percent if it takes the form of dividend income, since dividends in excess of the normal dividend are subject to progressive personal labour income tax under the 3:12 rules.[12] For taxpayers in the top bracket of the personal income tax schedule, the effective marginal tax rate on wage income is 67.2 percent, compared to a total effective marginal tax rate of 68.8 percent on dividends above the normal dividend. An active shareholder wishing to withdraw a gross income exceeding 490,500 kronor plus the normal dividend will therefore want to do so in the form of wages.

Given these tax incentives, a controlling active shareholder subject to the 3:12 rules who optimises the company's distribution policy with the purpose of minimising the total average tax rate on income withdrawn from the company will face the tax schedule for distributed income summarised in Table 3.2, where *N* denotes the normal dividend which will vary from one shareholder and company to another. Note that since the business income underlying dividends is subject to the 28 percent corporate income tax rate, the amount of gross (pre-tax) business income corresponding to the normal dividend is equal to $N/(1-0.28) = N/0.72$, as stated in the first column of Table 3.2.

[12] When the qualified shareholder has already withdrawn a gross income of 490,500 kronor in the form of wage income, his assessed income will exceed 370,400 kronor (see Table 3.1) in which case he will face a marginal tax rate of 51.6 percent on any dividend income in excess of the normal dividend (see Table A.3.1 in Appendix 3.1). With a 28 percent corporate income tax rate, the combined corporate and personal marginal tax rate on the excess dividend will therefore be 28 + (1-0.28)x51.6 = 65.2 percent. For taxpayers in the top tax bracket (with an assessed income above 488,600 kronor) where the marginal personal tax rate on assessed income is 56.6 percent, the total marginal effective tax rate on dividends above the normal dividend is 28 + (1-0.28)x56.6 = 68.8 percent.

Table 3.2. Tax schedule for qualified shareholders who optimise the company's distribution policy (2007 tax rules)

Income withdrawn from the company		Effective marginal tax rate (%)[3]
Gross business income[1]	Assessed personal income[2]	
0 – 42,100	0- 31,800	0
42,100 – 145,100	31,800 – 109,600	19.1
145,100 – 435,100	109,600 – 328,600	23.9
435,100 – 490,500	328,600 – 370,400	39.0
490,500 – $490{,}500+\frac{N}{0.72}$	370,400 – 370,400+N	42.4
$490{,}500+\frac{N}{0.72}$ – $647{,}000+\frac{N}{0.72}$	370,400+N – 488,600+N	63.5
$647{,}000+\frac{N}{0.72}$ –	488,600+N –	67.2

N = normal dividend
1. Income before deduction for social security contribution and corporate income tax.
2. Income after deduction for social security contribution and corporate income tax.
3. Including corporate income tax, social security tax and personal income tax.

Source: Numbers based on table 3.1, assuming the controlling active shareholder(s) subject to the 3:12 rules follow a tax-minimising distribution policy.

Because they pay a slightly lower social security contribution, the total effective marginal tax rates on the earned income of sole proprietors are a bit different from those stated in Table 3.1. Sole proprietors may opt to take advantage of the rules for positive interest allocation described in section 3.5, or they may choose to have all of the income withdrawn from the business taxed as labour income. Since the effective marginal tax rate on gross labour income below 429,500 is lower than the flat 30 percent capital income tax rate, a proprietor with a total business income below this level will have no tax incentive to opt for interest allocation. When the proprietor's income exceeds 429,500 kronor, a tax-minimising proprietor will opt for positive interest allocation, since he can thereby ensure that income up to the limit of 429,500 + N kronor (where N is the amount of positive interest allocation) gets taxed at a marginal rate of 30 percent rather than the effective marginal rate of 39 percent applying to labour income above 429,500 kronor.

Given the effective marginal personal tax rates on assessed income stated in Table A.3.3 in Appendix 3.1 and the tax-exclusive social security contribution rate of 30.71 percent,[13] a proprietor following a tax-minimising strategy will therefore face the effective tax rate schedule summarised in Table 3.3 on income withdrawn from his firm.

Table 3.3. Tax schedule for sole proprietors making optimal use of the option for positive interest allocation (2007 tax rules)

Income withdrawn from the firm		Effective marginal tax rate (%)[3]
Gross business income[1]	Assessed personal income[2]	
0 – 41,600	0- 31,800	0
41,600 – 143,300	31,800 – 109,600	19.4
143,300 – 429,500	109,600 – 328,600	24.2
429,500 – 429,500+ *N*	328,600 – 328,600+ *N*	30.0
429,500+ *N* – 484,100+ *N*	328,600+ *N* – 370,400+*N*	39.5
484,100+ *N* – 638,600+ *N*	370,400+*N* – 488,600+*N*	63.0
638,600+ *N* –	488,600+*N* –	66.8

N = amount of positive interest allocation (positive räntefördelning).
1. Income before deduction for social security contribution.
2. Income after deduction for social security contribution.
3. Including social security tax and personal income tax. The tax rates are expressed in percent of gross income. The tax-exclusive social security contribution rate (egenavgift) is 30.71 percent, while the tax-inclusive rate is 30.71/(1+0.3071) = 23.5 percent.

Source: Numbers based on table A.3.3, assuming the proprietor follows a tax-minimising distribution policy.

3.9. Summary of the 2007 tax rules

Table 3.4 provides a brief summary of the key tax parameters for the four different forms of business organization. The notation 'm' indicates the marginal effective tax rate on labour income which varies with the amount of income earned. For holders of qualified shares in closely held corporations, the notation '20/m' indicates that dividends and capital gains up to the 'normal' return

[13] In 2007, sole proprietors are entitled to a temporary 2.5 percentage point reduction in their rate of social security contribution (up to a cap of 4,500 kronor), but this reduction has been abolished from 2008 and hence will not be included in the calculations in this report.

are taxed at a 20 percent rate, whereas dividends and capital gains above that level are taxed as labour income. Similarly, for proprietors the notation '30/m' signifies that income withdrawn from the business is taxed at 30 percent up to the limit given by the sum of the imputed normal return and UDPs carried over from previous years, while income above this limit is taxed as labour income.

Table 3.4. Some key parameters in the Swedish system of business income taxation, 2007 (percent)

	Widely held public corporations[1]	Widely held private corporations[2]	Closely held private corporations[3]	Sole proprietorships
Corporate income tax rate	28	28	28	n.a.
Tax rate on allocations to expansion fund	n.a.	n.a.	n.a.	28
Personal tax rate on distributed profits	30	25	20[4]/m	30[5]/m
Personal tax rate on realized capital gains on shares	30	25	20[4]/m[6]	n.a.
Imputed rate of return for qualified shareholders	n.a.	n.a.	12.54	n.a.
Interest rate used in the carry-forward of UDPs[7]	n.a.	n.a.	6.54	8.54
Wage-based addition to normal dividend (% of wage bill)	n.a.	n.a.	25[8]	n.a.
Imputed rate of return for sole proprietors (positive interest allocation)	n.a.	n.a.	n.a.	8.54
Imputed rate of return for sole proprietors (negative interest allocation)	n.a.	n.a.	n.a.	4.54

n.a. = not applicable.
m = marginal effective tax rate on labour income.
1. Listed companies.
2. Unlisted companies.
3. Companies with (some) shareholders subject to the 3:12 rules.
4. Tax rate on 'normal' return.
5. Tax rate on positive interest allocation.
6. In 2007-2009, half of the gain will be taxed as capital income at a rate of 30 percent.
7. Upräkningsränta.
8. Applies for wage bills up to 2,670,000 kronor. Wage bills above this limit generate a further 25 percent addition to the WBA.

Chapter 4

EFFECTIVE TAX RATES ON BUSINESS INCOME

To provide a first impression of the absolute and relative magnitude of the tax burden on the different forms of business organization, this chapter presents estimates of average and marginal effective tax rates on business income in Sweden, accounting for all taxes collected at the level of individual investors as well as at the firm level. The calculation of marginal effective tax rates is based on a widely used method developed by King and Fullerton (1984), while the estimation of average effective tax rates builds on a simple conceptual framework laid out in Appendix 4.1. The King-Fullerton methodology allows a quantification of the tax burden on a 'marginal' investment that only yields the investor's minimum required rate of return, whereas the average effective tax rate measures the total tax burden on the income from all the activities of a firm, including those with a yield above the minimum required return. As the chapter will explain, it may be particularly important to consider the average effective tax rate to understand how the tax system affects the choice between alternative organizational forms.

One limitation of the King-Fullerton methodology is that it does not explicitly allow for risk. It thus abstracts from the fact that investors may require different risk premia on different types of investment. To highlight how the tax system may affect the trade-off between risk and return, one must use an analytical framework that explicitly accounts for the uncertainty and different degrees of volatility attached to alternative streams of business income. Such a framework will be presented in Chapter 5 in this report.

Another limitation is that the King-Fullerton method generally assumes that firms and taxpayers can take full advantage of all available deductions from the tax base. In practice this is not always the case. In particular, relatively young firms may often have to run a sequence of losses before they start making profits, and during this start-up phase where the risk of bankruptcy may be high, they may be hampered by limitations on loss offsets. Chapter 6 presents a framework designed explicitly to illustrate the impact of taxation on the expected profitability of starting up new firms, whereas the estimated effective tax rates presented in the present chapter are best thought of as applying to well-established going business concerns.

Despite these limitations, the extended King-Fullerton framework applied in this chapter is a useful tool for evaluating the effect of different parameters of the tax code for the effective tax burden on alternative investments. For example, the framework is well suited to highlight non-neutralities in the tax treatment of different modes of investment finance. Since this report focuses in particular on non-neutralities in the taxation of different organizational forms, it abstracts from distortions that may arise due to differences between taxable business income and the 'true' business income recorded under appropriate accounting rules for the valuation of business assets and liabilities. This means that non-neutralities due to different tax treatments of different assets are not taken into account. In general this should not imply any bias in the comparison of the tax burden on different organizational forms, since the rules for the calculation of taxable business income normally do not depend on the legal form used by the business.[14]

The next section explains the concepts of the marginal and average effective tax rates on business income and discusses how they are likely to affect business behaviour, including the choice of organizational form. The subsequent sections then present the estimated effective tax rates and illustrate their sensitivity to various important parameters of the tax code. The final section of the chapter provides a summary of the main findings.

4.1. The average and the marginal effective tax rate

There are two key notions of effective tax rate, focused on different aspects of business decisions:

● The **average effective tax rate** (AETR) is the ratio of the present value of the taxes that will be paid on the income from a firm to the present value of the pre-tax profit it will generate;

● The **marginal effective tax rate** (METR) is the proportionate difference between the pre-tax return on an investment project that just yields the investor's required after-tax rate of return and that required return itself.

[14] One exception to this rule is the special treatment of capital gains on business real estate realized by a sole proprietor. The impact of this rule on the effective tax burden will be analysed in Chapter 6.

The AETR measures how much of the income from a project or a firm that will be paid in tax, assuming some given pre-tax rate of return. The METR measures the tax burden on a project with a pre-tax return which is so low that it is only barely worth undertaking. To calculate the METR, one thus needs to estimate the firm's **cost of capital**, defined as the minimum real pre-tax return an investment must yield in order to generate the real after-tax rate of return required by investors.

Both the AETR and the METR on the different types of business organization will influence the choice of organizational form, since firms will tend to choose the legal form that offers the highest total after-tax profit from their activity. Since the METR represents the tax burden on a marginal investment project that is just barely profitable, it determines the optimal scale of investment within any given organizational form. Once the optimal scale of activity is known, investors can calculate the total amount of pre-tax profit obtainable on a business activity carried out within a certain organizational form. On the basis of the AETR which determines the total tax burden on that profit, entrepreneurs can then estimate which organizational form will yield the highest total after-tax profit.

The choice of organizational form will thus depend on the METR as well as the AETR. In practice, a change in the tax schedule that changes the METR will usually also affect the AETR, and vice versa. However, to understand the separate roles of the two tax rate measures, it is useful to ask what will happen if one of them is changed while the other one is kept constant.[15] This question is addressed in Appendix 4.1 which shows that for any given METR, a higher AETR on the profits obtainable within a particular organizational form will always discourage the use of that legal form. The explanation is straightforward: when the METR is unchanged, the firm's optimal level of investment and hence its total pre-tax profit is also unchanged, so when the AETR on a particular business form goes up, the total after-tax profit obtainable under that form must necessarily fall.

However, when the AETR is kept constant, a rise in the METR has an ambiguous impact on a firm's total after-tax profit, when economic profits are measured in the appropriate way as profits net of the non-deductible cost of equity finance. The reason is that the fall in the firm's investment caused by the rise in the METR has two offsetting effects on economic profits. On the one hand the fall in the capital stock reduces the firm's after-tax earnings by reducing its level of output and

[15] As Appendix 4.1 explains, under a non-proportional tax schedule it is in fact possible to change the METR without changing the AETR, and vice versa.

sales. On the other hand the fall in investment also reduces the firm's total financing costs. The analysis in Appendix 4.1 shows that these two effects will exactly offset each other if the METR equals the AETR initially, that is, if the tax schedule is purely proportional at the outset. If the METR is initially higher (lower) than the AETR, as will be the case under a progressive (regressive) tax schedule, the net effect of the rise in the METR will be to reduce (increase) the firm's total after-tax profit, thus discouraging (encouraging) the use of the organizational form subject to the tax increase. But even when a rise in the METR reduces total net profit, it will typically have a smaller negative impact on after-tax profit than a corresponding rise in the AETR, according to the analysis in Appendix 4.1. Hence the AETR will normally be more important for the choice of organizational form than the METR.

In summary, when it comes to the impact of taxation, the choice of organizational form will mainly be done on the basis of the AETR, whereas the METR will determine the optimal scale of business activity within the chosen legal form. However, because a relatively low METR on a particular organizational form implies relatively favourable conditions for business expansion within that legal form, it is relevant to consider both the METR and the AETR when evaluating how the tax system treats alternative forms of business organization.

4.2. The impact of personal taxes on effective tax rates

In recent years it has become increasingly common to ignore personal taxes in studies of effective tax rates on corporate income, thus focusing only on the tax collected at the corporate level. The motivation for this choice is that, in a small open economy with free international mobility of capital, (large) companies will typically have access to finance via the international capital market. Hence the marginal supplier of funds to domestic corporations may well be a foreign investor whose required return on shares is unaffected by personal taxes on domestic residents. If a residence-based personal tax on equity income (dividends and capital gains) makes shareholding less attractive to domestic investors, they will sell (some of) their domestic shares to foreign investors who stand ready to buy the shares at prices determined by the world stock market. Thus, although they will influence the pattern of ownership, personal taxes on equity income will have no effect on the cost of equity finance (and hence no effect on the METR) for domestic corporations.

By analogy, if a domestic personal tax on interest income makes shareholding relatively more attractive to domestic investors, their increased demand for shares will not drive up the price of domestic shares and hence will not reduce the cost of equity finance for domestic companies, since foreign investors who are unaffected by the domestic interest income tax stand ready to sell domestic shares at the going international stock market price. According to this line of reasoning domestic personal taxes thus have no impact on the domestic cost of capital and may therefore be ignored in an analysis of effective tax rates.

This case for ignoring domestic personal taxes is not necessarily destroyed by the fact that the shares in small unlisted companies are not traded in the international stock market. If these shares are perfect substitutes for shares in large public corporations, the international price of the latter type of shares will also determine the domestic price of shares in unlisted companies without any impact from domestic personal taxes.

However, in practice the shares in small unlisted companies will typically be imperfect substitutes for the shares in large listed corporations, say, because they have different risk characteristics, and because listed corporations are subject to different regulations than unlisted companies. In that situation the cost of finance for the latter companies can move independently of the prices of internationally traded shares and will indeed be affected by domestic personal taxes, as shown by Apel and Södersten (1999) and Sørensen (2005).

Since the present report focuses on the taxation of small firms, it therefore includes domestic personal taxes in the analysis of effective tax rates. This is equivalent to assuming that the marginal supplier of investment funds is a domestic personal taxpayer. For most small firms this assumption is likely to be realistic, at least when it comes to equity finance.

The estimates of effective tax rates presented below assume a given market rate of interest, representing the cost of debt finance. The cost of equity finance is the minimum pre-tax rate of return on equity holdings that personal investors must earn in order to be willing to invest in equity rather than in debt instruments. In the calculations below the cost of equity finance is therefore

given as the pre-tax return on equity that will ensure an after-tax return equal to the after-tax market interest rate, once the personal taxes on interest, dividends and capital gains are allowed for.[16]

4.3. The Marginal Effective Tax Rate on alternative organizational forms

This section presents estimates of marginal effective tax rates for the four different forms of business organization considered in this report. The formulae used to calculate the effective tax rates are derived in detail in Appendix 4.2. As that appendix explains, the analytical framework used here is a generalization of a framework that has previously been used to study the impact of taxation on investment incentives in Sweden. For the purpose of the present report, the framework has been extended to allow explicitly for the impact of inflation and for the recent introduction of a wage-based allowance in the 'normal dividend' imputed to qualified shareholders.

The assumptions underlying our benchmark estimates of marginal effective tax rates are summarized in Table 4.1. The various tax parameters are those prescribed by the Swedish tax code for 2007, explained in more detail in Chapter 3. The assumed nominal interest rate of 8 percent is somewhat higher than the interest rate on risk-free government bonds, since the interest rate on business debt typically includes a risk premium.[17] The assumption of a 2 percent annual inflation rate corresponds to the official inflation target of the Swedish central bank and is close to the average rate of inflation experienced in Sweden in recent years.

[16] For sole proprietorships, the cost of equity finance is also the cost of capital for equity-financed investment. For corporations the cost of equity finance is the minimum return that must be left to shareholders after payment of corporation tax but before payment of personal tax. Hence the cost of corporate capital is higher than the cost of equity finance, because the pre-tax return on the marginal corporate investment must compensate investors for the corporate income tax as well as for the personal taxes on dividends and capital gains.

[17] We do not include an additional required risk premium on equity (over and above the assumed risk premium on business debt) since we wish to isolate the impact of the tax system on the cost of capital for different modes of investment finance.

Table 4.1. Assumptions underlying the estimates of marginal effective tax rates

Parameter	Value
Nominal interest rate	8 %
Rate of inflation	2 %
Statutory corporate income tax rate	28 %
Personal capital income tax rate	30 %
Personal tax rate on dividends and realized capital gains on unlisted shares	25 %
Personal tax rate on dividends and realized capital gains on qualified shares	20 %
Average holding period for shares	10 years
Average value of marginal personal tax rate on labour income	54.1 %
Tax-exclusive social security tax rate (wage earners/sole proprietors)	32.42/30.71 %
Sole proprietors: Imputed rate of return on equity	8.54%
Qualified shareholders: Imputed rate of return on equity	12.54 %
Qualified shareholders: Fraction of capital gain taxed as labour income	100 %
Qualified shareholders: Wage-based allowance included in normal dividend	25% of wage bill
Qualified shareholders: Marginal ratio of wage bill to capital stock	0

The formulae for the METR derived in Appendix 4.2 assume that the assessed labour income of sole proprietors and qualified shareholders is so high that they pay personal labour income tax to the central government and that they cannot increase their social security entitlements by increasing their taxable labour income. Specifically, Table 4.1 assumes that on average proprietors and qualified shareholders face a marginal personal tax rate on labour income which is half way between the two marginal rates in the income tax schedule for individuals subject to central government labour income tax (51.6 and 56.6 percent in an average municipality in 2007). It is also assumed that entrepreneurs follow the tax-minimising distribution policy described in Chapter 3. This means that qualified shareholders always pay themselves a dividend equal to the normal dividend and that the marginal business income distributed from a closely held corporation takes the form of wages or salaries.

To calculate effective tax rates on investment financed by retained earnings, an estimate of the effective personal tax rate on accrued capital gains on shares is needed, since retention of profits generates capital gains to shareholders. While the statutory tax rate on *realized* capital gains is

stated in the tax code, the effective tax rate on *accrued* gains will depend on the average period in which shareholders hold on to their shares before realizing their gains, since the deferral of tax until the time of realization effectively involves an interest-free loan from the government, implying a larger tax subsidy the longer the holding period. Appendix 4.2 derives a formula for the effective tax rate on accrued capital gains for any given average holding period for shares, assumed here to be 10 years.[18] Realized capital gains on qualified shares are taxed as capital income (at a reduced rate of 20 percent) in so far as the sum of dividends and capital gains does not exceed the imputed normal dividend, whereas gains above this level are taxed progressively as personal labour income (from 2009).[19] Since our calculations assume that qualified shareholders always pay themselves a dividend equal to the normal dividend, it follows that all of a realized capital gain will be taxed as labour income, as stated in Table 4.1.[20]

Qualified shareholders may include a wage-based allowance in their imputed normal dividend provided their own wage from the company exceeds a certain threshold. As a main rule, the wage-based allowance amounts to 25 percent of the company's total wage bill (see section 3.4 of Chapter 3 for details). Our benchmark scenario assumes that the qualified shareholder is eligible for this 25 percent wage-based allowance.

The average ratio of the wage bill to the capital stock in the Swedish business sector has been estimated by the Ministry of Finance to be 26.9 percent. However, the estimated METRs presented below measure the tax burden on an *additional* investment undertaken by a firm that is already established, and at the margin an increase in the capital stock may either raise or reduce the firm's wage bill, depending on whether capital and labour are complements or substitutes in the production process. For example, additional new machinery may be labour-saving, or it may require the input of additional manpower to operate the machines. As a benchmark case, the calculations in

[18] The average holding period may well be longer for shares in closely held companies whereas it may be shorter for shares in public corporations. However, to isolate the impact of capital gains tax rules on the different organizational forms, a common length of the holding period has to be assumed.

[19] During the period 2007-2009 only half of the gain in excess of the normal dividend will be taxed as labour income, whereas the other half will be taxed as capital income at the standard 30 percent rate. In the present benchmark scenario we consider the permanent rule that will prevail from 2009.

[20] As mentioned in Chapter 3, the maximum annual amount of capital gain that can be taxed as labour income during a six-year period is 100 inkomstbasbelopp, amounting to 4,590,000 kronor in 2007. We assume here that this limitation is not binding.

this section assume that the closely held company's marginal investment neither adds to nor subtracts from its wage bill, as stated in Table 4.1.[21]

As already mentioned, the marginal effective tax rate is the proportionate difference between the pre-tax and the after-tax rate of return on an investment which is just barely profitable, that is,

$$METR = \frac{c - r}{c}$$

where c is the cost of capital (the required minimum real rate of return before tax), and r is the minimum real after-tax return required by the suppliers of finance. The calculations here assume that r is equal to the after-tax real rate of interest that investors could alternatively have earned by investing their funds in the capital market. The value of r is taken as a given constant (equal to 3.6 percent at the assumed levels of nominal interest, capital income tax and inflation), so all of the variation in the estimated METRs stems from variation in the cost of capital, that is, a higher (lower) METR indicates a higher (lower) cost of capital.

Table 4.2 shows the estimated METRs across the four alternative organizational forms and the three different sources of investment finance available to firms (new equity, retained earnings or debt), given the assumptions made in Table 4.1.

Table 4.2. Estimated Marginal Effective Tax Rates (%)

Mode of finance	Sole proprietorship	Closely held corporation	Widely held private corporation	Widely held public corporation
New equity	25.0	9.3	46.0	49.6
Retained earnings	28.0	53.0	39.5	41.8
Debt	30.0	30.0	30.0	30.0

Source: Own calculations, based on Table 4.1 and Appendix 4.2.

[21] This assumption implies that the firm's capital-labour ratio increases when it undertakes an additional investment. The next section will investigate the implications of alternative assumptions regarding the marginal capital-labour ratio.

For investment financed by debt, the METR is seen to coincide with the 30 percent capital income tax rate imposed on the recipients of the interest payments made by firms. Since interest expenses are deductible, and because the marginal investment that is barely worth undertaking does not yield a surplus above the interest payable on the debt, there is no further tax collected at the level of the firm.

For equity-financed investment undertaken by widely held corporations, the METR is considerably higher than that imposed on debt-financed investment, because the return to equity-financed investment is subject to corporation tax as well as personal tax on dividends and capital gains on shares. The slightly lower METR on private than on public corporations is explained by the reduced capital income tax rate on dividends and capital gains on unlisted shares.

By contrast, for sole proprietorships the METR is lower for equity-financed than for debt-financed investment. These firms are not subject to double taxation, and their retained earnings are only taxed at the 28 percent rate also applied to corporate income. The low METR on a proprietor's investment financed by new equity is due to the fact that the imputed return on equity exceeds the assumed market rate of interest. It is therefore profitable for a proprietor to undertake investments with a pre-tax return below the market interest rate, since he can thereby increase the fraction of total business income that gets taxed at the low capital income tax rate rather than at the high marginal labour income tax rate. In this way the excess of the imputed return over the market interest rate works like a tax subsidy which is reflected in the low METR on a proprietor's investment financed by new equity.
For closely held corporations the imputed rate of return on equity is even higher above the market interest rate, so the tax subsidy to investment financed by new equity is larger for qualified shareholders than for sole proprietors. Hence qualified shareholders face a lower METR on such investment, as shown in Table 4.2.

On the other hand the METR on investment financed by the retained earnings of closely held companies is seen to be quite high. This is because the capital gains on shares triggered by the retention of profit are taxed at the high marginal labour income tax rate rather than the low capital income tax rate, and because the profits underlying the capital gains have already borne corporation tax.

As a result of these asymmetries in the tax code, the METR for qualified shareholders differs quite markedly across the different modes of finance. In particular, this group of investors has a strong tax incentive to finance investment by distributing profits and reinjecting it as new equity rather than by retaining profits in the company. For closely held companies operating as going concerns, the relatively heavy taxation of realized capital gains on shares is therefore hardly a serious obstacle to the expansion of the firm. However, it may imply a tax disincentive in cases where an entrepreneur starts up a closely held company with the purpose of scoring a gain by selling his shares within a limited time horizon. The effects of the capital gains tax in such a context will be studied in detail in Chapter 6.

4.4. The effects of the wage-based allowance on the METR for qualified shareholders

The recent inclusion of a wage-based allowance (WBA) in the normal dividend of qualified shareholders marks an important change in the tax code for closely held companies. The impact of the WBA on individual companies will differ significantly depending on the ratio of their wage bill to their capital stock. As noted earlier, a rise in a firm's capital stock may either increase or reduce the wage bill paid to its employees, depending on whether capital and labour are complementary or substitutable factors of production. As a benchmark, the scenario in section 4.3 considered a case where an additional investment did not affect the company's employee wage bill.

However, the WBA still played a role in the benchmark scenario in the previous section because the shareholder's own wage income varies with the firm's investment and financing strategy. The first row in Table 4.3 shows how the marginal effective tax rates on closely held companies would change compared to the benchmark scenario (repeated in the second row of the table) if the WBA were abolished. Without the WBA, it is seen that the METR on investment financed by new equity would drop dramatically and would in fact become negative, indicating that the tax system would directly subsidize investment at the margin.

Table 4.3. Effects of the wage-based allowance on the METR for closely held corporations (%)

	METR on investment financed by		
	New equity	**Retained earnings**	**Debt**
No wage-based allowance	-20.9	53.0	30.0
Marginal ratio of employee wage bill to capital stock: 0	9.3	53.0	30.0
Marginal ratio of employee wage bill to capital stock: -0.05	21.3	56.4	37.4
Marginal ratio of employee wage bill to capital stock: +0.05	-7.0	48.9	20.7

Source: Own calculations, based on Table 4.1 and Appendix 4.2.

The explanation for this surprising result is somewhat involved: as previously noted, investment financed by new equity benefits from an imputed return to equity that is much higher than the market rate of interest. At the margin an additional equity-financed investment with a pre-tax return below the imputed return therefore increases the fraction of the profit from the intramarginal investments that gets taxed as dividends rather than as labour income. But when the company reduces its wage payment to the shareholder in order to increase its dividends, the cut in the wage reduces the shareholder's normal dividend through a drop in the WBA. This in turn limits the possibility for shareholders to turn high-taxed labour income into low-taxed dividends. When there is no WBA, this limit on the possibilities for income shifting does not exist, and so the tax subsidy implied by the high imputed rate of return becomes larger. This explains why the METR would fall if the WBA were abolished.

The calculations underlying Table 4.2 indicate that the pre-tax real return to a closely held company's marginal investment (the cost of capital) is roughly 5 percent.[22] The third row in Table 4.3 considers the case of a labour-saving investment where all of the 5 percent marginal investment yield stems from a permanent 0.05 kronor cut in annual wage costs for each krona of additional investment. In such a scenario the extra investment induces a fall in the WBA and hence in the normal dividend, so a larger fraction of profits becomes subject to the high marginal labour income tax rate. As a consequence the METR is seen to increase, regardless of the source of investment finance.

The bottom row of Table 4.3 focuses on the opposite case where the additional investment generates a need for additional hired labour so that the company's wage bill permanently increases by 5 percent of the investment expenditure. Since the investment now triggers a rise in the WBA and hence in the share of profit distributed as a normal dividend rather than as high-taxed shareholder wage income, the effective marginal tax rates drop.

The rather strong impact of the WBA on the METR on investments that alter the company's employee wage bill suggests that the wage-based allowance could seriously distort a qualified shareholder's choice between labour-saving and labour-demanding technologies. In particular, the wage-based allowance implies a tax bias against the former and a tax subsidy in favour of the latter type of technology. At the same time, we saw that the WBA triggered by the qualified shareholder's own wage reduces the distortionary impact of the tax subsidy arising from the large positive gap between the imputed return on equity and the market rate of interest.

4.5. The Average Effective Tax Rate on alternative organizational forms

While the marginal effective tax rate measures the tax burden on the last unit of investment undertaken by a firm, the average effective tax rate (AETR) measures the total tax burden on the profits from all the investments of the firm, starting all the way from the first krona earned. In a dynamic setting, the AETR is defined as

[22] This should be thought of as a risk-adjusted rate of return, since it does not include a risk premium for equity finance.

$$AETR = \frac{PVT}{PV}$$

where PVT is the present value of the total tax paid by the firm over time, and PV is the present value of its pre-tax earnings. If the firm's real activity and earnings are constant over time, the definition of AETR given above will be equivalent to

$$AETR = \frac{T}{Y}$$

where T is the total real amount of tax imposed on the income from the firm in each year, and Y is the firm's total real profit before tax. Thus the AETR is simply the ratio of total tax to total income.

The METR determines how far it is profitable for firms to carry the level of investment within a given organizational form. It thereby influences the total after-tax profit obtainable within that form of organization. But as shown in Appendix 4.1, the AETR is typically more important for total after-tax profit and hence for the choice of organizational form. Moreover, because the AETR depends on the shape of the entire tax schedule for business income, and not just on the tax treatment of the last krona earned, it can vary independently of the METR. To give a full picture of the taxation of different forms of business organization, it is therefore necessary to supplement the estimated METRs by calculations of the AETR.

Since some business income is subject to progressive labour income tax, the average tax burden will generally depend on the level of total income. Table 4.4 presents estimates of the AETR for four different levels of annual pre-tax business profits, ranging from half a million to 2 million kronor. Profits are defined here as pre-tax business income after deduction for all costs (including interest payments) except the cost of equity finance and the cost of wages or salaries paid to the owner of the firm. The motivation for using this definition of 'profit' is that controlling owners may choose to take out income from their firms either as labour income or as capital income (e.g. dividends) and that the optimal split between the two types of income varies across organizational forms.

Table 4.4. Estimated Average Effective Tax Rates (%). Basic scenario[1]

Pre-tax business profit (kronor)[2]	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
500,000	22.5	22.9	24.2	46.0	24.7	49.6
1,000,000	41.8	33.2	34.5	46.0	36.3	49.6
1,500,000	49.1	40.2	38.3	46.0	40.7	49.6
2,000,000	52.7	44.0	40.2	46.0	43.0	49.6

3. Assumptions: Equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.
4. Pre-tax business income after interest but before deduction for wage payments to owners.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3, assuming a zero variance of business income.

In line with the assumption underlying the estimated METRs, Table 4.4 assumes that entrepreneurs follow the tax-minimising distribution policies described in Chapter 3. The table allows for the possibility that the holders of shares in widely held companies may receive part of their income from the firm in the form of a wage or salary, just like the owners of closely held companies. However, controlling shareholders working in a widely held corporation must respect the need to pay dividends to minority shareholders. Table 4.4 therefore assumes that any business income up to 15 percent of a widely held company's equity must be distributed as dividend income.[23] Business income above this level is assumed to be paid out in the form that is most lightly taxed. This implies that shareholders in widely held companies will never receive more than 370,400 kronor of income in the form of wages or salaries, since labour income beyond that level is more heavily taxed than (double-taxed) dividends, according to the effective labour income tax schedule derived in Chapter 3. Based on the analysis in Appendix 3.1, the calculations underlying Table 4.4 thus assume that the effective marginal social security tax rate is zero for income up to 370,400 kronor and equal to the

[23] This may seem like a very high dividend payout-ratio, but it must be recalled that the relevant equity base in the present context is the basis value of shares for tax purposes which is often considerably below the current market value of the shares, since much equity is formed through retention of profits.

statutory tax rate for income above that level. If all of the social security contribution were treated as a pure tax, the AETRs would be higher than indicated in the table, but the *relative* magnitude of the AETRs across organizational forms would remain roughly the same in the case where shareholders in widely held corporations are able to receive part of their income as labour income.

For completeness, Table 4.4 also considers the case where the holders of shares in widely held companies have no flexibility in choosing their form of remuneration and must hence receive all of their income in the form of dividends.

To calculate the AETR, one needs to know the size of the firm's net equity, and for qualified shareholders one also needs information on the total amount of wages paid to employees, since this enters the base for the wage-based allowance included in the imputed normal dividend. Table 4.4 assumes an equity-to-profit ratio of one, meaning that a firm with a pre-tax profit of, say, 1 million kronor also has an equity base (a basis value of shares) equal to 1 million. The ratio of the employee wage bill to equity is assumed to be 0.5, so a firm with an equity of 1 million kronor is assumed to spend half a million kronor on wages to its employees. The assumed constancy of these ratios implies that the firm's investment and employment activity is scaled up or down in proportion to its profits. Tables 4.5 and 4.6 below will illustrate the sensitivity of the AETRs to the magnitude of the two ratios, but first we consider Table 4.4.[24]

Given the progressivity of the labour income tax, it is not surprising to see that relatively low levels of profits earned by widely held companies are subject to a relatively high AETR when these profits must be paid out as double-taxed dividends rather than as wages or salaries. Nor is it surprising that the AETR rises more steeply with the level of profit in sole proprietorships and closely held companies than in widely held corporations, since the former two organizational forms are subject to progressive labour income tax on their marginal business income whereas income from widely held companies is subject to a constant marginal tax rate whenever these companies start to pay dividends.

At a profit level around 500,000 kronor, sole proprietors and qualified shareholders face roughly the same AETR, but at higher profit levels proprietors are subject to a higher tax burden. This is

[24] For a full documentation of the computer algorithms used to calculate the AETRs in this chapter the reader is referred to Appendix 5.1 through 5.3.

primarily due to the wage-based allowance and – to a lesser extent – to the higher imputed return to equity granted to qualified shareholders.

When shareholders in a widely held private corporation can take out part of their income from the company in the form of wages or salaries, we see from Table 4.4 that they are subject to approximately the same AETR as qualified shareholders up to a profit level of about 1.5 million kronor. For higher levels of profit, the progressivity of the labour income tax imposed on the incremental income of qualified shareholders drives the AETR for this group above that for shareholders in widely held private companies.

Overall, the differences in the total tax burden on closely and widely held companies appear to be modest when shareholders in the latter companies can receive part of their income as wages or salaries. The AETR on sole proprietors seems to be somewhat higher, because a smaller fraction of the business income of these taxpayers tends to get taxed as capital income.

4.6. Sensitivity analysis: the importance of the equity base and the wage bill for the AETR

The estimates in Table 4.4 assumed an equity/income ratio of one and an employee wage bill/equity ratio of one half. Table 4.5 tests the sensitivity of the results to the former assumption by showing the AETR for different equity/income ratios, keeping the wage bill/equity ratio equal to 0.5, and assuming a pre-tax profit (income) level equal to 1 million kronor. The numbers in the table thus relate to firms with an equity base that may vary between half a million and five million kronor.

The equity/income ratio is seen to be quite important for the AETR on sole proprietors. As the equity base increases, a larger fraction of the total business income of proprietors gets taxed at the relatively low capital income tax rate, thus pulling down the AETR.

Table 4.5. Estimated Average Effective Tax Rates (%): Importance of the equity/income ratio[1]

Equity/ income ratio	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
0.5	43.3	36.1	34.5	46.0	36.3	49.6
1.5	40.2	32.7	34.5	46.0	36.3	49.6
3	35.5	32.6	34.5	46.0	36.3	49.6
5	29.5	32.6	39.0	46.0	41.7	49.6

1. Assumptions: Pre-tax business profit after interest but before deduction for wage payments to owners = 1,000,000 SEK; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3, assuming a zero variance of business income.

For qualified shareholders the same mechanism works to reduce the AETR as the equity/income ratio increases up to the level where the imputed normal dividend becomes so large that all of the shareholder's marginal business income is taxed as dividend income at a constant marginal rate. In Table 4.5, this level is reached at an equity/income ratio equal to roughly 1.5. Beyond that threshold the AETR stays constant, because any further increase in the equity/income ratio just increases the imputed normal dividend beyond the level where the shareholder can take advantage of shifting income from the labour income tax base to the capital income tax base.

For widely held corporations where controlling shareholders can take out part of their income as labour income, the AETR is seen to be less sensitive to the equity/income ratio. As long as that ratio stays below a certain level (equal to 3 in Table 4.5), it is optimal for these taxpayers to receive 370,400 kronor in the form of wages (since this is the income level where the social security contribution is estimated to become a genuine tax), and to receive their remaining income from the company as dividends subject to a constant marginal tax rate. Hence the AETR on the 1 million kronor of business income remains constant in this range. But when the firm's equity base grows beyond this level, the necessary dividend payments to minority shareholders become so large that

the wages of the controlling majority shareholders have to be cut. These investors then start to receive a larger share of their total income in the form of double-taxed dividends that are taxed more heavily than labour incomes below 370,400 kronor, so from this point on the AETR starts to increase.

Since Table 4.5 assumes a profit level of 1 million kronor, the numbers in that table may be compared to those in the second row of Table 4.4. This comparison indicates that the AETR for corporations is not particulary sensitive to the equity/income ratio, whereas the sensitivity is larger for proprietorships.

Consider next Table 4.6 illustrating the sensitivity of the AETRs for closely held corporations with respect to the employee wage bill determining the wage-based allowance (along with the shareholder's own wage). The table assumes an equity/income ratio of one and ranges from firms without any employees to firms with an employee wage bill of 10 million kronor. Comparing the figures in Table 4.6 to those in the second column of Table 4.4, one sees that a combination of a relatively high profit and a relatively large wage bill pulls down the AETR, as one would expect. With this combination, the shareholder is eligible for the additional 25 percent allowance for wage bills in excess of 2,670,000 kronor. This in turn increases the fraction of total business income that escapes the progressive labour income tax.

However, at lower levels of profit such as those in the interval between one half and one million kronor, the AETR is rather insensitive to the employee wage bill, because the marginal business income in this interval tends to get taxed at the constant marginal tax rate applying to normal dividends.

Table 4.6. Estimated Average Effective Tax Rates for a closely held corporation (%). Importance of the employee wage bill/equity ratio[1]

Pre-tax business profit (kronor)[2]	Ratio of employee wage bill to equity				
	0	0.5	1	3	5
500,000	22.9	22.9	22.9	22.9	22.9
1,000,000	36.1	33.2	32.7	33.6	33.5
1,500,000	43.6	40.2	37.0	38.0	37.1
2,000,000	47.4	44.0	43.9	40.7	39.1

1. Assumption: Equity/income ratio = 1.
2. Pre-tax business income after interest but before deduction for wage payments to owners.

Source: Own calculations, based on the simulation model described in Appendix 5.2, assuming a zero variance of business income.

4.7. Summary

This chapter has estimated average and marginal effective tax rates on investment by the four types of business organization considered in this report. The average effective tax rate (AETR) measures the total tax burden relative to the firm's total income, whereas the marginal effective tax rate (METR) indicates the tax burden on the last unit of investment that only just yields the market's minimum required return. A high AETR on investment within a particular organizational form will discourage use of that form, whereas a high METR will reduce the optimal scale of activity within a given organizational form, once that form has been chosen.

The estimated METRs assume that sole proprietors and qualified shareholders are subject to the progressive central government income tax on labour income. For investment financed by debt, it was found that all organizational forms face the same METR. For investment financed by equity, whether in the form of retained earnings or new equity, sole proprietorships were found to have a lower METR than widely held companies. Because of the rather high imputed rate of return on new equity, closely held companies were found to have the lowest METR for investment financed in this

way. On the other hand, because capital gains on shares in closely held companies are taxed as labour income, investment financed by the retained profits of such companies faces the highest METR, but this high marginal tax burden may be escaped if qualified shareholders withdraw profits as wages and reinject them as new equity rather than retaining them in the business. Under such a financing strategy, closely held companies face the lowest METR among all organizational forms.

The METR on investment by closely held companies was found to be quite sensitive to the wage-based allowance included in the normal dividend that gets taxed as capital income. The sensitivity is particularly high in cases where the company's investment induces changes in the wage bill paid to employees. At the margin the wage-based allowance generates a significant disincentive to adopt labour-saving technologies and quite a strong incentive to introduce labour-intensive technology. In this way the newly introduced wage-based allowance could cause serious distortions to the technological choices made by closely held companies. At the same time the WBA generated by the qualified shareholder's own wage was found to reduce the distortionary effect of the tax subsidy arising from the large positive gap between the imputed return on equity and the market rate of interest.

Since some business income is taxed progressively as labour income, the average effective tax rate (AETR) generally depends on the total level of business income. The analysis in this chapter estimated the AETR on entrepreneurs with annual business profits ranging from half a million kronor to two million kronor. When shareholders are able to withdraw income from their companies either as wages or as dividends with the purpose of minimising the tax burden on distributions, the benchmark estimates suggest that the average effective tax rate (AETR) on income from corporations is lower than that on income from sole proprietorships, since a larger fraction of the income from proprietorships tends to be subject to the progressive labour income tax. However, due to the double taxation of corporate equity income, this result may be reversed for firms with high ratios of equity to annual profits. If such firms are organized as sole proprietorships, a large part of their income will be single-taxed as capital income, whereas a large fraction will be double-taxed as dividends if these firms are organized as corporations.

Within the corporate sector, the estimates suggest that the AETRs for closely held companies and for widely held private companies are at roughly the same level, although there is a tendency for the

AETR on closely held companies to be higher at high levels of profit where the progressive labour income tax on the marginal income carries a larger weight.

Chapter 5

ASYMMETRIC TAXATION UNDER UNCERTAINTY: THE IMPACT ON ALTERNATIVE ORGANIZATIONAL FORMS

The previous chapter provided a first impression of the tax burden on the different forms of business organization, but it did not explicitly allow for uncertainty about the rate of return on a business venture. The present chapter investigates whether the main results of the effective tax rate analysis in Chapter 4 are significantly modified when uncertainty and risk-averse behaviour is accounted for.

In the presence of uncertainty, risk-averse entrepreneurs will require a risk premium to be willing to invest their wealth in an active business rather than in safe assets such as government bonds. The required risk premium on business equity will tend to be higher the greater the expected volatility of income from the business activity considered. In theory, the required risk premium on a highly risky activity may be relatively low if the return on that activity is negatively correlated with the return on other risky assets held by the entrepreneur, since the losses on the risky activity will then tend to be offset by gains on the other assets in any given year, and vice versa, thereby helping the entrepreneur to smooth his income. However, in practice the limited wealth and financing opportunities available the owners of small enterprises usually mean that they have to invest the bulk of their net wealth in their own business. Hence their opportunities for diversifying risk by simultaneously investing in many different assets are typically small. In that situation a risk-averse owner of a small enterprise will indeed require a larger expected risk premium the greater the perceived business risk he assumes.

This chapter analyses whether the tax rules for the different forms of business organization are especially favourable to activities with relatively high or relatively low riskiness, measured by the volatility of business income. To the extent that the answer is affirmative, the tax system may distort the choice of organizational form as well as the level and pattern of risk-taking.

It should be stressed that the present chapter (like the previous one) focuses on 'going concerns', that is, business firms that are already established, having survived the initial start-up phase. Thus the analysis in this chapter does not explicitly account for the risk of bankruptcy which may be a serious threat in the start-up phase. For new start-up firms the rules for loss offsets may also assume a special importance that is not accounted for in the present chapter. Chapter 6 will focus explicitly on the tax (dis)incentives to start up new firms within alternative organizational forms.

5.1. Comparing alternative risky income flows

To evaluate whether the tax system discriminates between income flows involving different amounts of risk-taking, one needs a method for comparing alternative income streams with different degrees of volatility. This section explains the most common method used for this purpose, drawing on the formal analysis in Appendix 5.4.

The method consists in converting a risky income stream with a certain degree of volatility into an equivalent 'safe' income stream displaying no volatility at all. This is done by asking how much the mean value of the risky (fluctuating) income flow will have to exceed the constant level of the safe income flow for an investor to be indifferent between receiving one or the other income flow. The difference between the mean of the risky income flow and the safe income flow that would make the investor equally happy to receive one or the other income stream is the *risk premium* required to compensate the investor for assuming risk. When the risk premium is subtracted from the mean value of the risky income flow, one obtains the corresponding 'risk-adjusted' income, defined as the constant (risk-free) level of income that is equivalent to the risky income stream in the eyes of the investor.[25] By comparing the risk-adjusted income levels corresponding to two alternative risky flows of business income, one can thus evaluate which flow is the more attractive one, since the risk-adjustment converts both income streams into stable income flows with zero risk.

To apply this method of adjusting for risk, one needs a quantitative measure of the degree of riskiness of an income stream as well as a quantitative measure of the entrepreneur's degree of aversion towards risk. The degree of riskiness of a volatile income flow is commonly measured by

[25] In technical jargon, the risk-adjusted level of income is sometimes referred to as the 'certainty-equivalent' level of income.

its *standard deviation*, defined as the average deviation between the mean value of income and the actual income earned in any particular year.[26] For example, if an income stream has a mean value of 100 and a standard deviation of 10, the actual income realized in any year will on average be either 10 units higher or 10 units lower than 100. The greater the standard deviation of an income stream, the greater is the volatility and hence the riskiness of that flow of income.

The degree of an investor's or an entrepreneur's aversion towards risk-taking is often measured by the so-called Coefficient of Relative Risk Aversion (CRRA), defined in formal terms in Appendix 5.4. The larger the CRRA, the higher is the required risk premium associated with a given risky income stream relative to the mean value of that income flow. It is frequently assumed that the CRRA is a constant that is independent of the investor's expected average level of income. This means that if the mean level of income and the standard deviation both increase by, say, 10 percent (so that the standard deviation relative to the mean is unchanged), the required risk premium measured in kronor also goes up by 10 percent. The analysis in this chapter adopts the common assumption that the CRRA is in fact constant for any given entrepreneur. However, since different entrepreneurs may have different attitudes towards risk-taking, section 5.3 will investigate how the tax system affects the relative attractiveness of the different organizational forms for entrepreneurs with different degrees of risk aversion, measured by the CRRA.

As demonstrated in Appendix 5.4, one important implication of a constant CRRA is that the imposition of a purely proportional income tax with full loss offsets will not change the relative attractiveness of different risky income streams; it will simply reduce the risk-adjusted values of all of these streams by a common fraction equal to the tax rate. By contrast, if the tax system is not strictly symmetric and proportional, say, because of limitations on loss offsets or because the marginal tax rate varies with the level of income, it may change the ranking of alternative risky income flows. In particular, a progressive tax schedule tends to reduce the standard deviation of after-tax income by relatively more than it reduces its mean value. In this way tax progressivity may make highly risky income flows relatively more attractive compared to the case with proportional taxation, but at the same time limitations on loss offsets reduce the attractiveness of volatile income streams that involve a relatively high risk of losses.

[26] In mathematical terms, the standard deviation is the positive square root of the variance which in turn is defined as the expected value of the squared deviation from the mean. The precise definitions are given in Appendix 5.4.

These observations suggest that the presence of risk will only affect the relative attractiveness of different organizational forms to the extent that the tax regimes for the various legal forms deviate from strictly proportional taxation to different degrees. This insight will be helpful for understanding the results reported in the sections below.

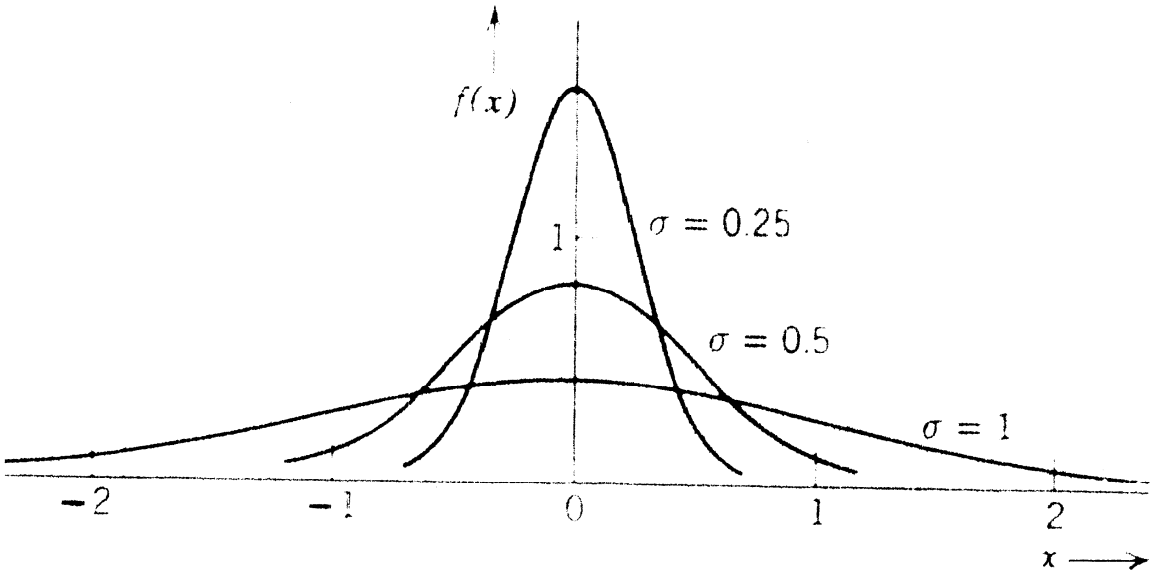
To illustrate the impact of taxation on business ventures with different degrees of risk, this chapter will compare a hypothetical 'safe' income stream to two risky streams with a 'medium' and a 'high' degree of volatility, measured by the standard deviation. The hypothetical risky income flows are constructed by assuming that business income follows a so-called normal probability distribution. A probability distribution for income specifies the probability that the realized income in any year will assume a certain value. The normal distribution of a random variable (such as a fluctuating business income stream) can be fully characterized by its mean and its standard deviation. It has the symmetric 'bell-shape' illustrated in Figure 5.1 where the mean value of the random variable considered is assumed to be zero and where the standard deviation is denoted by σ. $f(x)$ is the probability that the random variable will take some particular value x. The larger the value of σ, the greater the probability that the variable considered will assume a value far from its mean, so the flatter is the curve describing the probability distribution.[27]

The normal probability distribution is widely used because many random variables (including many economic variables) do in fact seem to be normally distributed, or at least approximately so. The risky income streams considered in the analysis below have been constructed by drawing a sample of 800 observations from two normal distributions with different means and standard deviations.[28]

[27] Regardless of size of σ, the normal distribution has the property that about two thirds of the realized values of the variable considered will fall within a distance of plus/minus one standard deviation from the mean, and about 95 percent will fall within plus/minus two standard deviations from the mean.

[28] With such a large number of observations, the mean values and standard deviations of the numbers observed in the sample come very close to the true means and standard deviations of the distributions from which the samples were drawn.

Figure 5.1. The normal probability distribution



As reported in Table 5.1, the 'highly risky' income stream has a mean value of 1,000,000 kronor per year and a standard deviation of half that amount, whereas the income flow involving 'medium risk' has a mean value of about 571,000 kronor and a standard deviation of one quarter of that amount (about 143,000 kronor). Figure 2 plots the first 50 observations from each sample to give an impression of the degree of income volatility involved. It is seen that the most risky income flow displaying the largest fluctuations involves occasional business losses.

The means and standard deviations of the two risky income streams have been chosen such that – in the absence of tax – the corresponding risk-adjusted income levels are both equal to the safe income stream of 500,000 kronor included in the first row of Table 5.1, given the degree of risk aversion assumed in the benchmark scenario considered in this chapter (see note 3 to Table 5.1). This degree of risk aversion (measured by the CRRA) falls within the medium range of estimates found in empirical studies of behaviour towards risk.

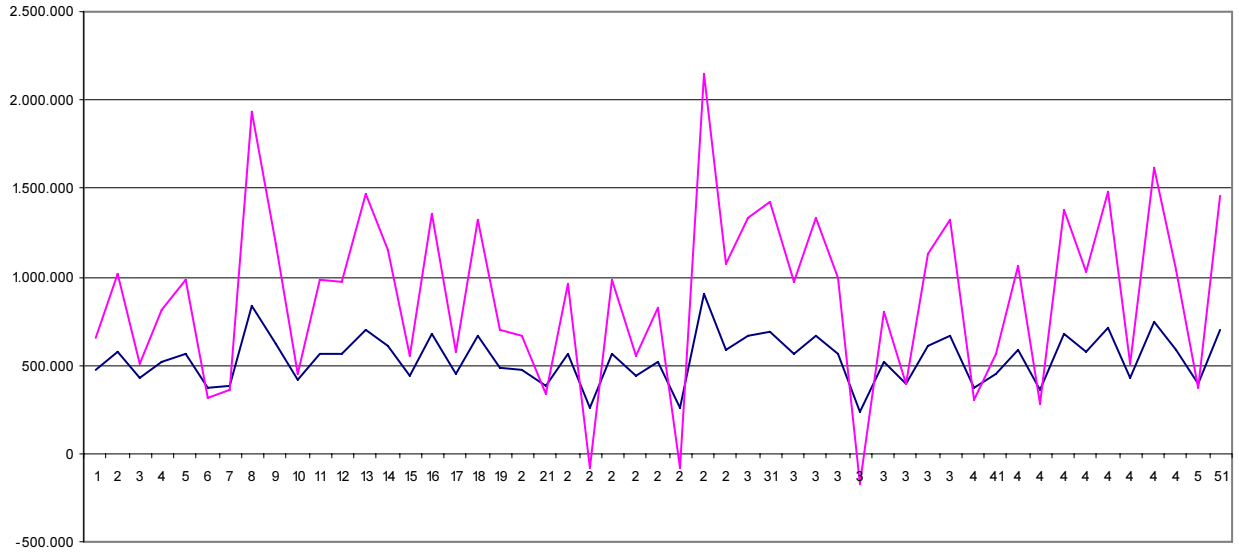
Table 5.1. Alternative income streams in benchmark scenario (kronor per year)[1]

Degree of riskiness	Actual mean income	Standard deviation of income[2]	Risk-adjusted income in the absence of tax[3]
No risk	500,000	0	500,000
Medium risk[4]	571,429	142,857	500,000
High risk[5]	1,000,000	500,000	500,000

1. Pre-tax business income after interest but before deduction for wage payments to owners.
2. Average deviation from mean income.
3. Assuming a Coefficient of Relative Risk Aversion equal to 4.
4. Standard deviation of income = 25 percent of mean income.
5. Standard deviation of income = 50 percent of mean income.

Roughly speaking, the three income streams considered in Table 5.1 (and the two flows depicted in Figure 5.2) would therefore be equally attractive to entrepreneurs in a hypothetical world of no taxation, provided business owners are neither highly risk-averse nor very little concerned about risk. A neutral tax system would imply that taxation reduces the risk-adjusted income levels for all income streams by the same fraction under all forms of business organization. The following section investigates how the actual tax rules affect the risk-adjusted income levels obtainable within the various organizational forms, given the means and standard deviations of pre-tax income assumed in Table 5.1. To the extent that the tax-induced change in the risk-adjusted income levels varies across organizational forms, the tax system may distort the choice of business organization.

Figure 5.2. Evolution of simulated risky streams of business income



Note: The most volatile graph is the 'highly risky' income stream with a mean of 1,000,000 kronor and a standard deviation of 500,000 kronor, while the less volatile graph shows the income stream associated with 'medium risk', where the mean is 571,429 kronor and the standard deviation is 142,857 kronor.

5.2. The impact of taxation on the choice between alternative risky income streams: Benchmark scenario

Given the simulated pre-tax income streams described in the previous section, one can calculate the tax liability and the after-tax income available to the entrepreneur under alternative organizational forms in each of the 800 periods considered, using the computer algorithms documented in Appendix 5.1 through 5.3. On this basis one obtains mean values and standard deviations of disposable income. These in turn allow a calculation of the risk-adjusted disposable income levels attainable under each of the four organizational forms considered.

The calculations relate to well-established firms that have reached a stage of maturity where the owners seek to maintain a constant stock of business equity over time. In each year the owner thus withdraws all of the business income net of depreciation and tax from the firm, following the tax-minimising distribution policies described in Chapter 3. In years where the firm is running a loss,

the owner is assumed to inject new equity into the business to keep the stock of equity constant. As in Chapter 4, pre-tax profits are defined as pre-tax business income after deduction for all costs (including interest payments) except the cost of wages or salaries paid to the owner of the firm. In line with Chapter 4, we also allow for the possibility that the holders of shares that are taxed according to the rules applicable to widely held corporations may receive part of their income in the form of a wage or salary from the company.[29]

Table 5.2 reports the means and standard deviations of disposable income under the three alternative streams of pre-tax income. Note that the standard deviations (St. dev.) are now measured in percent of the mean value of disposable income. Table 5.2 also shows the mean value of the Average Effective Tax Rate (AETR = total tax/total pre-tax income) over the entire sample period, measured in percent.

The differences in the AETRs of course explain the differences in the mean values of after-tax income. The first row of Table 5.2 indicates that when holders of shares subject to the tax rules for widely held companies can receive labour income from the firm, the AETRs and the associated disposable incomes are roughly the same across organizational forms when pre-tax income is at a 'safe' level of around 500,000 kronor. This confirms the result stated in the first row of Table 4.4 in Chapter 4.

When mean income rises to the level of about 571,000 kronor associated with medium risk, the progressivity of the labour income tax means that the AETRs go up in the cases where entrepreneurs receive labour income from the firm. From Table 5.2 the rise in the AETR is seen to be particularly large for sole proprietors who do not benefit from the wage-based allowance and the high imputed rate of return used to calculate the normal dividend for qualified shareholders. However, because sole proprietorships are affected more strongly by the progressivity of the tax system, the relative standard deviation of disposable income also falls by a larger amount for this organizational form than for any other legal form. When the marginal tax rate rises significantly with the level of income, the tax system tends to reduce the volatility of after-tax income by a

[29] In these cases we maintain the assumption in Chapter 4 that the company must pay a dividend of 15 percent of the basis value of shares to satisfy the minority shareholders. We also maintain the assumption that a controlling shareholder's income above this level is paid out in the form that is most lightly taxed (see section 4.5 of Chapter 4 for further explanation).

greater proportion than it reduces the mean value of disposable income. To illustrate, the standard deviation of the pre-tax income stream with medium risk was assumed to be 25 percent of the mean, but according to Table 5.2 the standard deviation of the disposable income of proprietors is only 18.2 percent of the mean of disposable income in the case with medium risk. Thus the progressivity of the labour income tax provides a form of income insurance for proprietors, and to a lesser extent for qualified shareholders for whom the tax system also reduces the standard deviation of income relative to the mean.

Table 5.2. The mean and standard deviation of disposable business income and the Average Effective Tax Rate (%). Benchmark scenario[1]

Degree of riskiness		Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
				Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk	Mean	387,334	385,509	379,031	270,000	376,331	252,000
	St. dev.	0	0	0	0	0	0
	AETR	22.5	22.9	24.2	46.0	24.7	49.6
Medium risk[2]	Mean	412,965	424,637	424,223	309,392	421,083	288,766
	St. dev.	18.2	20.9	25.7	25.2	25.3	25.2
	AETR	27.9	25.9	26.0	46.0	26.5	49.6
High risk[3]	Mean	566,931	670,276	658,038	542,871	639,504	506,679
	St. dev.	39.8	46.3	49.9	51.4	49.4	51.6
	AETR	43.6	33.4	34.5	46.0	36.4	49.6

Note: The first number in each cell shows the mean value of disposable business income. The second number indicates the relative standard deviation of disposable income, i.e. the average percentage deviation from the mean, and the third number reports the percentage Average Effective Tax Rate (AETR), calculated as the average ratio of total tax to total pre-tax income over the sample period. The assumptions on the mean and standard deviation of pre-tax business income are taken from Table 5.1.

5. Assumptions: Equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.
6. Standard deviation of pre-tax income = 25 percent of mean pre-tax income.
7. Standard deviation of pre-tax income = 50 percent of mean pre-tax income.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

The same pattern reveals itself as one moves from the safe income stream at the top of Table 5.2 to the highly risky income flow at the bottom of the table. The relative standard deviation of the highly risky pre-tax income is 50 percent, but the progressive labour income tax reduces the relative standard deviation of after-tax income to 39.8 percent for proprietors and to 46.3 for qualified shareholders.[30]

By contrast, Table 5.2 shows that the tax system hardly affects the relative standard deviation of income from widely held companies. When all income is distributed as dividends, the combination of the corporation tax and the personal capital income tax works roughly like a proportional tax on total business income, and as shown in Appendix 5.4, a strictly proportional tax system does not change the relative standard deviation of income.[31]

It may seem surprising that the tax system does not reduce the relative standard deviation of income in the cases where shareholders subject to the tax rules for widely held companies receive part of their income in the form of wages or salaries liable to the progressive labour income tax. The explanation is that under the tax-minimising distribution policy assumed here, the marginal income from widely held companies is always paid out as a dividend subject to the proportional capital income tax. Specifically, shareholders taxed by the rules for shares in widely held companies never receive more than 370,400 kronor as labour income, since labour income beyond that level is more heavily taxed than double-taxed dividends. Hence the marginal tax rate for these shareholders remains constant even in the face of large fluctuations in pre-tax income, and because of this absence of tax progressivity at the margin, there is no tax-induced reduction in the relative standard deviation of income.

On the basis of the means and relative standard deviations reported in Table 5.2, Table 5.3 presents estimated risk-adjusted disposable income levels, using the estimation method explained in section

[30] The lower reduction of income volatility for the latter group is explained by the fact that a larger fraction of the income of qualified shareholders gets taxed at the proportional capital income tax rate, due to the relatively generous rules for calculating the normal dividend.

[31] When business income is distributed as dividends, the only (minor) deviation from strict proportionality arises from the fact that business losses do not trigger a refundable tax credit in the same tax year and cannot be carried forward with interest.

5.1 and in Appendix 5.4. A comparison between the two tables shows that, in the presence of risk, it may be highly misleading to evaluate the attractiveness of an income stream by looking only at its mean value. For example, for shareholders in widely held corporations receiving labour income from the company, the mean value of disposable income from the highly risky income flow is seen from Table 5.2 to be significantly higher than the mean of a proprietor's disposable income from that flow. Yet the third row of Table 5.3 shows that the risk-adjusted net income is in fact higher for the proprietor, because the tax regime for proprietors reduces the riskiness of the income flow considerably.

Table 5.3. Risk-adjusted disposable business income under alternative organizational forms. Benchmark scenario[1]

Degree of riskiness	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk	387,334	385,509	379,031	270,000	376,331	252,000
Medium risk	385,580	387,556	368,195	270,130	367,016	252,121
High risk	387,492	382,914	330,429	256,056	327,814	236,819

Note: The numbers show the risk-adjusted (certainty-equivalent) values of disposable business income, calculated in the manner described in Appendix 5.4, using the results in Table 5.2. The assumptions on the mean and standard deviation of pre-tax business income are taken from Table 5.1.

1. Assumptions: Equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

In a similar way, the mean of the disposable income generated by the highly risky income stream is seen from Table 5.2 to be much higher for qualified shareholders than for proprietors, but according to Table 5.3 the risk-adjusted level of disposable income is in fact slightly higher for proprietors, since they benefit more from the income insurance provided by the progressive labour income tax.

Two broad conclusions emerge from Table 5.3. First, given the 'medium' degree of risk aversion assumed, the tax rules for sole proprietorships and closely held corporations seem to be fairly neutral towards income streams with different degrees of riskiness, since the risk-adjusted income levels in the first two columns of Table 5.3 are roughly unchanged as the degree of riskiness varies. Moreover, the tax system seems to be roughly neutral between sole proprietors and qualified shareholders, since the estimated risk-adjusted disposable income levels are very similar for these two groups.

Second, the tax system appears to discriminate against owning shares that are subject to the tax rules for shares in widely held corporations. This is so even in the case where shareholders can reduce their average tax burden by receiving part of the income from the company in the form of wages and salaries. The lack of progressive taxation of the marginal income from widely held companies means that the tax system offers relatively little income insurance. This has a rather strong negative impact on the risk-adjusted value of highly volatile income streams from widely held corporations.

In the following sections we examine the robustness of these conclusions to changes in various key assumptions.

5.3. Risk-adjusted after-tax incomes from alternative forms of business organization: the importance of the degree of risk aversion

The benchmark scenario considered above assumed a degree of risk aversion lying in the medium range of empirical estimates. In practice the attitude towards risk is likely to vary across entrepreneurs, so this section investigates how the impact of taxation on risk-adjusted disposable income varies with the riskiness of the income stream for different degrees of risk aversion.

To identify the non-neutralities embodied in the tax rules, we must once again compare the taxation of different income streams that would have the same risk-adjusted value in the absence of tax. Table 5.4 describes seven different pre-tax income flows that all have a risk-adjusted value of

500,000 kronor, showing how the mean values of these flows depend on the standard variation and on the degree of risk aversion.

Table 5.4. Alternative certainty-equivalent income streams (kronor per year)[1]

Degree of riskiness		Actual mean income	Standard deviation of income[2]	Risk-adjusted income in the absence of tax[3]
No risk		500,000	0	500,000
Medium risk[4]	Low risk aversion	533,333	133,333	500,000
	Medium risk aversion	571,429	142,857	500,000
	High risk aversion	615,385	153,846	500,000
High risk[5]	Low risk aversion	666,666	333,333	500,000
	Medium risk aversion	1,000,000	500,000	500,000
	High risk aversion	2,000,000	1,000,000	500,000

1. Pre-tax business income after interest but before deduction for wage payments to owners.
2. Average deviation from mean income.
3. Assuming the following alternative values of the Coefficient of Relative Risk Aversion (CRRA): Low risk aversion: CRRA=2. Medium risk aversion: CRRA=4. High risk aversion: CRRA=6.
4. Standard deviation of pre-tax income = 25 percent of mean pre-tax income.
5. Standard deviation of pre-tax income = 50 percent of mean pre-tax income.

Source: Own calculations, based on the method described in Appendix 5.4.

As in the previous section, the standard deviation amounts to 25 percent of the mean for the income stream involving 'medium risk', and to 50 percent of the mean of the 'highly risky' income stream. The 'medium' degree of risk aversion is represented by a Coefficient of Relative Risk Aversion equal to 4 (as assumed in the previous section), while the scenarios with 'low' and 'high' risk aversion assume a value of the CRRA equal to 2 and 6, respectively. We see that, with high risk

aversion, the highly risky income stream must have a mean value of 2,000,000 kronor to be equivalent to a risk-free income flow equal to 500,000 kronor.

Following the same procedure as the previous section, we simulated income flows with the means and standard deviations stated in Table 5.4 over a time span of 800 periods, assuming that business income follows a normal distribution. For each period the tax liability and the entrepreneur's after-tax income under alternative organizational forms was calculated by means of the computer algorithms documented in Appendix 5.1 through 5.3. From the mean values and standard deviations of the simulated disposable income streams we then calculated the risk-adjusted disposable income levels reported in Table 5.5.

The table indicates that, for income streams with medium risk, the attainable risk-adjusted disposable income is not very sensitive to variations in the degree of risk-aversion. The variation of risk-adjusted net income across organizational forms is therefore very similar to the pattern observed in the benchmark scenario with medium risk aversion.

However, for highly risky investments the degree of risk aversion does matter significantly for the amount of risk-adjusted disposable income obtainable under the different organizational forms. In particular, with high risk aversion the tax rules for sole proprietorships and especially for closely held corporations are much more favourable towards highly risky investments than the tax rules for widely held corporations, as indicated by the numbers in the bottom row of Table 5.5.

The reason is that, with high risk aversion and highly risky investment, the income insurance implied by the progressive taxation of the marginal income from sole proprietorships and closely held companies becomes particularly valuable. Moreover, while qualified shareholders tend to benefit just as much as proprietors from the income insurance implied by the progressive labour income tax on their marginal income, qualified shareholders face a lower average tax burden on their intramarginal income because of the relatively generous rules for calculating the imputed capital income of this group. Specifically, since the mean value of the highly risky income stream is quite high (2 million kronor) when risk aversion is high, and since the equity base and the employee wage bill are assumed to rise in proportion to mean income, qualified shareholders benefit substantially from the wage-based allowance and the high imputed return on their equity. Hence the

closely held corporation stands out as the most favoured organizational framework for risky investments when entrepreneurs are highly risk averse.

Table 5.5. Risk-adjusted disposable business income (kronor per year): Importance of the degree of risk aversion[1]

Degree of riskiness		Sole proprie-torship	Closely held corpo-ration	Widely held private corporation		Widely held public corporation	
				Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk		387,334	385,509	379,031	270,000	376,331	252,000
Medi-	Low risk av.	380,436	383,807	375,523	270,443	373,498	252,414
um	Medium risk av.	385,580	387,556	368,195	270,130	367,016	252,121
risk	High risk av.	393,622	392,164	370,408	269,768	369,750	251,784
High	Low risk av.	363,780	375,889	333,662	266,309	330,624	247,833
risk	Medium risk av.	387,492	382,914	330,429	256,056	327,814	236,819
	High risk av.	435,640	514,290	330,445	225,298	329,545	203,778

Note: The numbers show the risk-adjusted (certainty-equivalent) values of disposable business income, calculated in the manner described in Appendix 5.4. The assumptions on the mean and standard deviation of pre-tax business income are taken from Table 5.5. Further assumptions: Equity/Income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent.

1. Assuming the following alternative values of the Coefficient of Relative Risk Aversion (CRRA): Low risk aversion: CRRA=2. Medium risk aversion: CRRA=4. High risk aversion: CRRA=6.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

5.4. Risk-adjusted after-tax incomes from alternative forms of business organization: Importance of the equity/income ratio

This section returns to the assumption of a 'medium' degree of risk aversion (CRRA=4) made in the benchmark scenario in section 5.2. Instead, Table 5.6 illustrates how the risk-adjusted disposable income level varies with the entrepreneur's ratio of equity to mean business income when he is faced with the three alternative income streams characterized in Table 5.1.[32]

Table 5.6 shows that the risk-adjusted net income levels corresponding to income flows with low and medium riskiness are not very sensitive to variations in the equity/income ratio, at least not within the range of variation considered. For business ventures involving a medium degree of riskiness, it remains the case that proprietors and qualified shareholders receive roughly the same tax treatment, and that these two groups are treated somewhat more favourably than holders of shares in widely held companies.

For highly risky projects the equity/income ratio does not matter for the risk-adjusted net income received from widely held companies, because the mean income from these projects is so high that the marginal income is always received in the form of flatly taxed dividends. On the other hand, variations in the equity/income ratio do matter for the risk-adjusted net income obtainable from high-risk projects undertaken by proprietors and qualified shareholders. For proprietors engaging in high-risk investment, a relatively high equity/income ratio ensures that a larger part of the intramarginal business profit gets taxed at the low capital income tax rate whereas the marginal business income will typically be subject to the progressive labour income tax that offers income insurance. This combination of a reasonably low average tax rate and a high marginal tax rate means that proprietors benefit from a high equity/income ratio when engaging in risky business ventures, as indicated by the relatively high risk-adjusted net income reported in the bottom row of the first column of Table 5.6.

[32] Again we have simulated an 800-period sample from each alternative income stream, assuming that business income is normally distributed, and have used the analytical apparatus in Appendix 5.1 through 5.4 to obtain the results in Table 5.6.

Table 5.6. Risk-adjusted disposable business income (kronor per year): Importance of the equity/income ratio[1]

Degree of riskiness		Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
				Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk	E/I=0.5	385,310	385,509	383,199	270,000	381,849	252,000
	E/I=1.0	387,334	385,509	379,031	270,000	376,331	252,000
	E/I=3.0	389,967	385,509	345,826	270,000	337,726	252,000
Medium risk	E/I=0.5	381,024	387,546	367,143	270,130	366,075	252,121
	E/I=1.0	385,580	387,556	368,195	270,130	367,016	252,121
	E/I=3.0	392,659	387,556	360,384	270,130	354,240	252,121
High risk	E/I=0.5	376,980	405,812	330,429	256,056	327,814	236,819
	E/I=1.0	387,492	382,914	330,429	256,056	327,814	236,819
	E/I=3.0	413,818	383,075	330,429	256,056	327,814	236,819

Note: The numbers show the risk-adjusted (certainty-equivalent) values of disposable business income, calculated in the manner described in Appendix 5.4, using the results in Table 5.2. The assumptions on the mean and standard deviation of pre-tax business income are taken from Table 5.1. Further assumptions: Employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent; performance-related share of wage to shareholders in widely held companies = 0.

1. E/I = Equity/Income ratio (ratio of equity to mean pre-tax business income)

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

By contrast, because of the generous rules for calculating the normal dividend of qualified shareholders, a high equity/income ratio means that the marginal income received by this group typically gets taxed proportionally as capital income and hence does not benefit from the income

insurance offered by the progressive labour income tax.[33] When investment is highly risky, this income insurance becomes especially important, so for qualified shareholders it actually becomes advantageous to have a relatively low equity/income ratio (at least given the range of ratios considered in Table 5.6), since they will then benefit from less volatility of their net income (because their marginal income will more often be taxed progressively as labour income) and will still have a fairly large share of their income taxed at the lower capital income tax rate, due to the generous rules for calculating the normal dividend.

For qualified shareholders the normal dividend subject to the low proportional capital income tax depends not only on the equity-income ratio, but also on the ratio of the wage bill to equity, since the latter ratio determines the size of the wage-based allowance. However, simulations based on the computer algorithms in Appendix 5.1 through 5.3 revealed that the risk-adjusted disposable income for qualified shareholders is not very sensitive to variations in the ratio of the employee wage bill to equity at the income levels studied here, that is, pre-tax income streams with a risk-adjusted value of around 500,000 kronor. The reason is that in the benchmark scenario studied in section 5.2, the qualified shareholder already has an unutilized distribution potential in almost every year. Hence his marginal income typically gets taxed as capital income, and the normal dividend typically exceeds the actual dividend. As a consequence, the qualified shareholder does not gain anything from the higher wage-based allowance triggered by a higher wage bill.

5.5. Summary

This chapter has analysed whether the tax rules for the different forms of business organization are especially favourable to activities with either relatively high or relatively low riskiness, measured by the volatility of business income. For this purpose we estimated the risk premium that must be subtracted from the mean value of a volatile income stream to make it fully comparable to a safe income stream with no volatility. The estimated risk premia were used to calculate the risk-adjusted disposable income levels obtainable through the various forms of business organization.

[33] This outcome follows in part from the assumption underlying Table 5.6 that the employee wage bill rises proportionately with the equity base so that a higher stock of equity raises the wage-based allowance as well as the shareholder's imputed return.

As a way of summarising the main findings, it is convenient to convert the estimates of risk-adjusted disposable incomes into so-called risk-adjusted average effective tax rates. The Risk-adjusted Average Effective Tax Rate (RAETR) is defined in the following manner,

$$CE = (1 - RAETR) \cdot CEB \qquad \Leftrightarrow$$

$$RAETR = \frac{CEB - CE}{CEB} \tag{1}$$

where *CE* is the risk-adjusted ('Certainty-Equivalent') value of after-tax income, and *CEB* is the risk-adjusted amount of pre-tax income. Thus the RAETR measures the fraction of total risk-adjusted income that is paid in tax. Because it adjusts for differences in risk, we may directly compare the RAETR on alternative income streams with different degrees of volatility.

Drawing on the estimates of *CE* in Table 5.3, Table 5.7 shows the RAETRs on the various organizational forms in our benchmark scenario. Assuming a degree of risk aversion in the medium range of available empirical estimates, this scenario compared the disposable income from a risk-free income stream to the risk-adjusted disposable income obtainable from two alternative income streams involving a 'medium' and a 'high' degree of risk, respectively. The pre-tax income flow with medium risk had a standard deviation of 25 percent of the mean income level, meaning that on average the realized income in any year is either one quarter above or one quarter below its average level. The highly risky income flow had a standard deviation amounting to 50 percent of the mean. The mean values of the risky income streams were chosen such that the risk-adjusted level of pre-tax income – corresponding to the variable *CEB* in equation (1) – was 500,000 kronor per year for all income flows.

The RAETRs reported in Table 5.7 indicate that the risk-adjusted tax burden on sole proprietorships and closely held corporations is roughly the same and that it varies very little with the degree of riskiness of the income from the business. According to the analysis in section 5.2, the *actual* (unadjusted) average tax burden on risky income streams is higher for proprietors than for qualified shareholders, since the former group is more affected by the progressivity of the labour income tax, but at the same time the progressivity of the tax system provides a higher degree of income

insurance to proprietors than to qualified shareholders. The net result of these offsetting factors is that the two groups face roughly the same average tax burden in risk-adjusted terms.

Table 5.7. Risk-adjusted Average Effective Tax Rates under alternative organizational forms. Benchmark scenario[1]

Degree of riskiness	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
No risk	22.5	22.9	24.2	46.0	24.7	49.6
Medium risk	22.9	22.5	26.4	46.0	26.6	49.6
High risk	22.5	23.4	33.9	48.8	34.4	52.6

Note: The numbers show the Risk-adjusted Average Effective Tax Rate calculated from equation (1), using the values of CE reported in Table 5.3, and recalling that CEB = 500,000 kronor in the benchmark scenario described in Table 5.1.

1. Assumptions: Equity/income ratio = 1; employee wage bill/equity ratio = 0.5; ratio of dividends to basis value of shares in widely held corporations = 15 percent; performance-related share of wage to shareholders in widely held companies = 0.

Source: Own calculations, based on simulation models described in Appendix 5.1 through 5.3.

Table 5.7 also suggests that the tax system discriminates against ownership of shares in widely held corporations even in the case where shareholders can reduce their average tax burden by receiving part of the income from the company in the form of wages and salaries. In particular, the lack of progressive taxation of the marginal income from widely held companies means that the tax system offers relatively little income insurance. This implies a relatively high RAETR on highly volatile income streams from widely held corporations.

Sensitivity analyses showed that these results are not very dependent on the degree of risk aversion as long as one considers business ventures with a medium degree of risk. However, when entrepreneurs are highly risk averse, the analysis strongly indicated that a closely held corporation

is the most attractive organizational framework for highly risky activities. The reason is that the tax regime for qualified shareholders combines a relatively low tax burden on the intramarginal profit with substantial income insurance due to progressive tax on the marginal income from highly risky investments. The analysis also indicated that the tax rules for sole proprietors are more favourable to highly risky activities than are the tax rules for widely held corporations.

Chapter 6

THE TAX BURDEN ON START-UP FIRMS

We have so far focused on the taxation of firms that are already well established as 'going concerns'. However, the start-up of new business firms is an important source of innovation and economic growth (see, for example, the survey by Braunerhjelm (2007)). This chapter therefore presents estimates of the effective tax burden on new start-up firms and considers whether the tax system makes some forms of business organization more attractive than others as a legal framework for the establishment of new firms.

Newly started firms typically go through an initial stage where they are running losses and sometimes face a substantial risk of bankruptcy. Following this critical initial phase, a successful firm enters an expansion phase where earnings are growing and where the firm consolidates and expands through the retention and reinvestment of (a large part of) its profits. Once the firm has demonstrated its viability and ability to grow, the original founder and owner quite often chooses to sell his (ownership share in the) firm, thus reaping a substantial part of the return to his initial investment in the form of a capital gain at the time of sale. Indeed, the possibility of scoring a large capital gain may provide a crucial incentive for the start-up of new innovative but risky business activities.

Because of these special features, the tax treatment of capital gains and the asymmetric tax treatment of gains and losses take on a special importance for new start-up firms. The analysis in the present chapter will highlight this fact and investigate whether the previous conclusions regarding the relative tax burden on alternative organizational forms are significantly modified once we focus on new business firms. In particular, the chapter will estimate how the Swedish tax system affects the expected value of new start-up firms when the risk of bankruptcy is explicitly accounted for. Extending the analysis in the previous chapter, we will present estimates of risk-adjusted average effective tax rates on the expected income from new firms.

Our analysis will focus on the incentives for entrepreneurs who establish a new firm with the purpose of selling (their ownership share in) it at some point when it has proved profitable. We

therefore start out considering the tax consequences of a change in business ownership under the current Swedish tax rules, drawing on the analysis in Chapter 3. Following this, we will be ready to analyse the tax burden on new start-up firms under alternative assumptions regarding the size, the time profile and the riskiness of the cash flows from the firm.

6.1. The tax consequences of a change in ownership

To illustrate the tax rules applying when an entrepreneur sells his business firm, we consider a simplified case where an entrepreneur invests a net equity of 1,000,000 kronor in a business at the start of year 1; uses all of the after-tax profit earned during year 1 to increase the firm's equity base, and sells the (shares in the) firm at the end of year 2 at a price equal to the firm's equity base plus a capital gain of 1,000,000 kronor. The pre-tax profit earned during year 1 is assumed to be 400,000 kronor. In year 2 the pre-tax profit (excluding the revenue from the sale of the firm) is assumed to be 400,000 plus 10 percent of the increase in the firm's net equity between year 1 and year 2 (implying a 10 percent marginal return on the firm's equity).

We describe the tax implications of these business transactions under different organizational forms. In all numerical examples, the government bond rate (statslåneräntan) is assumed to be 4 percent in both years. This implies that the imputed normal rate of return on equity is 9 percent for sole proprietors and 13 percent for qualified shareholders subject to the 3:12 rules. For the purpose of calculating the present value of the entrepreneur's net cash flows, it is assumed that he uses an after-tax discount rate of 10 percent.[34]

Since the tax code treats retained and distributed profits in different ways, we start by considering a scenario where all after-tax profits earned in year 1 are retained and reinvested in the firm. In the case of a sole proprietor, this allows us to illustrate the implications of the expansion fund system described in section 3.5 of Chapter 3. We will compare this scenario to an alternative case where all after-tax profits generated in year 1 are distributed in the most 'tax-efficient' way and then immediately reinjected in the firm as new equity.

[34] The exact choice of the subjective discount rate is not important for the general conclusions drawn below.

Sole proprietor

In the following example, we consider a sole proprietor who uses the expansion fund system in year 1 and the option of positive interest allocation (positiv räntefördelning) in year 2. His business transactions and tax payments during the two years may then be summarised as follows (further explanatory remarks will be given below):

Example 1 (sole proprietor)

Year 1(all profits allocated to expansion fund)

1. Business equity at the end of year 0	1,000,000
2. Business profit before tax	400,000
3. Business income tax (0.28×2)	112,000
4. Retained after-tax profit allocated to expansion fund (2-3)	288,000
5. Unutilised Distribution Potential (0.09×1)	90,000
6. Business equity at the end of the year, including expansion fund (1+4)	1,288,000

Year 2

7. Business profit before tax, excluding revenue from sale of firm (2+0.1×4)	428,800
8. Revenue from sale of firm (1 + 1,000,000)	2,000,000
9. Positive interest allocation (5 + 0.09× (1+5))	188,100
10. Taxable gross labour income (7+$\left(\frac{1}{1-0.28}\right)\times 4$+8 -1-9)	1,640,700
11. Assessed personal labour income ($\frac{10}{1.3071}$)	1,255,221
12. Capital income tax (0.3×9)	56,430
13. Effective social security tax (0.3071×(11 – 370,400))	271,729
14. Personal labour income tax before credit	605,355
15. Credit for pre-paid business income tax ($\left(\frac{0.28}{1-0.28}\right)\times 4 = 3$)	112,000
16. Total tax bill (12+13+14-15)	821,513
17. Net cash flow (4+7+8-16-$(1.1)^2\times 1$)	685,287

During year 1 the proprietor retains and reinvests all of the after-tax profit in his firm. Hence he may use the expansion fund system according to which retained earnings are taxed at the 28 percent corporate income tax rate. If the proprietor had chosen to withdraw income from the firm while using the option for positive interest allocation, a maximum amount equal to 9 percent of the firm's net equity would have been taxed as capital income. This amount represents the proprietor's Unutilised Distribution Potential (see line 5) which may be carried forward into the next year.

At the end of year 1, the firm's actual equity thus consists of the initial equity base plus the retained after-tax profit allocated to the expansion fund during the year (line 6). However, under the rules for positive interest allocation, equity allocated to the expansion fund is not included in the base for calculating the proprietor's imputed return, whereas the Unutilised Distribution Potential (UDP) from the previous year may be carried forward at the imputed rate of return. Hence taxable capital income (the amount of positive interest allocation) in year 2 equals the 9 percent imputed return on the sum of the UDP and the business equity at the end of year 0, plus the amount of the UDP (see line 9).

The profit in year 2 exceeds the profit in year 1 by the assumed 10 percent return on the increase in the firm's equity base between the two years (line 7). The tax code requires that the equity in the expansion fund be withdrawn at the end of year 2 before the sale of the firm, so the revenue from the sale equals the initial equity base plus the assumed capital gain of 1,000,000 kronor (line 8).[35] The taxable capital gain is therefore equal to the revenue from the sale of the firm minus the initial equity injected at the end of year zero. In addition, the proprietor is obliged to add the grossed-up (pre-tax) income previously allocated to the expansion fund to his taxable business income in the year when he sells the firm. Thus taxable business income in year 2 equals the sum of that year's ordinary profit (line 7), the taxable capital gain from the sale of the firm (line 8 minus line 1), and the grossed-up income previously allocated to the expansion fund (line 2 = $\left(\frac{1}{1-0.28}\right)\times 4$). Gross taxable labour income for tax purposes is defined as taxable business income minus the imputed capital income, as indicated in line 10. This labour income is subject to social security tax and personal income tax, calculated in accordance with the rules for 2007 described in Chapter 3 (see

[35] If the proprietor reinjected the amount withdrawn from the expansion fund as new equity right before selling the firm, the sales price would go up by a corresponding amount, but so would the deductible equity base for the purpose of calculating the taxable capital gain. The net after-tax cash flow earned by the proprietor would therefore be identical to that stated in line 17 in Example 1.

line 11, 13 and 14), while the proprietor's capital income is taxed at the flat 30 percent capital income tax rate (line 12). At the same time the proprietor receives a credit for the preliminary 28 percent tax already paid when the allocation to the expansion fund was made (line 15). The net result of these rules is a total tax bill of 821,513 kronor in year 2 (line 16). Note that social security tax is also payable on that part of the gain from the sale of the firm which is deemed to be labour income, since the sale of the firm is treated as a normal taxable business transaction.

Line 17 states the proprietor's after-tax cash flow from all the transactions, calculated in present value terms at the end of year 2. This consists of the after-tax cash flow in that year minus the 1,000,000 injection of equity at the start of year 1, carried forward at the assumed discount rate of 10 percent. The cash flow in year 2 includes the withdrawal from the expansion fund plus the current profit and the revenue from the sale of the firm, minus the net tax bill for year 2.

Instead of expanding the firm's equity base by retaining the profit through the expansion fund in year 1, the proprietor may choose to have his business income in that year taxed as if it were all distributed from the firm. At the end of year 1, he may then inject all of that year's after-tax profit as new equity in the firm. As explained in Chapter 3, a tax-minimising proprietor will not want to opt for interest allocation as long as his gross business income is below 429,500 kronor (2007 level). In Example 2 below, it is therefore assumed that the proprietor chooses to have all of his income in year 1 taxed as labour income.[36]

A comparison with Example 1 shows that, given the level and time profile of pre-tax earnings assumed here, it is not to the proprietor's advantage to make use of the expansion fund system in order to build up equity in his firm, since the present value of his after-tax cash flow is higher if he avoids use of the expansion fund (compare line 17 in Example 1 to line 19 in Example 2). There are essentially two reasons for this result. First, when the proprietor uses the expansion fund, his taxable labour income becomes more unevenly distributed over time, and hence he is hit harder by the progressivity of the (effective) social security tax and the personal labour income tax in year 2.

[36] In this example as well as the following ones, the entrepreneur reinvests his labour income net of the *effective* labour income tax paid, accounting for the fact that part of his social security contribution is offset by entitlement to additional social security benefits. In other words, the entrepreneur reinvests a larger amount than the cash left over after payment of social security contribution and personal income tax on his current income from the firm, since his current earnings have generated rights to additional future payments from the social security system. This assumes that the entrepreneur can mobilise current cash from other sources, say, by borrowing on his private account or by drawing on accumulated savings.

Example 2 (sole proprietor)

Year 1 (no use of expansion fund)

1. Business equity at the end of year 0	1,000,000
2. Business profit before tax = taxable gross labour income	400,000
3. Assessed personal labour income ($\frac{2}{1.3071}$)	306,021
4. Effective social security tax	0
5. Personal labour income tax	81,752
6. Profit after tax (2-4-5)	318,248
7. Unutilised Distribution Potential (0.09×1)	90,000
8. Injection of new equity at the end of the year (=6)	318,248
9. Total business equity at the end of the year (1+8)	1,318,248

Year 2

10. Business profit before tax, excluding revenue from sale of firm ($2+0.1\times 8$)	431,825
11. Revenue from sale of firm (1 + 1,000,000)	2,000,000
12. Positive interest allocation ($7 + 0.09\times(7+9)$)	216,742
13. Taxable gross labour income (10+11 -1 -12)	1,215,083
14. Assessed personal labour income ($\frac{13}{1.3071}$)	929,602
15. Capital income tax (0.3×12)	65,023
16. Effective social security tax ($0.3071\times(14 - 370{,}400)$)	171,731
17. Personal labour income tax	421,054
18. Total tax bill (15+16+17)	657,808
19. Net cash flow ($8+10+11-18-(1.1)^2\times 1$)	882,265

Second, and less important, when he avoids use of the expansion fund, the proprietor's tax bill in year 1 is somewhat lower, so in this way he benefits in present value terms from a deferral of tax. The latter effect is due to the fact that the level of profit in year 1 is below the level that would trigger central government income tax when the profit is taxed as labour income.

These examples suggest that for proprietors with a fairly even distribution of profits over time, it will generally not be attractive to use the expansion fund system. However, if profits in some year are very high due to extraordinary circumstances and the proprietor has a long investment horizon, it may be advantageous for him to retain the profit in the expansion fund as a means of deferring the progressive labour income tax.

Examples 1 and 2 assume that the capital gain in year 2 does not include any gain from the sale of real estate. For comparison, Example 3 below assumes that all of the equity injected in the firm at the end of year zero is invested in business real estate (näringsfastighet), and that all of the capital gain realized at the end of year 2 stems from the sale of this real estate. As explained in section 3.7 of Chapter 3, a proprietor's capital gain on business real estate is taxed as capital income, and only 90 percent of the realized gain is included in the capital income tax base.[37]

From line 21 in Example 3 one sees that the gain from the sale of the firm is treated much more favourably by the tax code when it arises from the realization of real estate, since the proprietor will then escape the progressivity of the (effective) social security tax and the personal labour income tax. Thus the tax rules for sole proprietors involve a significant non-neutrality across different types of business assets.

[37] For simplicity Example 3 assumes that the proprietor claims no depreciation on his real estate in year 1. If any depreciation were claimed in year 1, it would have to be added to taxable business income in year 2.

Example 3 (sole proprietor)

Year 1 (no use of expansion fund)

1. Business equity at the end of year 0	1,000,000
2. Business profit before tax = taxable gross labour income	400,000
3. Assessed personal labour income ($\frac{2}{1.3071}$)	306,021
4. Effective social security tax	0
5. Personal labour income tax	81,752
6. Profit after tax (2-4-5)	318,248
7. Unutilised Distribution Potential (0.09×1)	90,000
8. Injection of new equity at the end of the year (=6)	318,248
9. Total business equity at the end of the year (1+8)	1,318,248

Year 2 (capital gain arises from sale of real estate)

10. Business profit before tax, excluding revenue from sale of firm ($2+0.1\times 8$)	431,825
11. Revenue from sale of firm (1 + 1,000,000)	2,000,000
12. Taxable capital gain ($0.9\times(11-1)$)	900,000
13. Positive interest allocation ($7 + 0.09\times(7+9)$)	216,742
14. Taxable capital income (12+13)	1,116,742
15. Taxable gross labour income (10 -13)	215,083
16. Assessed personal labour income ($\frac{15}{1.3071}$)	164,550
17. Capital income tax (0.3×14)	335,023
18. Effective social security tax	0
19. Personal labour income tax	37,047
20. Total tax bill (17+18+19)	372,070
21. Net cash flow ($8+10+11-20-(1.1)^2\times 1$)	1,168,003

Qualified shareholder

When the firm is organized as a closely held corporation owned by a qualified shareholder, the equity investment made at the end of year zero takes the form of an acquisition of shares worth 1,000,000 kronor, and the ownership change at the end of year 2 involves a sale of these shares at a price equal to the equity accumulated in the firm at the time of sale plus a gain of 1,000,000 kronor. According to the analysis in section 3.8 of Chapter 3, a qualified shareholder optimising the company's distribution policy will distribute all of the company's income below 490,500 kronor in the form of wages or salaries. As indicated in Table 3.2 of Chapter 3, the shareholder will face an effective marginal tax rate below the 28 percent corporate income tax rate as long as his gross wage income (including the social security contribution) is below 435,100 kronor. Thus, for income below this level the shareholder will not want to form equity through retention of profits in the company, since he will then have to pay the flat 28 percent corporate income tax on his business income. Instead he will distribute all profits as wages and reinject the after-tax wage income as new equity at the end of the year. This strategy also has the advantage that it increases the basis for calculating the normal dividend for the subsequent year, thus increasing the fraction of next year's income that may be taxed at the low 20 percent dividend tax rate.

In Example 4 below it is therefore assumed that all of the company's gross business income in year 1 is paid out as wages to the qualified shareholder who then reinjects all of his after-tax wage income as new equity at the end of the year. Note that this strategy for the formation of equity in year 1 is directly comparable to the tax-minimising strategy followed by the sole proprietor in Example 2. By analogy to that example, the calculations below assume that the shareholder follows an optimal distribution policy in year 2 as well as in year 1. As explained in section 3.8 of Chapter 3, this implies that all gross business income below 490,500 and above 490,500 plus the normal dividend is distributed as wage income. The tax implications for the qualified shareholder may then be stated as follows:

Example 4 (qualified shareholder)

Year 1

1. Business equity at the end of year 0 (= acquisition price of shares)	1,000,000
2. Business profit before tax and deduction for shareholder wage	400,000
3. Gross wage of qualified shareholder (=2)	400,000
4. Assessed personal labour income ($\frac{3}{1.3242}$)	302,069
5. Corporate income tax ($0.28\times(2-3)$)	0
6. Effective social security tax	0
7. Personal labour income tax	80,503
8. Unutilized Distribution Potential (normal dividend = 0.13×1)	130,000
9. Injection of new equity at the end of the year (3-6-7)	319,497
10. Business equity at the end of the year (basis value of shares = 1+9)	1,319,497

Year 2

11. Business profit before tax and deduction for shareholder wage ($2+0.1\times 9$)	431,950
12. Revenue from sale of shares (10 + 1,000,000)	2,319,497
13. Capital gain on shares (12-10)	1,000,000
14. Gross wage of qualified shareholder (=11)	431,950
15. Normal dividend ($0.13\times 10+1.07\times 8+0.25\times 4$)	386,152
16. Assessed personal labour income ($\frac{14}{1.3242}$+13-15)	940,045
17. Corporate income tax ($0.28\times(11-14)$)	0
18. Capital income tax (0.2×15)	77,230
19. Effective social security tax	0
20. Personal labour income tax	426,965
21. Total tax bill (17+18+19+20)	504,195
22. Net cash flow (12+14-21-$(1.1)^2\times 1$)	1,037,252

In the example above the shareholder's normal dividend in year 2 includes a wage-based allowance of 25 percent of his assessed personal wage income in year 1 (it is assumed that the company has no employees). In addition, the normal dividend for year 2 includes the Unutilized Distribution Potential from year 1, carried forward at an interest rate three percentage points above the assumed 4 percent government bond rate (see line 15).[38]

The taxable capital gain on shares in year 2 is the difference between the sales price and the basis value of the shares (line 13). The normal dividend for year 2 stated in line 15 gives that part of the capital gain which is taxed as capital income at the reduced 20 percent rate applying to qualified shareholders. The remaining part of the capital gain is subject to progressive personal labour income tax.

Note that capital gains (and dividends) on qualified shares are not subject to social security tax even if they are categorised as labour income, whereas a sole proprietor must pay social security tax (egenavgift) on that part of the gain from the sale of a firm which is classified as labour income. This is the reason why the sole proprietor in Example 2 is taxed more heavily in year 2 than the qualified shareholder in Example 4.

Widely held corporations

Consider next the case where the entrepreneur owns the company jointly with several other shareholders so that he is not categorised as a qualified shareholder subject to the 3:12 rules. To maintain comparability with the previous examples, we continue to assume that the entrepreneur works in the company; that his equity in the firm amounts to 1,000,000 kronor at the end of year zero, that his proportionate share of the company's profit before deduction for wages paid to the owners amounts to 400,000 kronor in year 1, and that he scores a capital gain of 1,000,000 kronor by selling his share in the firm at the end of year 2. As in the previous examples, we also assume that the after-tax income received from the company during year 1 is reinvested in the firm at the

[38] Under Swedish tax law a normal dividend is imputed to a qualified shareholder only if the company has distributed some amount of dividend. However, even a purely symbolic dividend of, say, one krona suffices for this purpose, so in practice this rule has no quantitative importance. Example 4 therefore assumes that a normal dividend is imputed to the shareholder even though no dividend is paid in year 2.

end of year 1. Since gross wage income below 435,100 kronor (2007 level) is taxed at a lower effective rate than the 28 percent corporate income tax rate, the entrepreneur's tax-minimising strategy is to receive his income from the company in the form of a wage or salary and reinject his after-tax labour income as new equity at the end of year 1, rather than having the company retain its profits. Similarly, in year 2 the shareholder will want to receive his income from the company as a wage rather than a dividend.

If the corporation is a private (that is, unlisted) company, its shareholders will be subject to the reduced 25 percent tax rate on their dividends and capital gains, and the tax consequences of the entrepreneur's transactions will then be as indicated in Example 5 below. Comparing examples 2, 4 and 5, one sees that the shareholder in the widely held company ends up with a higher after-tax cash flow than the sole proprietor and the qualified shareholder. The reason is that all of the capital gain of the shareholder in the widely held company is taxed as capital income, thus escaping social security tax as well as the progressivity of the personal labour income tax.

If the widely held company is listed on the stock exchange, the dividends and capital gains of its shareholders are taxed at the standard 30 percent capital income tax rate. The item in line 16 of Example 5 would then rise to 300,000 kronor, and the net cash flow in line 20 would fall to 1,153,319 kronor, still leaving the shareholder in the widely held company better off than the sole proprietor and the qualified shareholder, except in the case where all of the proprietor's capital gain arises from the sale of real estate (Example 3).

These simple examples suggest that when capital gains constitute a substantial part of the total business income of an entrepreneur, proprietors carry a relatively heavy tax burden, whereas shareholders in widely held companies receive a relatively lenient tax treatment, with qualified shareholders falling somewhere between these two poles. The rest of this chapter will investigate whether this conclusion is robust to changes in the level, timing and riskiness of the income from the firm.

Example 5 (widely held private corporation)

Year 1

1. Business equity at the end of year 0 (= acquisition price of shares)	1,000,000
2. Business profit before tax and deduction for shareholder wage	400,000
3. Gross wage of shareholder (=2)	400,000
4. Assessed personal labour income ($\frac{3}{1.3242}$)	302,069
5. Corporate income tax ($0.28\times(2-3)$)	0
6. Effective social security tax	0
7. Personal labour income tax	80,503
8. Injection of new equity at the end of the year (3-6-7)	319,497
9. Business equity at the end of the year (basis value of shares = 1+8)	1,319,497

Year 2

10. Business profit before tax and deduction for shareholder wage ($2+0.1\times8$)	431,950
11. Revenue from sale of shares (9 + 1,000,000)	2,319,497
12. Capital gain on shares (11-9)	1,000,000
13. Gross wage of shareholder (=10)	431,950
14. Assessed personal labour income ($\frac{13}{1.3242}$)	326,197
15. Corporate income tax ($0.28\times(10-13)$)	0
16. Capital income tax (0.25×12)	250,000
17. Effective social security tax	0
18. Personal labour income tax	88,128
19. Total tax bill (15+16+17+18)	338,128
20. Net cash flow (11+13-19-$(1.1)^2\times1$)	1,203,319

6.2. A stylized scenario for a new start-up firm

As a prelude to a more comprehensive and systematic analysis of the tax treatment of new start-up firms, this section describes a stylized scenario for the establishment and growth of a new firm. This scenario will form the basis for the estimates of effective tax rates presented in the subsequent sections. Although necessarily simplified, the scenario captures some typical features of young firms, and it is sufficiently flexible to allow for different levels and time profiles of the cash flows from the firm as well as different degrees of riskiness of these cash flows. By varying the assumptions regarding these characteristics, we can estimate how they affect the effective tax burden on firms started up under alternative organizational forms. We can also study how alternative capital gains tax rules affect the profitability of starting up new firms.

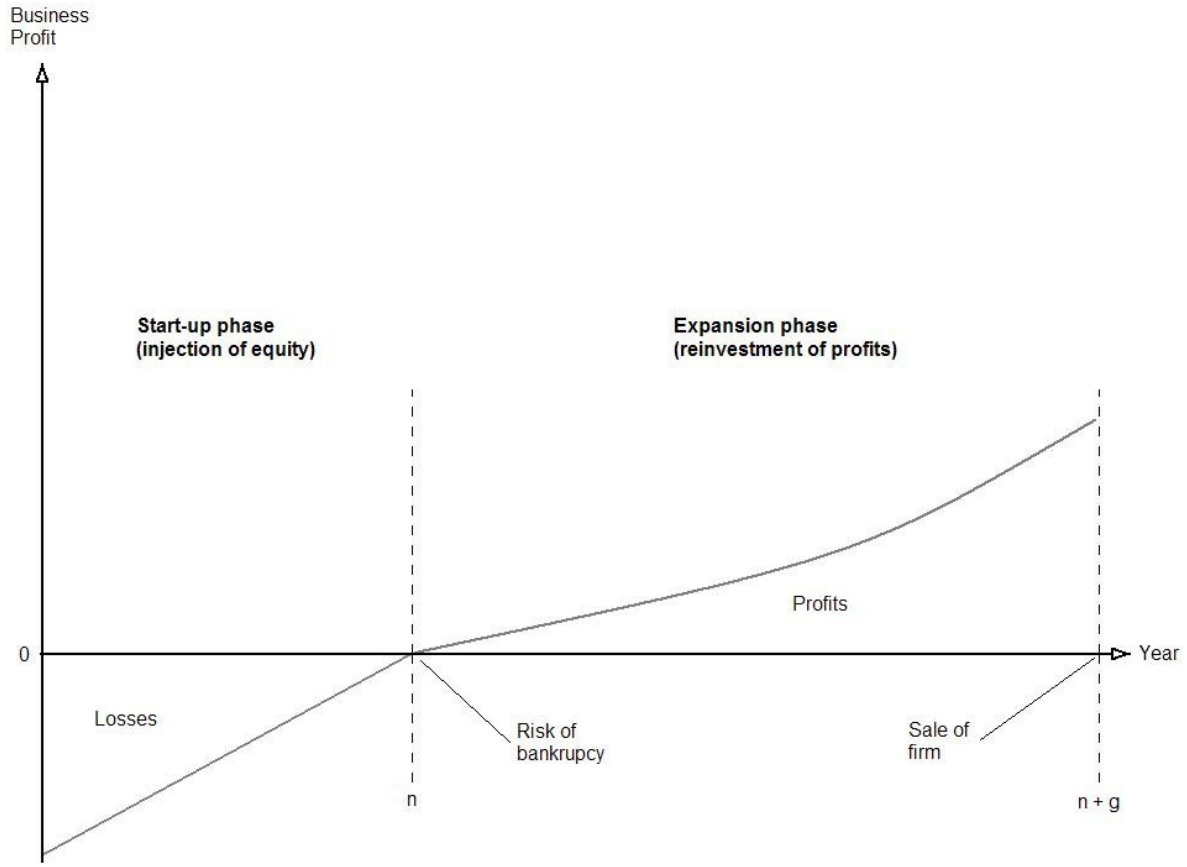
The qualitative features of our scenario are illustrated in Figure 6.1 (a more precise formal description is given in Appendix 6.1 through 6.3). At the beginning of year zero, the entrepreneur starts up a new business by injecting an initial amount of equity into the firm. During the first years of its existence the firm makes losses, but the losses are gradually declining and are completely eliminated in year *n*.

The period from year zero to year *n* is denoted the 'start-up' phase. During this phase the firm develops its product and/or method of production and starts to penetrate its market. As a simple way of accounting for risk and uncertainty, the firm is assumed to face some given probability of going bankrupt at the end of the start-up phase. For example, we may think of the start-up phase as the time it takes for the firm to develop a new product. At the end of that phase, the new product is ready for marketing, and then it is revealed whether it passes or fails the market test. If the potential customers like the new product, the firm will survive and prosper, but if they do not like it, the firm will have to go out of business. By varying the probability of bankruptcy, we can vary the degree of riskiness attached to the expected cash flows from the firm and can consider very 'safe' as well as highly risky business ventures.

During the start-up phase the firm's net equity is assumed to be kept constant. Since the firm is making losses, the entrepreneur must therefore inject an additional amount of new equity equal to

the amount of loss every year during the start-up phase. Note that these equity injections do not add to the business assets of the firm, since they only serve to prevent a rise in its debt.

Figure 6.1. Stylized scenario for a new start-up firm



If the firm survives the start-up phase, it enters the 'expansion phase' which lasts until year $n+g$ where the firm is sold by the initial owner. During the expansion stage the firm continues to increase its profits year by year, in part by reinvesting all of the after-tax profit made during the previous year. In other words, a part of the annual increase in profits during the expansion stage arises from an increase in the firm's capital stock which is assumed to earn a fixed marginal rate of return. The revenue from the sale of (the shares in) the firm at the end of year $n+g$ is assumed to be proportional to the firm's profit during that year.

Initially during the expansion phase the firm pays no tax because of carry-forward of the losses made during the start-up phase. As profits grow and positive tax liabilities emerge, the entrepreneur is assumed to follow a distribution policy that minimises the total tax paid by the firm and the owner. For a proprietor this means that use of the expansion fund system is not profitable in the scenario considered in this chapter, for the reasons explained in section 6.1. Further, a qualified shareholder is assumed to pay himself a wage or salary and to reinject his after-tax labour income as new equity in the company whenever this leads to a lower overall tax bill than retention of profit. As far as widely held companies are concerned, we will consider a case where shareholders do not receive any labour income from the firm as well as a case where the company can pay them wages (which are then reinvested as new equity) with the purpose of minimising the total tax bill for the firm and its owners.

In our stylized scenario the entrepreneur does not make any net withdrawal of cash from the firm until he sells it, except for withdrawals needed to pay the taxes imposed along the way.[39] This implicitly assumes that he has other sources of income or that he is able to borrow or can draw on previously accumulated savings to finance his consumption until the time of sale of the firm.

Our scenario also assumes that reinvested profits made during the expansion phase add to the firm's equity base for tax purposes. If the firm relies on intangible rather than tangible assets, one may think of the firm as building up intangible assets such as know-how and goodwill through the work effort of its owner. These intangibles then provide the basis for the subsequent profits earned. If the firm is making a positive profit that is not immediately consumed by the owner, and if this retained profit is not invested in tangibles, it must be invested in financial assets or used to repay the firm's debt. In these cases the firm's net equity base for tax purposes will still increase. For example, when a company is accumulating financial assets or repaying debt, the controlling owner can use this as a basis for issuing new shares to himself (he can take out the profit and reinvest it as new equity in the firm, and the firm can then use the funds to buy financial assets or to repay debt). Hence the analysis below is relevant for firms relying on intangibles as well as for firms whose assets are mainly tangible.

[39] Indeed, the calculations below assume that the entrepreneur only withdraws an amount equal to the sum of his personal tax liability and his *effective* social security tax. When he receives wage income from the firm, he thus reinvests the value of additional social security entitlements generated by this income. This is analogous to the assumption made in the examples in section 6.1 (see footnote 3).

The model of the start-up and growth of a new firm outlined above is specified in formal mathematical terms in Appendices 6.1 through 6.3 for the various organizational forms. By choosing specific values for the parameters of the model, one can estimate average effective tax rates on each organizational form. Table 6.1 reports the parameter values chosen in the benchmark scenario analysed in the next section.

As indicated, the start-up phase and the expansion phase are both assumed to last for five years, so the entrepreneur's planning horizon at the time of start-up is 10 years. The initial amount of equity injected at the time of start-up is half a million kronor, as is the business loss incurred during the first year of operation. Over the remaining four years of the start-up phase the loss declines linearly to zero. To make up for the losses, the entrepreneur injects additional new equity into the firm in every year of the start-up phase, so after five years he has invested a total amount of 1,750,000 kronor in the firm. After 10 years he sells the (shares in the) firm at a price equal to about 6.8 million kronor, amounting to 10 times the profit made during the tenth year. Our benchmark scenario assumes that the business assets sold do not include real estate, since capital gains on real estate realized by a sole proprietor are subject to special tax rules, as explained in section 6.1. Section 6.6 will illustrate the tax implications for sole proprietors of varying the share of real estate in total business assets.

The expected probability of bankruptcy at the end of the start-up phase is assumed to be 10 percent. According to the analysis in Appendix 6.1 a bankruptcy risk of this magnitude implies that the standard deviation of the cash flow received in year 10 is 33 percent of its mean value (when evaluated from the time of start-up). As will be recalled from Chapter 5, the standard deviation of a random variable measures the average size of its deviation from the mean value around which it fluctuates. The standard deviation of 33 percent assumed here exceeds the standard deviation of 25 percent that was taken to represent a 'medium' degree of riskiness in the benchmark scenario of Chapter 5. The difference is meant to reflect that the future income flows from a new start-up firm tend to be more uncertain than the income from a well-established firm.

Table 6.1. Characteristics of the start-up firm in the benchmark scenario

Length of start-up phase	5 years
Length of expansion phase	5 years
Initial injection of equity	500,000
Initial business loss	500,000
Annual increase in profits during start-up phase	125,000
Annual increase in profit during expansion phase[1]	100,000
Profits during last year of expansion phase in the absence of tax	683,700
Revenue from sale of firm in the absence of tax	6,837,000
Marginal real rate of return on business investment during expansion phase	0.1
Capitalisation factor[2]	10
Share of real estate in total business assets	0
Probability of bankruptcy at the end of start-up phase	0.1
Risk-free real discount rate	0.02
Coefficient of Relative Risk Aversion	4

1. In addition to the increase in profit stemming from the rise in the firm's capital stock.
2. Defined as $k=R/Y$, where R is the revenue from the sale of the firm, and Y is business profit during the last year before the sale

The so-called Coefficient of Relative Risk Aversion (CRRA) reported in the bottom row of Table 6.1 is used to convert the risky cash flow from the firm into a risk-adjusted number that may be directly compared to a completely safe (risk-free) cash flow. The method of risk-adjustment used here is identical to the one applied in Chapter 5. The CRRA of 4 assumed in Table 6.1 corresponds to the 'medium' degree of risk aversion assumed in the benchmark scenario considered in Chapter 5. Given the level of risk implied by the 10 percent probability of bankruptcy, a CRRA equal to 4 implies a risk premium of 22.2 percent, meaning that the risk-adjusted value of the uncertain cash flow received in year 10 is 22.2 percent lower than its expected mean value.

Once the future cash flows from the firm have been adjusted for risk, their net present value can be calculated by using the so-called risk-free discount rate, that is, the rate of interest on 'safe' assets

such as short-term government bonds. As stated in Table 6.1, we assume a risk-free real discount rate of 2 percent.

To measure the tax burden in the presence of uncertainty, and to compare the tax burdens on business ventures with different degrees of riskiness, we use a variant of the Risk-Adjusted Average Effective Tax Rate (RAETR) already introduced in Chapter 5. The exact mathematical definition of the RAETR is given in Appendix 6.1. Roughly speaking, the definition is

$$RAETR = \frac{\text{risk-adjusted present value of total tax payments}}{\text{risk-adjusted present value of pre-tax cash flows generated after the time of start-up}} \qquad (1)$$

Thus the RAETR measures the government's share in the present value of the future risk-adjusted cash flows from the firm. This measure of tax is equivalent to the concept of RAETR introduced in section 5.5 of Chapter 5, since both measures rely on exactly the same form of risk adjustment. By converting taxes and pre-tax income into present value terms, the measure of RAETR used here just accounts for the fact that inflows and outflows of cash are unsynchronized and unevenly distributed over time.

Note that the RAETR measures the expected risk-adjusted tax burden as seen from the time of start-up when the entrepreneur does not know whether his new firm will survive. This is the relevant 'forward-looking' measure of tax burden when one wants to estimate how the tax system affects the *incentive* to undertake *new* business activities.

To illustrate the implications and importance of adjusting for risk, the next section will also apply a measure of Average Effective Tax Rate (AETR) defined as

$$AETR = \frac{\text{expected present value of tax payments}}{\text{expected present value of pre-tax cash flows generated after the time of start-up}} \qquad (2)$$

The expected present values in the numerator and in the denominator of this measure of effective tax are the mean values in the statistical sense, that is, the average values across failing and successful firms. The AETR defined above therefore measures the average amount of tax *revenue*

collected from the type of firms considered. For a *risk-neutral* entrepreneur who focuses only on the average level of net profit without any regard to the volatility of earnings, this is also the expected tax burden that determines his incentive to start up a firm. Thus the RAETR will converge towards the AETR as the degree of risk aversion (the CRRA) approaches zero, so the two measures of effective tax are closely connected, since the AETR is just the limiting value of the RAETR.

When the degree of risk aversion is positive, the RAETR will always exceed the AETR in our scenario, so the effective tax burden for a risk averse entrepreneur will always be larger than the expected tax burden for a risk-neutral entrepreneur. A simple numerical example may illustrate why this is so: suppose the expected present value of tax payments is 50, and suppose the losses made during the start-up phase have a present value of -100 while the expected value of the positive pre-tax cash flows during the expansion phase is 200. According to equation (2) the Average Effective Tax Rate will then be given by

$$AETR = \frac{50}{-100+200} = \frac{50}{100} = 0.5$$

Consider now the definition of the RAETR given in equation (1) and suppose that, to be comparable to a cash flow occurring with full certainty, the risky cash flows in our example have to be adjusted downwards by a risk premium of 20 percent. In our scenario for a new start-up firm, the tax payments appearing in the numerator of equation (1) are all uncertain, since they only have to be made if the firm survives the start-up phase. In our numerical example the numerator in the expression for the RAETR may therefore be calculated as $(1-0.2)\cdot 50 = 40$. The denominator in (1) includes the uncertain pre-tax cash flows that will be realized if the firm survives into the expansion stage. The risk-adjusted value of these flows in our example is $(1-0.2)\cdot 200 = 160$. But the denominator in (1) also includes the negative cash flows realized during the start-up phase, and these initial losses are assumed to occur with certainty. This is a simple way of capturing the fact that the initial losses of a new start-up firm tend to occur with greater certainty than the positive cash flows expected to materialize in the more distant (and hence less predictable) future. Since the initial losses of 100 in our example are fully predictable, they do not need any adjustment for risk. According to (1) the Risk-adjusted Average Effective Tax Rate therefore becomes

$$RAETR = \frac{(1-0.2)\cdot 50}{-100+(1-0.2)\cdot 200} = \frac{40}{60} = 0.666$$

which is seen to be higher than the AETR. The reason is that the risk-adjustment causes a larger proportionate reduction of the denominator than of the numerator in (1), since it does not affect the negative cash flow appearing in the denominator.

Even if the initial losses were in fact uncertain, the RAETR would still be higher than the AETR in all cases where the initial losses occur with greater certainty than the positive cash flows earned in the more distant future. In all such cases the risk-adjustment would still imply a smaller proportionate reduction of the negative cash flows in the denominator of (1) than the proportionate reduction in the positive cash flows included in the definition of the RAETR. The conclusion that the RAETR exceeds the AETR may thus be expected to hold for most new start-up firms, since losses are often unavoidable in the initial start-up phase, and since the near future is easier to predict than the events of a more distant future.[40]

6.3. Effective tax rates on start-up firms under alternative organizational forms: benchmark scenario

Based on the assumptions described in the previous section and the computer algorithms documented in Appendix 6.1 through 6.3 (embodying the tax rules for 2007), Table 6.2 presents estimates of Average Effective Tax Rates and Risk-adjusted Average Effective Tax Rates on new firms started up under alternative organizational forms. The table also reports the expected net present value of the (cash flows from the) firm before and after tax, measured at the time of start-up in unadjusted as well as risk-adjusted terms.

[40] However, one can think of cases where the negative cash flows in the start-up phase are in fact more uncertain than the positive flows occurring in the expansion phase. For example, if the expected losses in the start-up phase stem from highly unpredictable R&D activities, and if a successful R&D effort will result in a new production method that will ensure future cost reductions with a high degree of certainty (or will result in a new product that will surely be in demand), the RAETR as defined in (1) could exceed the AETR defined in (2), since the risk-adjustment of the negative initial cash flows in the denominator of (1) would be relatively large in these cases.

Table 6.2. Estimated average effective tax rates on a start-up firm: benchmark scenario[1]

	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
Expected value of firm before tax	3,851,060	3,851,060	3,851,060	3,851,060	3,851,060	3,851,060
Expected value of firm after tax	1,442,221	2,469,422	2,795,448	2,665,391	2,649,611	2,460,389
Risk-adjusted value of firm before tax	2,617,115	2,617,115	2,617,115	2,617,115	2,617,115	2,617,115
Risk-adjusted value of firm after tax	743,573	1,542,507	1,796,082	1,694,927	1,682,654	1,535,481
AETR (%)[2]	55.4	31.8	24.3	27.3	27.6	32.0
RAETR (%)[3]	60.1	34.5	26.3	29.6	30.0	34.7

8. Based on the assumptions summarised in Table 6.1.
9. Average Effective Tax Rate, as defined in equation (2).
10. Risk-Adjusted Average Effective Tax Rate, as defined in equation (1).

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

In the absence of tax the firm will generate exactly the same cash flows and will hence have the same value under all organizational forms, as indicated in the first and the third row of Table 6.2. The risk-adjusted value of the firm in the third row is seen to be considerably lower than the expected mean value of its cash flows reported in the first row, reflecting the substantial risk implied by the possibility of bankruptcy. The difference between the AETRs and the RAETRs recorded in the two bottom rows of Table 6.2 also illustrate the quantitative importance of adjusting for risk when calculating the effective tax burden. The risk-adjusted tax rate (RAETR) is seen to be higher than the unadjusted tax rate (AETR) under all organizational forms, for the reasons explained in the previous section. Moreover, in the presence of tax the risk-adjusted values of the

firm and the Risk-adjusted Average Effective Tax Rates are seen to differ across organizational forms, implying that the tax system is non-neutral.

For example, the RAETR on a firm started up as a sole proprietorship is much higher than the RAETR on a start-up firm organized as a closely held corporation. There are three main reasons for this. First, for the proprietor a larger part of the capital gain from the sale of the firm is taxed at the high marginal rate applying to labour income rather than at the low marginal rate applying to capital income. Specifically, in our benchmark scenario the proprietor's imputed normal return to equity is roughly 881,000 kronor in the last year of the expansion phase, whereas the imputed normal return for the qualified shareholder amounts to more than 2,181,000 kronor in that year, partly because the imputed rate of return is higher for qualified shareholders than for proprietors, and partly (and less important here) because the qualified shareholder may include a wage-based allowance in his imputed return.[41] The second reason for the lower RAETR on the qualified shareholder is that his capital income is taxed at the reduced rate of 20 percent, whereas the proprietor must pay the standard 30 rate of tax on his capital income. Third, and most important, while the proprietor is liable to social security tax as well as personal labour income tax on the part of his capital gain categorised as labour income, the qualified shareholder does not pay any social security tax on that part of his capital gain which exceeds his imputed return to equity. In the benchmark scenario underlying Table 6.2, the proprietor pays an effective social security tax of more than 1,014,000 kronor in the year when the firm is sold, whereas the qualified shareholder only pays an effective social security tax of about 41,000 kronor on his wage income during that year.

As a result of these differences in tax rules, the Risk-adjusted Effective Average Tax Rate on the proprietor is more than 25 percentage points higher than that on the qualified shareholder in Table 6.2. For widely held public corporations that are not able to distribute part of their income as wages to shareholders, the RAETR is seen to be roughly similar to that imposed on closely held companies, but when widely held companies can distribute part of their income as wages to shareholders with the purpose of minimising the total tax burden, the AETR and the RAETR levied on these companies is even lower (and indeed considerably lower in the case of widely held private companies) than the corresponding tax rates for qualified shareholders. The explanation is that all of the capital gain made on the sale of the shares in the widely held companies in the last year of the

[41] In our benchmark scenario the firm is assumed to have no employees, so the wage-based allowance is based only on the wage paid by the company to the qualified shareholder himself.

expansion phase is taxed as capital income (at a rate of 25 percent for unlisted shares and 30 percent for listed shares), thus escaping the progressivity of the labour income tax.

The estimates in Table 6.2 are based on the specific assumptions underlying our benchmark scenario for the start-up of a new firm. The following sections will test the robustness of the estimates to changes in these assumptions.

6.4. The importance of bankruptcy risk and risk aversion for the risk-adjusted tax burden

The expected probability that the firm will go bankrupt is an important determinant (indeed the sole determinant in our scenarios) of the riskiness of starting up a new business, since a higher probability of bankruptcy increases the standard deviation of the expected future cash flows from the firm, as demonstrated in Appendix 6.1.

Because the entrepreneur in our scenario only pays tax if his new firm survives into the expansion phase, one would expect the risk-adjusted tax burden to vary with the level of bankruptcy risk. Table 6.3 shows the estimated RAETRs for three different probabilities of bankruptcy (5 percent, 10 percent and 20 percent, respectively). According to the analysis in Appendix 6.1 these alternative levels of bankruptcy risk imply that the standard deviation of the expected net cash flow from the firm in the year of sale is, respectively, 23 percent, 33 percent and 50 percent of its mean value.

When estimating the RAETRs for the different levels of risk considered in Table 6.3, the annual increase in profit during the expansion phase was adjusted upwards with the level of risk to keep the risk-adjusted value of the firm before tax at the same level in as in the benchmark scenario. The table thus compares three different business ventures that would be equally attractive in the absence of tax, even though they involve different degrees of riskiness. Apart from varying the level of bankruptcy risk and the associated steepness of the rise in profits during the expansion phase, Table 6.3 maintains all the other assumptions of the benchmark scenario.

Table 6.3. Risk-Adjusted Average Effective Tax Rates (%) on a start-up firm at varying degrees of riskiness[1]

	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
Low risk of bankruptcy[2]	54.6	26.6	23.6	26.7	26.7	31.5
Medium risk of bankruptcy[3]	60.1	34.5	26.3	29.6	30.0	34.7
High risk of bankruptcy[4]	71.6	48.5	32.3	35.1	37.0	40.8

1. Based on the assumptions summarised in Table 6.1, except for the assumption on the probability of bankruptcy. The annual increase in profits during the expansion phase is adjusted to keep the risk-adjusted value of the firm before tax at the same level as in the benchmark scenario for all probabilities of bankruptcy.
2. Probability of bankruptcy at the end of start-up phase = 0.05.
3. Probability of bankruptcy at the end of start-up phase = 0.1 (benchmark scenario).
4. Probability of bankruptcy at the end of start-up phase = 0.2.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

It is seen that the RAETRs for all organizational forms increase significantly with the level of risk. As will be recalled from section 6.2, the risk-adjustment of the firm's cash flows systematically increases the effective tax burden, because the proportionate downward adjustment of the expected pre-tax cash flows is larger than the proportionate downward adjustment of the expected future tax payments. This positive effect of risk-adjustment on the RAETR is greater the higher the degree of riskiness, since higher riskiness is associated with a higher risk premium that requires a stronger adjustment for risk.

We also see from Table 6.3 that a rise in the risk level causes a larger increase in the RAETR for sole proprietorships and closely held companies than for widely held corporations. As the expected level of profit in the expansion phase goes up to compensate for a higher level of risk, the capital

gain from the sale of the firm also increases. Since the imputed return on equity does not rise correspondingly, a larger fraction of the gain for proprietors and qualified shareholders becomes subject to progressive labour income tax. For widely held companies this tax progressivity effect on the RAETR is absent, since all of the capital gain is taxed as capital income. In the case of high risk aversion where the pre-tax capital gain at the end of the expansion phase is large, the tax progressivity effect for qualified shareholders is also mitigated by the rule that the amount of capital gain that can be taxed as labour income cannot exceed 4,590,000 kronor during a six-year period.

While Table 6.3 focuses on the impact on the RAETR of varying the level of risk for a given degree of risk aversion, Table 6.4 shows the effect on the RAETR of varying the entrepreneur's aversion towards risk, holding the probability of bankruptcy as well all other parameters constant at the levels assumed in the benchmark scenario. Thus the magnitude and timing of all pre-tax and after-tax cash flows are exactly the same as in that scenario. Given the assumed 10 percent probability of bankruptcy, the three different degrees of risk aversion considered in Table 6.3 correspond to required risk premia of, respectively, 11 percent, 22 percent and 33 percent of the expected mean value of the cash flow received in the year when the firm is sold.

Table 6.4 shows that the RAETR is systematically increasing with the degree of risk aversion. As the required risk premium goes up with the level of risk aversion, the risk-adjustment of the firm's uncertain future cash flows becomes stronger, resulting in a stronger positive effect on the RAETR, for the reason explained above. However, we also see from Table 6.4 that variations in the degree of risk aversion do not have a dramatic impact on the Risk-adjusted Effective Tax Rate.

Table 6.4. Risk-Adjusted Average Effective Tax Rates (%) on a start-up firm at varying degrees of risk aversion[1]

	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
Low risk aversion[2]	57.3	32.9	25.1	28.2	28.6	33.1
Medium risk aversion[3]	60.1	34.5	26.3	29.6	30.0	34.7
High risk aversion[4]	64.2	36.8	28.1	31.6	32.0	37.1

1. Based on the assumptions summarised in Table 6.1, except for the assumption on the Coefficient of Relative Risk Aversion.
2. Coefficient of Relative Risk Aversion = 2.
3. Coefficient of Relative Risk Aversion = 4 (benchmark scenario).
4. Coefficient of Relative Risk Aversion = 6.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

6.5. The risk-adjusted tax burden at varying levels of profit and loss

The benchmark scenario in section 6.3 assumed an annual increase in profit of 100,000 kronor during the expansion phase, on top of the increase stemming from the return on reinvested profits, implying that the firm was making a current profit of about 683,000 kronor before tax in the final year of the expansion phase and that the revenue from the sale of the (shares in the) firm was about 6.8 million kronor.

Table 6.5 illustrates the sensitivity of the RAETR to varying the level of profitability during the expansion phase while maintaining the other assumptions of the benchmark scenario, including the assumption that the revenue from the sale of the firm is ten times the amount of profit earned during

the last year of the expansion phase. The different levels of profitability considered in the table imply that the risk-adjusted present value of the pre-tax cash flows from the firm vary from around 690,000 kronor to about 14.2 million kronor.

The relatively low level of profitability assumed in the first row of Table 6.5 was chosen such that the risk-adjusted present value of the firm after tax is only slightly positive for a sole proprietor. At this low level of profitability the Risk-adjusted Average Effective Tax Rate is seen to be more than twice as high for a proprietor than for a qualified shareholder. The reason is that all of the qualified shareholder's capital gain from the sale of the firm is taxed as capital income (because of the favourable rules for calculating the imputed return to the equity of a closely held company), whereas a substantial part of the proprietor's capital gain is taxed as labour income at a marginal rate that is more than three times as high as the capital income tax rate for qualified shareholders. As the level of profitability increases, a part of the capital gain of the qualified shareholder becomes subject to the progressive personal labour income tax, and hence the gap between the RAETR for proprietorships and closely held companies diminishes.

However, because the amount of capital gain that can be taxed as labour income cannot exceed 4,590,000 kronor over a six-year period for a qualified shareholder, the fraction of his gain that is subject to progressive labour income tax actually starts to fall when the gain exceeds a certain level. This explains why the RAETR for the closely held corporation falls as we move from the second last to the last row in Table 6.5. It also helps to explain why a very large gap remains between the RAETR for a sole proprietor and for a qualified shareholder at high levels of profitability.

Since holders of shares in widely held companies are not subject to progressive labour income tax on the capital gain on their shares, the RAETRs for these companies are relatively low and not very sensitive to variations in the level of profitability, as indicated by the last four columns in Table 6.5.

Table 6.5. Risk-Adjusted Average Effective Tax Rates (%) on a start-up firm at varying degrees of profitability[1]

Annual increase in profits during expansion phase	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
50,000[2]	53.4	22.9	26.0	27.9	29.0	33.4
100,000[3]	60.1	34.5	26.3	29.6	30.0	34.7
200,000[4]	61.5	41.0	27.8	30.2	31.9	35.0
400,000[5]	63.5	38.5	29.1	30.5	33.4	35.2

1. Based on the assumptions summarised in Table 6.1, except that the annual increase in profits during the expansion phase is varied to achieve different risk-adjusted values of the firm before tax.
2. Risk-adjusted value of firm before tax = 688,900.
3. Risk-adjusted value of firm before tax = 2,617,100 (benchmark scenario).
4. Risk-adjusted value of firm before tax = 6,473,500.
5. Risk-adjusted value of firm before tax = 14,186,300.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

Table 6.6 illustrates how the RAETR is affected by the size of the losses made during the start-up phase. In the benchmark scenario the firm starts out by making a loss of 500,000 kronor during the first year, corresponding to the entrepreneur's initial injection of equity. Typically the required initial equity base will increase with the expected level of initial business losses.[42] Table 6.6 therefore maintains the assumption that the equity injection at the time of start-up equals the expected first-year business loss. Further, to ensure comparability between the alternative scenarios shown in Table 6.6, the annual increase in profits during the expansion phase is adjusted upwards with the level of the initial loss to keep the risk-adjusted pre-tax value of the firm at the same level as in the benchmark scenario. The table thus considers alternative business ventures that are equally

[42] In particular, if the firm is also dependent on debt finance, potential lenders seeking to avoid excessive risk of default by the entrepreneur are likely to require a larger equity base the larger the initial business losses expected.

attractive in the absence of tax, but where ventures involving higher initial losses also involve a more steeply rising earnings profile throughout the start-up phase as well as the expansion phase.

Table 6.6. Risk-adjusted Average Effective Tax Rates on a start-up firm (%) at varying levels of losses during start-up phase[1]

Initial business loss (= initial injection of equity)	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
250,000[2]	57.2	39.0	24.9	30.1	28.5	34.9
500,000[3]	60.1	34.5	26.3	29.6	30.0	34.7
1,000,000[4]	61.1	28.8	26.7	28.3	30.5	33.7

1. Based on the assumptions summarised in Table 6.1, except that the initial business loss and the initial injection of equity (assumed to be equal to one another) are varied at the same time as the annual increase in profits during the expansion phase is varied to keep the risk-adjusted value of the firm before tax at the same level as in the benchmark scenario.
2. Annual increase in profits during expansion phase = 84,000.
3. Annual increase in profits during expansion phase = 100,000 (benchmark scenario).
4. Annual increase in profits during expansion phase = 132,000.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

For sole proprietorships we see that a larger initial loss implies a higher RAETR. As a higher initial loss is associated with a larger capital gain when the firm is sold, the proprietor is hit harder by the progressivity of the labour income tax on his capital gain, but according to Table 6.6 the impact on the RAETR is modest.

For qualified shareholders, a higher initial loss is seen to imply a significant drop in the RAETR, given our assumption that a larger initial loss must be accompanied by a larger equity base. With a larger equity base, the entrepreneur benefits more from the high imputed rate of return on qualified shares. The higher profits during the expansion phase associated with the higher losses during the start-up phase also enable him to increase his labour income from the firm so as to benefit from the

wage-based allowance included in the normal dividend. Hence a larger fraction of his capital gain gets taxed as capital income at the end of the expansion phase, thus driving down his RAETR.

For widely held companies we see that the size of the initial loss during the start-up phase has very little impact on the RAETR.

6.6. The importance of capital gains tax rules for the risk-adjusted tax burden

The benchmark scenario assumed that the assets sold by the sole proprietor at the end of the expansion phase do not include business real estate. As noted in section 6.1, capital gains on such assets are taxed as capital income when they are realized by a sole proprietor, and only 90 percent of the nominal gain is included in the proprietor's capital income tax base.

Table 6.7 illustrates how the RAETR on a firm started up by a sole proprietor varies with the share of real estate in the total assets sold at the end of the expansion phase. The table maintains all the other assumptions of the benchmark scenario, so the top row simply restates the RAETR estimated for that scenario. As the share of real estate in total assets rises from zero to one, the RAETR is seen to drop by 32 percentage points. With this dramatic decline, we see by comparing the bottom rows of Table 6.2 and 6.7 that the RAETR for a sole proprietor becomes roughly equal to the low RAETR imposed on widely held private corporations, and significantly lower than the RAETR for closely held corporations. On the other hand, when real estate only makes up half of total business assets, the RAETR for sole proprietors reported in Table 6.7 is roughly 42 percent, still considerably above the RAETRs for the other organizational forms in Table 6.2.

Table 6.7. Risk-adjusted Average Effective Tax Rate (%) on a firm started up by a sole proprietor: importance of the fraction of assets invested in real estate[1]

Fraction of assets invested in real estate	Risk-adjusted Average Effective Tax Rate
0[2]	60.1
0.5	41.8
1.0	28.1

1. Based on the assumptions summarised in Table 6.1, except that the fraction of assets invested in real estate is varied.
2. Benchmark scenario.

Source: Own calculations, based on simulation model described in Appendix 6.1.

These estimates suggest that the composition of business assets is very important for the effective tax burden imposed on sole proprietors. In particular, the previous conclusion that proprietors face a relatively heavy tax burden does not hold when their assets mainly consist of real estate.

Let us finally consider the implications of alternative rules for the taxation of capital gains on qualified shares. As noted in Chapter 3, these rules are currently in a state of transition. During the period 2007-2009 only half of the gain in excess of the qualified shareholder's imputed normal dividend will be taxed as labour income, whereas the other half will be taxed as capital income at the standard 30 percent rate. After 2009 a capital gain on a qualified share will be taxed as capital income at a reduced rate of 20 percent in so far as it does not exceed the normal dividend, whereas all of the gain above this limit will be taxed progressively as labour income.

Both of these sets of rules are modified by an additional permanent rule stating that the maximum amount of capital gain that can be taxed as labour income during a six-year period is 100 inkomstbasbelopp, amounting to 4,590,000 kronor in 2007. If the excess of the total gain over the

normal dividend is larger than this limit, the remaining gain is taxed as capital income at the standard 30 percent rate.

The benchmark scenarios in this report are based on the permanent capital gains tax rules for qualified shareholders that will prevail after 2009. However, it is also of interest to consider the implications of the current transitional rules, especially since they correspond to the historical practice regarding the taxation of capital gains on qualified shares.

Table 6.8. Risk-adjusted Average Effective Tax Rate (%) on a firm started up by a qualified shareholder: importance of capital gains tax rules[1]

Capital gain at the time of sale[2]	Capital gains tax rules	Risk-adjusted Average Effective Tax Rate
3,830,000[3]	Permanent rules	34.5[6]
	Temporary rules	30.5
6,620,000[4]	Permanent rules	42.6
	Temporary rules	36.0
9,445,000[5]	Permanent rules	41.0
	Temporary rules	41.0

1. Based on the assumptions summarised in Table 6.1, except for variation in the fraction of the excess capital gain which is taxed as labour income and for variation in the size of the gain. The 'permanent' capital gains tax rules are those that will prevail after 2009, while the 'temporary rules' are those in force in 2007-2009 (see text).
2. Rounded figures.
3. Annual increase in profits during expansion phase = 100,000 kronor.
4. Annual increase in profits during expansion phase = 150,000 kronor.
5. Annual increase in profits during expansion phase = 200,000 kronor.
6. Benchmark scenario.

Source: Own calculations, based on simulation model described in Appendix 6.2.

The first two rows of Table 6.8 show the RAETRs for a qualified shareholder under the permanent rules as well as under the current temporary capital gains tax rules, given the level and timing of the firm's cash flows in the benchmark scenario. Thus the figure in the top row of the last column simply restates the estimated RAETR in the benchmark scenario which was based on the permanent rules. From the second row of the last column we see that the current temporary rules actually imply a lower RAETR, because half of the gain in excess of the normal dividend escapes the progressivity of the personal labour income tax.

The 'medium size' capital gain of about 6.6 million kronor considered in the middle part of Table 6.8 is taxed more heavily than the 'small' gain in the upper part of the table, because a larger part of the total gain is now subject to progressive labour income tax, but the temporary rules remain more favourable than the permanent ones.

The bottom part of Table 6.8 assumes a high level of profitability during the expansion phase and hence a relatively high capital gain of around 9.5 million kronor when the entrepreneur sells his shares. In this case the 4,590,000 kronor limit on the amount of gain liable to labour income tax comes into force under the temporary as well as under the permanent tax rules. Hence the split of the gain into a labour income component and a capital income component is identical under both sets of rules, and consequently the RAETR is also the same.

These examples show that, for qualified shareholders with small and medium-size capital gains, the current temporary capital gains tax rules are more favourable than the future 'permanent' rules, whereas the two sets of rules imply the same tax burden on qualified shareholders with relatively large capital gains, due to the cap on the amount of gain that can be taxed as labour income.

6.7. Summary

This chapter presented estimates of the tax burden on new start-up firms. Since new firms often make losses during their first years of operation, and since they are frequently sold by the initial owner after having proved their viability, the tax treatment of losses and capital gains are especially important for young expanding firms. Moreover, new start-up firms face substantial business risks,

including the risk of bankruptcy, and while some amount of business loss is often unavoidable during the first years of operation, the positive profits expected in the more distant and unpredictable future tend to occur with much greater uncertainty.

To capture these characteristics, the chapter described the following stylized scenario for a new firm: At first, it goes through a start-up phase during which it makes gradually declining losses and faces some risk of bankruptcy. If the firm survives the start-up phase, it enters an expansion phase where it makes positive and gradually increasing profits which are reinvested in the firm. After a number of years the firm is then sold by the initial owner who makes a capital gain that depends on the current size of the firm's cash flow. By allowing alternative assumptions on the probability of bankruptcy and the level and steepness of the firm's earnings profile, this stylized scenario can encompass a wide range of business ventures with different degrees of profitability and riskiness.

Based on a set of benchmark parameter values, this model of a new start-up firm was used to calculate the expected mean values of its pre-tax and after-tax cash flows as well as the degree of uncertainty (measured by the standard deviation) attached to these flows under alternative forms of business organization. Following a procedure similar to the one used in Chapter 5, the uncertain cash flows were then adjusted for risk by subtracting appropriate risk premia to make all flows fully comparable to a safe cash flow.

In this way we arrived at the estimated effective tax rates summarised in Table 6.9, where the Average Effective Tax Rate (AETR) and the Risk-adjusted Average Effective Tax Rate (RAETR) are equivalent to the corresponding measures introduced in Chapter 5, except that here the effective tax rates are calculated from the discounted present value of the relevant cash flows to allow for the fact that the positive and negative cash flows for a start-up firm occur at different points in time.

The AETR measures the expected average tax burden across failing and successful start-up firms. This is the relevant measure of tax from the perspective of a risk-neutral entrepreneur who focuses only on the average expected net earnings. The RAETR measures the expected tax payments as well as the expected pre-tax cash flows in risk-adjusted terms, assuming a 'medium' degree of risk aversion. For entrepreneurs averse to risk, this is the more relevant measure of tax burden. The RAETR is seen to be systematically higher than the AETR. As the chapter explained, this will

always be the case when the new firm starts out by making losses and when these losses accrue with a higher degree of certainty than the positive profits expected further into the future.

In the benchmark scenario underlying Table 6.9, the tax burden on new firms started up by sole proprietors is much higher than the burden on firms established by qualified shareholders. There are three reasons for this. First, for the proprietor a larger part of the capital gain from the sale of the firm is taxed at the high marginal rate applying to labour income rather than at the low marginal rate applying to capital income, since the imputed rate of return to equity is higher for qualified shareholders than for proprietors, and since the qualified shareholder may include a wage-based allowance in his imputed return. Second, the qualified shareholder only pays a 20 percent tax on his capital income, whereas the proprietor must pay the standard 30 rate of tax on his capital income. Third, and most important, while the proprietor is liable to social security tax as well as personal labour income tax on the part of his capital gain categorised as labour income, the qualified shareholder only pays personal labour income tax on that part of his capital gain which exceeds his imputed return to equity.

Table 6.9. Estimated average effective tax rates (%) on a start-up firm: benchmark scenario[1]

	Sole proprietor-ship	Closely held corporation	Widely held private corporation		Widely held public corporation	
			Distribution of wages and dividends	Distribution of dividends	Distribution of wages and dividends	Distribution of dividends
AETR[2]	55.4	31.8	24.3	27.3	27.6	32.0
RAETR[3]	60.1	34.5	26.3	29.6	30.0	34.7

4. Based on the assumptions summarised in Table 6.1.
5. Average Effective Tax Rate, as defined in equation (1). Assumes risk neutrality.
6. Risk-Adjusted Average Effective Tax Rate, as defined in equation (2). Assumes 'medium' degree of risk aversion.

Source: Own calculations, based on simulation models described in Appendix 6.1 through 6.3.

For widely held public corporations that are not able to distribute part of their income as wages to shareholders, the RAETR in Table 6.9 is roughly similar to that imposed on closely held

companies. However, when widely held companies can distribute part of their income as wages to shareholders with the purpose of minimising the total tax burden on the firm and its owners – as assumed in the third and the sixth column of Table 6.9 – the effective tax rates levied on these companies is even lower than the corresponding tax rates for qualified shareholders. The explanation is that all of the capital gain made on the sale of shares in widely held companies is taxed as capital income (at a rate of 25 percent for unlisted shares and 30 percent for listed shares), thus escaping the progressivity of the labour income tax.

The chapter undertook extensive sensitivity analysis to test the robustness of the results in Table 6.9 to changes in the circumstances of the firm. The main findings were as follows:

A higher risk of bankruptcy combined with a higher expected profitability in case the firm survives systematically increases the risk-adjusted tax burden on all organizational forms. The rise in the RAETR on sole proprietors and qualified shareholders is particularly large, since these taxpayers are hit by the progressivity of the labour income tax as their level of earnings increases. The risk-adjusted tax burden also increases modestly for all organizational forms as the entrepreneur's degree of risk aversion goes up. However, varying the assumptions regarding the degree of riskiness or the degree of risk aversion does not change the conclusion that sole proprietors face a significantly higher tax burden than the other organizational forms, and that widely held private start-up companies are treated quite favourably by the tax code.

When the firm's profitability during the expansion phase goes up, generating a higher capital gain when the firm is sold, the RAETR for sole proprietors also increases as they are hit harder by the progressive labour income tax on (most of) their gain. By contrast, when the size of the capital gain rises above a certain level, a further rise in the gain actually reduces the RAETR on qualified shareholders, since a growing fraction of their gain gets taxed as capital income, due to the cap on the amount of their gain that can be taxed as labour income. For this reason the risk-adjusted tax burden on qualified shareholders becomes just as low as the burden on shareholders in widely held companies when the level of profitability and capital gain is high.

A higher level of initial loss during the start-up phase also reduces the RAETR on qualified shareholders, on the realistic assumption that it is associated with a larger initial injection of equity.

Because of the high imputed rate of return on the equity of a qualified shareholder, a larger equity base means that a larger share of his capital gain gets taxed at the low capital income tax rate. By contrast, the RAETR on the other organizational forms is not very sensitive to variations in the initial losses made during the start-up phase and the associated variations in the initial equity base and in the firm's earnings profile.

The estimated effective tax rates on closely held companies are based on the permanent rules for the the taxation of capital gains on qualified shares that will prevail after 2009. Under these rules all of the gain in excess of the imputed normal dividend is taxed as labour income, but the capital income component of the gain is taxed at a reduced rate of 20 percent. Under the temporary rules prevailing until the end of 2009, only half of the gain in excess of the normal dividend is taxed as labour income, while the other half is subject to the standard 30 percent tax rate on capital income. Both sets of rules are modified by the cap of 4,590,000 kronor (in 2007) on the amount of capital gain that can be taxed as labour income during a six-year period. All gains above the cap are taxed at the standard 30 percent capital income tax rate. In the case of large capital gains this cap means that the division of the gain into a labour income component and a capital income component will be the same under the current temporary rules and under the permanent rules, and hence the effective tax burden will also be the same. However, for gains of smaller size, the temporary rules will often be more favourable, because the fraction of the gain subject to progressive labour income tax tends to be smaller under these rules.

The benchmark scenario assumed that the assets sold by the sole proprietor at the end of the expansion phase do not include business real estate. When capital gains on such assets are realized by a sole proprietor, they are taxed as capital income, and only 90 percent of the nominal gain is included in the capital income tax base. As a result of this favourable tax treatment, the tax burden on proprietors falls substantially as the share of real estate in total business assets increases. Indeed, when this share comes close to one, the RAETR on sole proprietorships falls below that on closely held companies and becomes roughly equal to the RAETR on widely held companies. This suggests that a sole proprietorship (or a partnership) could be an attractive organizational form for businesses specializing in real estate investment.

In summary, the analysis in this chapter shows that when capital gains constitute an important part of the return to entrepreneurship, the tax burden on sole proprietorships is generally quite high, whereas the burden on widely held companies is relatively light, with the burden on closely held companies falling somewhere in between. In most circumstances the tax system appears to favour the widely held private company as an organizational framework for starting up a new business. However, for proprietorships and partnerships specializing in real estate investment, and for closely held companies generating large capital gains to their shareholders, the effective tax burden tends to be just as low as that on widely held private companies.

APPENDIX 3.1
THE TAXATION OF EARNED INCOME IN SWEDEN

This appendix explains the derivation of the effective marginal tax rates on labour income presented in Table 3.1 in Chapter 3. We employ the following

Notation

w = assessed personal labour income (taxerad arbetsinkomst)

G = standard deduction (grundavdrag)

E = earned income tax credit (jobskatteavdrag)

S = base for calculating the earned income tax credit (särskilt belopp)

τ^k = local government income tax rate

τ^{sb} = basic central government income tax rate

τ^{ss} = rate of central government surtax

T^P = personal labour income tax liability

The personal tax on labour income

To focus on the taxation of labour income, we consider a taxpayer with no income from other sources. Under current Swedish tax rules, the total personal income tax liability for a taxpayer with labour income above the standard deduction is given as follows:

$$T^P = \tau^k \left(w - G\right) - E \qquad \text{for} \qquad w \leq 328,600 \tag{3.1}$$

$$T^P = \tau^k \left(w - G\right) + \tau^{sb} \left(w - 328,600\right) - E \qquad \text{for} \qquad 328,600 < w \leq 488,600 \tag{3.2}$$

$$T^P = \tau^k \left(w - G\right) + \tau^{sb} \left(w - 328,600\right) + \tau^{ss} \left(w - 488,600\right) - E \qquad \text{for} \qquad w > 488,600 \tag{3.3}$$

Equation (3.1) describes the situation for a taxpayer with income below the level triggering central government income tax. Such a person only pays income tax to the local government. Equation (3.2) gives the tax bill for a person who is only liable for the basic central government income tax, while (3.3) states the tax liability for a person whose income exceeds the threshold for the central government surtax.

Both the standard deduction and the earned income tax credit depend on the level of labour income. Table A.3.1 shows the amount of standard deduction granted at various income levels (in rounded figures):

Table A.3.1. The standard deduction (grundavdrag) at various income levels (2007)

Assessed income (taxerad inkomst (*w*))	**Standard deduction (*G*)**
0 – 39,900	17,000
39,900 – 109,600	17,000 + 0.2(*w*-39,900)
109,600 – 125,300	31,000
125,300 – 317,600	31,000 – 0.1(*w*-125,300)
317,600 -	11,800

Source: Beräkningskonventioner 2007. En rapport från Skatte-ekonomiska enheten på Finansdepartementet (Tabell 3.2, p. 42).

The table shows that the standard deduction increases with income in the interval between 39,900 kronor and 109,600 kronor whereas it falls with income in the interval from 125,300 kronor to 317,600 kronor. However, the resulting impact on the effective marginal tax rate is neutralized by the way in which the earned income tax credit is calculated. Specifically, the earned income tax credit is given as

$$E = \tau^k \left(S - G\right) \qquad \text{for} \quad S \geq G$$
$$E = 0 \qquad \text{for} \quad S < G \tag{3.4}$$

where the amount *S* (särskilt belopp) varies with labour income in the manner described in Table A.3.2:

Table A.3.2. The base amount for calculating the earned income tax credit (särskilt belopp, taxpayer below age 65, rounded figures, 2007)

Assessed income (taxerad inkomst)	Särskilt belopp (*S*)
0 – 31,800	$S = w$
31,800 – 109,600	31,800 + 0.2(w-31,800)
109,600 -	47,400

Source: Beräkningskonventioner 2007. En rapport från Skatteekonomiska enheten på Finansdepartementet (Tabell 3.6, p. 46).

Combining equations (3.1) through (3.4) with the information in Tables A.3.1 and A.3.2, one obtains the following expressions for the total personal labour income tax liability in the various income brackets:

$$0-31{,}800: \qquad T^P = \tau^k\left(w-17{,}000\right)-\tau^k\left(w-17{,}000\right)=0$$

$$31{,}800-39{,}900: \qquad \begin{aligned} T^P &= \tau^k\left(w-17{,}000\right)-\tau^k\left[31{,}800+0.2\left(w-31{,}800\right)-17{,}000\right] \\ &= \tau^k\left(1-0.2\right)\left(w-31{,}800\right) \end{aligned}$$

$$39{,}900-109{,}600: \qquad \begin{aligned} T^P &= \tau^k\left[w-17{,}000-0.2\left(w-39{,}900\right)\right] \\ &\quad -\tau^k\left[31{,}800+0.2\left(w-31{,}800\right)-17{,}000-0.2\left(w-39{,}900\right)\right] \\ &= \tau^k\left(1-0.2\right)\left(w-31{,}800\right) \end{aligned}$$

$$109{,}600-125{,}300: \qquad \begin{aligned} T^P &= \tau^k\left(w-31{,}000\right)-\tau^k\left(47{,}400-31{,}000\right) \\ &= \tau^k\left(w-47{,}400\right) \end{aligned}$$

$$125{,}300-317{,}600: \qquad \begin{aligned} T^P &= \tau^k\left[w-31{,}000+0.1\left(w-125{,}300\right)\right] \\ &\quad -\tau^k\left[47{,}400-31{,}000+0.1\left(w-125{,}300\right)\right] \\ &= \tau^k\left(w-47{,}400\right) \end{aligned}$$

$$317,600-328,600: \quad T^P = \tau^k\left(w-11,800\right)-\tau^k\left(47,400-11,800\right)$$
$$= \tau^k\left(w-47,400\right)$$

$$328,600-488,600: \quad T^P = \tau^k\left(w-11,800\right)+\tau^{sb}\left(w-328,600\right)-\tau^k\left(47,400-11,800\right)$$
$$= \tau^k\left(w-47,400\right)+\tau^{sb}\left(w-328,600\right)$$

$$328,600-488,600: \quad T^P = \tau^k\left(w-11,800\right)+\tau^{sb}\left(w-328,600\right)-\tau^k\left(47,400-11,800\right)$$
$$= \tau^k\left(w-47,400\right)+\tau^{sb}\left(w-328,600\right)$$

$$488,600-: \quad T^P = \tau^k\left(w-11,800\right)+\tau^{sb}\left(w-328,600\right)+\tau^{ss}\left(w-488,600\right)-\tau^k\left(47,400-11,800\right)$$
$$= \tau^k\left(w-47,400\right)+\tau^{sb}\left(w-328,600\right)+\tau^{ss}\left(w-488,600\right)$$

The above equations define a continuous tax schedule with the effective marginal personal tax rates stated in Table A.3.3, where we have inserted the relevant values of the statutory tax rates prevailing in an average municipality in 2007 ($\tau^k = 0.316, \quad \tau^{sb} = 0.2, \quad \tau^{ss} = 0.05$):[43]

Table A.3.3. Effective marginal personal tax rates, 2007

Assessed income	Marginal tax rate
0 – 31,800	0
31,800 – 109,600	$\tau^k\left(1-0.2\right) = 0.253$
109,600 – 328,600	$\tau^k = 0.316$
328,600 – 488,600	$\tau^k + \tau^{sb} = 0.516$
488,600	$\tau^k + \tau^{sb} + \tau^{ss} = 0.566$

Source: Own calculations.

[43] Note that according to the above equations, the tax liability at the income level of 109,600 kronor may either be calculated as $T^P = \tau^k\left(1-0.2\right)\left(109,600-31,800\right)$ or as $T^P = \tau^k\left(109,600-47,400\right)$. Except for a small inaccuracy due to our rounding of the figures in the tax schedule, these two expressions imply the same tax bill, thus confirming that the tax schedule is indeed continuous at all income levels.

Social security tax

The Swedish social security tax is levied at a proportional (tax-exclusive) rate of 32.42 percent on all wages paid out by Swedish employers (arbetsgivaravgift), while sole proprietors are liable to a proportional social security tax (egenavgift) of 30.71 percent on their assessed personal labour income (2007 tax rates).

The total social security tax consists of a general wage tax (allmän löneavgift) of 4.4 percent plus a number of specific contributions set so as to cover the expected costs of various particular social security benefits. Table A.3.4 shows the contribution rates levied to finance the various social insurance programs in 2007.

Table A.3.4. Social security contribution rates (percent of personal labour income, 2007)

Social insurance programme	Contribution rate for wage earners (arbetsgivaravgift)	Contribution rate for self-employed (egenavgift)
Retirement benefit programme	10.21	10.21
Sickness insurance	8.78	9.61
Work injury insurance	0.68	0.68
Labour market contribution (unemployment insurance etc.)	4.45	1.91
Life insurance (efterlevandepensionsavgift)	1.70	1.70
Parental leave programme	2.20	2.20
Ordinary wage tax (allmän löneavgift)	4.40	4.40
Total social security contribution	32.42	30.71

Source: Beräkningskonventioner 2007. En rapport från Skatteekonomiska enheten på Finansdepartementet (Tabell 6.1, p. 97).

The social security benefits to which the taxpayer is entitled increase with his level of income up to a cap which varies across the different social insurance programmes. For example, the entitlement to retirement benefit increases in proportion to income up to 8.07 IBB (inkomstbasbelopp), corresponding to about 370,400 kronor (after deduction for social security contribution) in 2007. When income exceeds this threshold, the retirement benefit is capped. For sickness insurance and work injury insurance the income threshold where benefits are capped is 7.5 PBB (prisbasbelopp), equivalent to about 302,300 kronor in 2007, whereas the income threshold for benefits under the parental leave scheme is 10 PBB or roughly 403,000 kronor in 2007.

For income exceeding the thresholds where social security benefits are capped, the social security tax clearly works like an ordinary tax, but for income below these levels it may be seen as an insurance premium. Evaluating the exact element of tax in the total social security contribution is difficult, given the complex nature of the system of social insurance. A pragmatic estimate of the tax element could be obtained through the following line of reasoning:

The most important social security benefit is the retirement benefit which is capped at an income of about 370,400 kronor. The contribution rate for the retirement benefit roughly covers the total expenditure on such benefits, and the Swedish Ministry of Finance estimates that about 34 percent of the aggregate wage bill consists of wages exceeding 370,400 kronor per annum. Therefore, while 100 percent of the benefit entitlements accrue to wage incomes below 370,400 kronor, the social security tax on these incomes only finances about 66 percent of the benefits. On this basis one could argue that the effective social security tax rate is actually negative for incomes below 370,400 kronor. However, the total social security contribution also includes the 4.4 percent general wage tax which does not generate any entitlements. As a very rough approximation, the calculations in this report therefore assume that the effective marginal social security tax rate (adjusted for the increased benefit entitlement generated by an increase in income) is zero for income below 370,400 kronor, whereas it is equal to the statutory social security tax rate for income above that level.[44]

[44] Some social security benefits such as retirement benefits are on average paid out much later than the time when the taxpayer paid his social security contribution. To be directly comparable to the contributions, the benefits should be discounted back to the time when the contributions were made. Such discounting reduces the present value of the benefits, thereby increasing the element of pure tax in the social security contributions. On the other hand, benefit rates tend to grow over time in line with the growth of wage rates. If the average rate of increase of wages (and thus of benefits) corresponds roughly to the after-tax interest rate – which is probably not a bad approximation – the effect of discounting will tend to be offset by the effect of the growth in benefit rates over time. For this reason we do not make

The total marginal effective tax rate on labour income

The total tax on labour income consists of the social security tax and the personal labour income tax. Table 3.1 in Chapter 3 expresses the total marginal tax rate in percent of the taxpayer's *gross* labour income (W) which is related to his personal labour income (w) by the equation

$$W = (1+s)\,w \tag{3.5}$$

where s is the tax-exclusive social security tax rate. Measured relative to gross income, the marginal social security tax rate is thus equal to $s/(1+s)$. Similarly, to convert the marginal personal tax rates into percentages of gross labour income, one has to divide the marginal tax rates derived in Table A.3.3 (which were measured relative to wages *after* deduction for social security tax) by the factor $(1+s)$ and multiply by 100. The resulting numbers are stated in the third column of Table 3.1 in Chapter 3.

any attempt to allow for differences in the timing of contributions paid and benefits received in our rough estimate of the tax element in the social security contributions.

APPENDIX 4.1.
THE IMPACT OF EFFECTIVE TAX RATES ON INVESTMENT AND THE CHOICE OF ORGANIZATIONAL FORM

Chapter 4 introduced the concepts of the Average Effective Tax Rate (AETR) and the Marginal Effective Tax Rate (METR). This appendix explains the relations between these measures of effective tax and how they are likely to affect the decisions of firms.

The METR and investment decisions

Consider a simple example where the firm's value-added (Y) depends on the input of capital (K) and on a fixed factor which could represent the talent and skills of the entrepreneur. Specifically, suppose that value-added is given by

$$Y = F(K), \qquad F' > 0, \qquad F'' < 0 \tag{4.1}$$

where the signs of the derivatives of the function $F(K)$ reflect that the marginal productivity of capital is positive but diminishing, due to the presence of the fixed factor. Suppose further that the firm's investment is financed by equity and that the entrepreneur's opportunity cost of equity finance (r) is not deductible from taxable profits. After-tax economic profits (Π) are then equal to

$$\Pi = Y - rK - T(Y), \qquad T' > 0 \tag{4.2}$$

where $T(Y)$ is the total tax paid by the firm and its owner, and where the marginal tax rate T' is positive and may vary with the level of income.

If the entrepreneur invests with the purpose of maximising after-tax economic profits, the firm's capital stock may be found from the first-order condition $d\Pi / dK = 0$. Denoting the marginal pre-tax rate of return on capital by c, this condition implies that

$$c = \frac{r}{1-m}, \qquad c \equiv F'(K), \qquad m \equiv T'(Y) \tag{4.3}$$

As explained in Chapter 4, the marginal effective tax rate is defined as

$$METR = \frac{c-r}{c} \tag{4.4}$$

From (4.3) and (4.4) one easily finds that

$$METR = m \tag{4.5}$$

Equations (4.3) and (4.5) show that the firm's optimal capital stock - and hence the total level of pre-tax business income - depends on the METR. As stated in Chapter 4, the METR determines the optimal scale of business activity within a given organizational form subject to a given tax schedule.[45]

The AETR and the choice of organizational form

In the present static setting, the Average Effective Tax Rate (AETR) is defined as the total tax bill relative to total pre-tax income:[46]

$$AETR = \frac{T(Y)}{Y} \tag{4.6}$$

Equation (4.6) follows the conventional definition of the AETR according to which the total tax payment is measured relative to pre-tax profits *before* deduction for the opportunity cost of equity

[45] Strictly speaking, it is the tax schedule as such that determines the optimal scale of activity, since the METR will vary with the chosen level of investment whenever the marginal tax rate depends on the level of income. But in the example of a linear tax schedule given in equation (4.9) below, it is fully correct to say that the METR "determines" the optimal scale of investment.

[46] In a dynamic context, the AETR is defined as the present value of total tax relative to the present value of pre-tax income. When the latter is constant over time, this dynamic concept of AETR becomes identical to the AETR specified in (4.6), provided that tax rules are also kept constant.

finance, rK . This is in line with the practice of the tax code not to allow deduction for the cost of equity. Using (4.1), (4.2) and (4.6), we may write the total after-tax profit as

$$\Pi = \left[1 - AETR(K)\right] F(K) - rK, \qquad AETR(K) \equiv \frac{T(F(K))}{F(K)} \tag{4.7}$$

Since the level of K depends on the METR (which in itself depends on Y and hence on K), we see from (4.7) that the AETR is linked to the METR. In particular, it follows from (4.1), (4.6) and (4.7) plus the definitions stated in (4.3) that

$$\frac{dAETR}{dK} = \frac{T'F'Y - TF'}{Y^2} = \frac{c(METR - AETR)}{Y} \tag{4.8}$$

showing that a rise in the capital stock brought about by a lower METR will increase the AETR if the METR is initially higher than the AETR, and vice versa.

However, since the METR only reflects the marginal tax rate at the particular income level corresponding to the profit-maximising level of investment, it does not uniquely determine the AETR. Indeed, the AETR will depend on the properties of the entire tax schedule, that is, it will depend on the tax treatment of the firm's intramarginal income all the way from the first krona earned. Thus the AETR can vary independently of the METR.

Suppose now that the tax code imposes different tax schedules on different forms of business organization. Since opting for one organizational form excludes the use of another, an optimizing entrepreneur will choose the organizational form that enables him to earn the largest amount of total after-tax profit. In our example, he will opt for the legal form that maximizes the magnitude of Π in (4.7).

This choice can be thought of as involving two steps. In the first step, the entrepreneur must calculate the optimal capital stock and the associated level of pre-tax income for each particular

organizational form. In the second step, the entrepreneur calculates the total tax bill implied by that level of pre-tax income for each legal business form – thus implicitly calculating the AETR – and chooses the form that generates the highest after-tax income.

As a benchmark case, suppose the tax rules for two organizational forms imply the same METR at the optimal level of investment, but different values of AETR because of a different tax treatment of the intramarginal profits earned. Suppose further that the two organizational forms offer the same earnings opportunities in the absence of tax.[47] In this case the optimal capital stock and the associated total pre-tax profit will be the same whichever business form is chosen. It is then clear that a profit-maximising entrepreneur will make his choice between the two organizational forms solely on the basis of the AETR: he will choose the form subject to the lowest AETR.

In general the METR will differ across organizational forms when they are subject to different tax schedules. The choice of legal form will then be influenced by the METR as well as the AETR. The METR captures the tax treatment of the last krona earned and determines total pre-tax income, as already explained. The AETR embodies information about the tax treatment of all kronor earned up until the last one. Together, the two measures of tax therefore determine the total after-tax profit that may be earned within a given organizational form. Moreover, in the analysis above, both tax measures are the endogenous outcome of the optimal investment decision made by the entrepreneur on the basis of the total tax schedule, and so the METR and the AETR are linked by the parameters of the tax schedule.

The impact of the AETR and the METR on total after-tax profit

However, under a non-proportional tax schedule the government can vary the METR and the AETR independently of each other. To take the simplest possible case, suppose the tax schedule $T(Y)$ in (4.2) takes the linear form

$$T = mY - G \tag{4.9}$$

[47] In formal terms, this means that the production function (4.1) is exactly the same under the two forms of business organization.

where the marginal tax rate m is a constant, and G is likewise a constant which could represent a refundable tax credit. Here the METR is equal to m, so the $\text{AETR} \equiv T/Y = \left(mY - G\right)/Y$ can be varied independently of METR by changing the value of G, just as the METR may be varied through a change in m without any change in the AETR, as long as the magnitude of G is adjusted accordingly. Note that the tax schedule is progressive when G is positive, since $\text{AETR} = \left(mY - G\right)/Y = m - \left(G/Y\right)$ will then increase with the level of income Y. By contrast, a negative value of G means that the tax system is regressive.

According to (4.3) a profit-maximising firm will choose a capital stock satisfying

$$F'\left(K\right)\left(1-m\right) = r \tag{4.10}$$

Under the tax schedule (4.9) the METR is an exogenous policy parameter m that uniquely determines the firm's capital stock via the optimum condition (4.10). Thus (4.10) may be solved for K to give

$$K = K\left(m\right), \qquad K' \equiv \frac{dK}{dm} = \frac{F'\left(K\right)}{\left(1-m\right)F''\left(K\right)} < 0 \tag{4.11}$$

For convenience, let us now denote the AETR by t, and let us treat t as an exogenous policy variable since it can be fixed at the desired level through appropriate adjustment of the parameter G. Using (4.7) and (4.11), we may then write the firm's total after-tax economic profit as

$$\Pi = \left(1-t\right)F\left(K\left(m\right)\right) - rK\left(m\right) \tag{4.12}$$

By differentiating the expression in (4.12) with respect to t and m, we can calculate the effect on total net profit of a one percentage point change in each of the two tax rates. Doing so, we find

$$\frac{\partial \Pi}{\partial t} = -F\left(K\left(m\right)\right) < 0 \tag{4.13}$$

$$\frac{\partial \Pi}{\partial m} = K' \cdot \left[(1-t) F' - r \right]$$

$$= K' \cdot \left[(1-t) F' - (1-m) F' \right] \qquad (4.14)$$

$$= K' \cdot F' \cdot (m-t)$$

where we have used (4.10) to derive the second line in (4.14). These results show that whereas a rise in the AETR will always reduce total net profit, the impact of a rise in the METR on net profit is ambiguous. In particular, since $K' < 0$ and $F' > 0$, it follows from (4.14) that a rise in the METR will reduce total after-tax profit under a progressive tax schedule where the AETR is initially below the METR, but if the tax schedule is regressive so that $m < t$ initially, a rise in the METR will actually increase total net profit.

To understand this result, it is important to keep in mind that t is kept constant (through appropriate adjustment of G) as m changes. When m goes up, the firm reduces its capital stock, thereby reducing total business income. With an unchanged AETR, this fall in Y will reduce total after-tax profit by the amount $(1-t) F' K'$. But the fall in the capital stock also reduces the firm's cost of (equity) finance by the amount rK'. When the firm maximises its economic profit $Y - rK$, we know from (4.10) that $r = (1-m) F'$, reflecting that the firm will carry its investment to the point where the marginal after-tax return to investment, $(1-m) F'$, is just equal to the cost of finance, r. The derivative in (4.14) is thus the difference between the reduction in the firm's total financing cost, $r(dK/dm)$, and the reduction in after-tax earnings resulting from a lower level of output, $(1-t)(dY/dK)(dK/dm)$.

It may seem paradoxical that a rise in the METR will actually *increase* the firm's net profit when the AETR is initially above the METR, but the intuition is that a relatively high AETR on the intramarginal profit limits the loss of after-tax earnings occurring as the firm reduces its output.[48]

[48] Note that if the rise in m had been allowed to affect the AETR – that is, if the parameter G in (4.9) had not been adjusted upwards to keep the AETR constant – the increase in the METR would in fact have reduced the firm's after-tax profit. Specifically, in this alternative case one can show that $\partial \Pi / \partial m = -F(K)$.

The relative importance of the AETR and the METR for the choice of organizational form: an example

Under a progressive tax schedule where the METR exceeds the AETR, we saw that an increase in the METR reduces total net profit. However, the impact on net profit will normally be smaller than the reduction of profit implied by a similar rise in the AETR. To illustrate this, suppose the production function (4.1) takes the form $F(K) = K^{\alpha}$ so that

$$Y = K^{\alpha} \quad \Rightarrow \quad c \equiv dY/dK = \alpha K^{\alpha-1}, \qquad 0 < \alpha < 1 \tag{4.15}$$

where α is a constant. From (4.1) and (4.10) one can then derive

$$K = \left(\frac{\alpha(1-m)}{r}\right)^{\frac{1}{1-\alpha}} \quad \Rightarrow \quad Y = K^{\alpha} = \left(\frac{\alpha(1-m)}{r}\right)^{\frac{\alpha}{1-\alpha}} \tag{4.16}$$

Denoting the AETR by *t* and using (4.7) and (4.16), we may then write the firm's total after-tax profit as

$$\Pi = (1-t)\left(\frac{\alpha(1-m)}{r}\right)^{\frac{\alpha}{1-\alpha}} - r\left(\frac{\alpha(1-m)}{r}\right)^{\frac{1}{1-\alpha}} \tag{4.17}$$

where we maintain our assumption that *t* and *m* can be changed exogenously and independently of each other. Differentiating (4.17), we find

$$\frac{\partial \Pi}{\partial t} = -\left(\frac{\alpha(1-m)}{r}\right)^{\frac{\alpha}{1-\alpha}} < 0 \tag{4.18}$$

$$\frac{\partial \Pi}{\partial m} = \left(\frac{1}{(1-m)(1-\alpha)}\right)\left[r\left(\frac{\alpha(1-m)}{r}\right)^{\frac{1}{1-\alpha}} - \alpha(1-t)\left(\frac{\alpha(1-m)}{r}\right)^{\frac{\alpha}{1-\alpha}}\right]$$

$$= \left(\frac{\alpha(1-t)}{(1-m)(1-\alpha)}\right)\frac{\partial \Pi}{\partial t} + \left(\frac{1}{(1-m)(1-\alpha)}\right)r\left(\frac{\alpha(1-m)}{r}\right)^{\frac{1}{1-\alpha}} \tag{4.19}$$

In a competitive market, the parameter α may be estimated by the share of capital income in total income. On average, this is well below one half. As long as the METR (m) and the AETR (t) do not differ a lot, the fraction $\left(\frac{\alpha(1-t)}{(1-m)(1-\alpha)}\right)$ in (4.19) will then be positive, but smaller than one. Since the last term in the bottom line of (4.19) is also positive, it follows that even if $\partial\Pi/\partial m < 0$, a rise in the METR will typically have a *smaller* negative impact on total net profit than a corresponding rise in the AETR.[49]

Summing up

In summary, when the AETR and the METR are set independently of one another, a rise in the AETR on a particular form of business organization will always reduce the profitability of choosing that organizational form, whereas a rise in the METR may or may not do so. Specifically, an increase in the METR will tend to reduce total after-tax profit if the AETR is initially below the METR, as will be the case if the tax schedule for business income is progressive. However, if the effective tax rate schedule for a particular business form is regressive, implying that AETR is initially above the METR, a rise in the latter will actually tend to increase the total net profit obtainable through that organizational form. Further, even when a higher METR reduces net profit,

[49] The result in (4.19) is fully consistent with (4.14), since one can use (4.16) to rewrite the first line in (4.19) as

$$\frac{\partial \Pi}{\partial m} = \left(\frac{\alpha}{(1-m)(1-\alpha)}\right)\left(\frac{\alpha(1-m)}{r}\right)^{\frac{\alpha}{1-\alpha}}(t-m) = \left(\frac{\partial Y}{\partial K}\right)\left(\frac{\partial K}{\partial m}\right)(m-t)$$

This expression confirms that the impact on net profit of a rise in the METR will be negative if and only if the tax schedule is progressive so that $m>t$.

it will typically have a smaller negative impact on after-tax profit than a corresponding rise in the AETR. Hence the AETR will normally be more important for the choice of organizational form than the METR. At the same time the optimal scale of business activity within a given organizational form depends only on the METR.

APPENDIX 4.2
CALCULATING MARGINAL EFFECTIVE TAX RATES

This appendix derives the formulae that were used in Chapter 4 to calculate marginal effective tax rates on business income in Sweden, given the tax rules prevailing in 2007. The approach to the estimation of effective tax rates adopted here follows the tradition established by King and Fullerton (1984), discussed in detail by Sørensen (2004). In particular, the present appendix extends the analytical framework developed by Lindhe, Södersten and Öberg (2003) to allow for the impact of inflation and for the newly introduced wage-based allowance on the effective tax rates for closely held companies.

Since this report focuses on non-neutralities in the taxation of different organizational forms, we abstract from any non-neutralities stemming from differences between taxable business income and 'true' business income. Thus the analysis below implicitly assumes that depreciation for tax purposes corresponds to the true economic depreciation of business assets.

Throughout the appendix we shall use the following

Notation

c = cost of capital (required real pre-tax rate of return on investment)
i = nominal rate of interest
q = market value of an additional unit of investment
r = real after-tax rate of return required by investors
ρ = imputed nominal rate of return on business equity
π = rate of inflation
τ = statutory corporate income tax rate
τ^c = ordinary personal capital income tax rate
τ^d = personal tax rate on dividends
τ^g = effective personal tax rate on accrued capital gains on shares
τ^w = effective marginal personal tax rate on labour income (including social security tax)
s = social security tax rate

The marginal effective tax rate

The marginal effective tax rate (*METR*) measures the amount of tax collected on the last unit of investment undertaken by a firm and is defined as

$$METR = \frac{c - r}{c} \tag{4.1}$$

The variable *r* is the after-tax real rate of return required by those who supply the finance for the marginal investment. The variable *c* is the pre-tax real rate of return on that investment, also referred to as the cost of capital. Thus the METR is the difference between the pre-tax and the after-tax rate of return, measured relative to the pre-tax return.

The cost of capital is the minimum real pre-tax return an investment must yield in order to generate the real after-tax rate of return required by investors. A project with a pre-tax return equal to the cost of capital will have a zero net present value. Thus, for a project involving an initial investment expenditure equal to one krona, the cost of capital is the real pre-tax rate of return satisfying the break-even condition

$$PV - PVT - 1 = 0 \tag{4.2}$$

where *PV* is the net present value of the pre-tax profit flows from the project, and *PVT* is the net present value of the total tax liability generated by the project.

Given a constant inflation rate π and a real pre-tax rate of return *c*, the nominal pre-tax profit flow at time *t* from a unit investment undertaken at time zero will be $c \cdot e^{\pi t}$, where *e* is the exponential function. Since the investor's real net discount rate is *r*, his nominal discount rate is $r + \pi$, so the net present value of the pre-tax profit flow earned at time *t* will be $c \cdot e^{(\pi - (r+\pi))t} = c \cdot e^{-rt}$. Hence the present value of the pre-tax profit flowing from a unit investment undertaken at time zero is

$$PV = \int_0^{\infty} c \cdot e^{-rt} dt = \frac{c}{r} \tag{4.3}$$

The present value of taxes (*PVT*) in (4.2) will depend on the form of business organization chosen for the investment project, as explained in the sections below.

Marginal effective tax rates on income from sole proprietorships

Sole proprietor: finance by new equity

Consider a sole proprietor who injects one krona of *new equity* into his business, thereby increasing his imputed nominal capital income by the amount ρ in every future year. Assuming that the actual return on the investment exceeds the imputed return, the marginal income from the project will be taxed at the effective marginal labour income tax rate τ^w, but at the same time the proprietor will save an amount of tax equal to the difference $\tau^w - \tau^c$ between the marginal effective labour income tax rate and the capital income tax rate (τ^c) on that part of the return from the project which is taxed as capital income. Hence the present value of the future tax bill generated by the marginal investment becomes

$$PVT = \int_0^\infty \tau^w c \cdot e^{-rt} dt - \int_0^\infty \left(\tau^w - \tau^c\right) \rho \cdot e^{-(r+\pi)t} dt = \left(\frac{c}{r}\right)\tau^w - \left(\frac{\rho}{r+\pi}\right)\left(\tau^w - \tau^c\right) \tag{4.4}$$

Note that since the variable *c* measures the *real* profit stream from the project, it is discounted at the proprietor's real discount rate *r*. By contrast, the imputed return ρ is a fixed nominal amount which does not grow in line with inflation; for this reason it is discounted at the proprietor's nominal discount rate $r + \pi$.

To find the cost of capital, we insert (4.3) and (4.4) into (4.2) and solve for *c* to obtain

$$c = \frac{r}{1-\tau^c} + \left[\frac{r}{1-\tau^c} - \left(\frac{r}{r+\pi}\right)\rho\right]\left(\frac{\tau^w - \tau^c}{1-\tau^w}\right) \tag{4.5}$$

This formula is identical to equation (19) in Lindhe, Södersten and Öberg (2003, p. 13) in the case considered by those authors where the inflation rate is (implicitly) assumed to be zero ($\pi = 0$).

To identify the proprietor's *METR* on investment financed by new equity, one can substitute (4.5) into (4.1). To use the resulting formula, one must insert the relevant values for the tax parameters along with an assumption on the net rate of return required by the investor. For example, if the proprietor has the alternative option of investing in the capital market where his interest income will be taxed at the rate τ^c, he will require a (risk-adjusted) nominal after-tax return equal to

$$r + \pi = i\left(1 - \tau^c\right) \tag{4.6}$$

In the benchmark case where the imputed rate of return on equity is set equal to the market interest rate, it then follows from (4.1), (4.5) and (4.6) that the marginal effective tax rate on a proprietor's investment financed by new equity ($METR_n^p$) becomes

$$METR_n^p = \tau^c \qquad \text{for} \quad \rho = i \tag{4.7}$$

Sole proprietor: finance by retained earnings

Instead of injecting new equity, the proprietor may choose to finance the investment through *retained earnings*, making use of the expansion fund system. Since earnings retained in the expansion fund are taxed at the corporate tax rate τ, the proprietor must retain a pre-tax income of $\frac{1}{1-\tau}$ kronor to fund the 1 krona investment. By retaining this amount in the business rather than distributing it and having it taxed as labour income (assuming that total business income exceeds the imputed return to equity), the proprietor saves an amount of labour income tax equal to $\frac{\tau^w}{1-\tau}$, but at the same time he must pay an amount of tax equal to $\frac{\tau}{1-\tau}$ on the profit retained. During the year of investment, the decision to retain an additional amount of profit thus implies the following

$$\text{Tax saving at the time of investment:} \qquad \frac{\tau^w - \tau}{1-\tau} \tag{4.8}$$

Since profits retained in the expansion fund do not add to the equity base for the calculation of the proprietor's imputed capital income, all of the future income from the project will be taxed as labour income, generating a tax bill with the following present value:

$$\text{Present value of future taxes:} \qquad \int_0^{\infty} \tau^w c^{-rt} dt = \left(\frac{c}{r}\right)\tau^w \tag{4.9}$$

Combining (4.8) and (4.9), we get the net present value of the additional tax liability implied by the project:

$$PVT = \left(\frac{c}{r}\right)\tau^w - \left(\frac{\tau^w - \tau}{1-\tau}\right) \tag{4.10}$$

The cost of capital may now be found by inserting (4.3) and (4.10) into (4.2) and solving for *c*:

$$c = \frac{r}{1-\tau} \tag{4.11}$$

Equation (4.11) is identical to formula (21) in Lindhe et alia (2003, p. 14). Substituting (4.11) into (4.1), we find that the proprietor's marginal effective tax rate for investment financed through retentions ($METR_r^p$) is

$$METR_r^p = \tau \tag{4.12}$$

Note that the result in (4.12) holds irrespective of the magnitude of the imputed rate of return on equity, since the latter does not affect the cost of capital for investment financed by retentions.

Sole proprietor: finance by debt

As another alternative, the proprietor may finance investment by *debt* to benefit from the deductibility of interest. Assuming that the proprietor's investment return net of interest is paid out and taxed as labour income and that the suppliers of finance pay ordinary capital income tax on

their interest income, the present value of the total tax liability triggered by the marginal investment project will be

$$PVT = \int_0^{\infty} \tau^w c \cdot e^{-rt} dt + \int_0^{\infty} i\left(\tau^c - \tau^w\right) \cdot e^{-(r+\pi)t} dt = \left(\frac{c}{r}\right)\tau^w + \left(\frac{i}{r+\pi}\right)\left(\tau^c - \tau^w\right) \tag{4.13}$$

where the nominal interest rate is denoted by *i*, and where the last term on the right-hand side of (4.13) captures the combined effect of interest deductibility for the proprietor and the taxation of the interest income received by his creditors.

Inserting (4.3) and (4.13) into (4.2) and solving for *c*, we get the proprietor's cost of capital for debt-financed investment:

$$c = \frac{r}{1-\tau^c} + \left[\frac{r}{1-\tau^c} - \left(\frac{r}{r+\pi}\right) i\right]\left(\frac{\tau^w - \tau^c}{1-\tau^w}\right) \tag{4.14}$$

When the proprietor's required after-tax rate of return is given by (4.6), we see that this expression for the cost of capital simplifies to $c = \frac{r}{1-\tau^c}$. It then follows from (4.1) that the marginal effective tax rate becomes

$$METR_d^p = \tau^c \qquad \text{for} \qquad r + \pi = i\left(1 - \tau^c\right) \tag{4.15}$$

Effective tax rates on income from closely held corporations

We now consider a closely held company owned by a qualified shareholder who follows the optimal distribution policy described in Table 3.2 of Chapter 3. We assume that, at the margin, the shareholder is subject to the progressive central government labour income tax. As explained in section 3.9 of Chapter 3, he will then pay himself a dividend equal to the normal dividend and will withdraw any further income from the company in the form of wages.

Qualified shareholder: finance by new equity

Suppose such a qualified shareholder finances one krona of investment by injecting *new equity* into his business. Potentially his imputed normal dividend then goes up by the amount ρ (the imputed rate of return) in every future year. However, provided he meets the eligibility criterion for the wage-based allowance described in section 3.4 of Chapter 3, a qualified shareholder may include a certain fraction (denoted here by ω) of his wage in his normal dividend, so when he reduces his wage withdrawal by one krona, the normal dividend falls by ω kronor.[50] As a consequence, the net increase in the normal dividend (ΔD) made possible by the injection of one krona of new equity into the company becomes

$$\Delta D = \rho - \omega \cdot \Delta w = \rho - \omega \cdot \left(\frac{\Delta W}{1+s} \right) \tag{4.16}$$

where ΔW is the absolute reduction in the company's wage cost including the social security tax, and $\Delta w = \frac{\Delta W}{1+s}$ is the absolute reduction in the wage paid out to the shareholder net of the social security tax s. The profit underlying the dividend is subject to corporation tax, so when the company cuts the deductible gross wage to the shareholder by the amount ΔW, it can only increase its dividend payment by the amount $\Delta D = (1-\tau)\Delta W$. Inserting this into (4.16), it follows that the amount of pre-tax business income that may be transformed from wage income into dividend income when the shareholder's equity base increases by one krona must satisfy the constraint

$$\Delta W (1-\tau) = \rho - \omega \cdot \left(\frac{\Delta W}{1+s} \right) \quad \Leftrightarrow \quad \Delta W = \frac{\rho}{1-\tau+\hat{\omega}}, \qquad \hat{\omega} \equiv \frac{\omega}{1+s} \tag{4.17}$$

so the net increase in the normal dividend becomes

$$\Delta D = (1-\tau)\Delta W = \rho \left(\frac{1-\tau}{1-\tau+\hat{\omega}} \right) \tag{4.18}$$

[50] Since time is treated as a continuous variable for simplicity, we assume that a fall in wage payments has an immediate impact on the normal dividend, whereas in practice the normal dividend for the current year depends on wage payments during the previous year. The inaccuracy implied by this simplification is likely to be minor.

From (4.17) and (4.18) it follows that the transformation of wage income into dividend income will lead to the following annual nominal reduction in personal tax and social security tax (which is included in the marginal effective labour income tax rate (τ^w)):

$$\tau^w \Delta W - \tau^d \Delta D = \left(\frac{\rho}{1-\tau+\hat{\omega}} \right) \left[\tau^w - \tau^d \left(1-\tau\right) \right] \tag{4.19}$$

At the same time, since wages are deductible from the corporate income tax base, the result in (4.17) implies the following annual nominal increase in the corporate tax bill:

$$\tau \Delta W = \frac{\tau \rho}{1-\tau+\hat{\omega}} \tag{4.20}$$

Combining (4.19) and (4.20), we obtain the

Annual nominal tax saving resulting from the increase in the equity base:

$$\tau^w \Delta W - \tau \Delta W - \tau^d \Delta D = \left(\frac{\rho}{1-\tau+\hat{\omega}} \right) \left[\tau^w - \tau - \tau^d \left(1-\tau\right) \right] \tag{4.21}$$

Note that since the basis value of the shares in the company is not indexed to inflation, the imputed rate of return ρ is a fixed nominal amount, so the future annual tax savings recorded in (4.21) should be discounted at the shareholder's nominal discount rate.

Equation (4.21) does not include the effect of the wage-based allowance generated by wages paid to the company's employees. To account for this effect, we allow for the possibility that when the firm's capital stock is increased by one krona, the total *real* annual wage bill paid to the employees may go up by some amount *A*, reflecting the possible need for increased manpower to operate the larger capital stock.[51] Hence one krona of investment will ceteris paribus increase the real annual

[51] On average the parameter *A* will be positive, given that firms always use some combination of labour and capital in production. However, at the margin of investment *A* will be negative if labour and capital are substitutes in the production process (and positive if labour and capital are complementary factors of production), as explained in the main text of Chapter 4.

normal dividend by the amount ωA through an increase in the wage-based allowance. Following a procedure identical to the one described above, we can therefore derive the following

Annual real tax saving due to higher allowance for wages paid to employees:

$$\left(\frac{\hat{\omega}A}{1-\tau+\hat{\omega}}\right)\left[\tau^{w}-\tau-\tau^{d}\left(1-\tau\right)\right] \tag{4.22}$$

Since A is a *real* amount, the tax saving in (4.22) must be discounted at the shareholder's real discount rate.

The wage-based allowance also affects the net tax rate on the distributed investment return c. As the yield from the investment generates higher wage payments to the shareholder, the wage-based allowance also goes up, enabling the shareholder to distribute part of the investment yield as a higher normal dividend. In particular, since $\Delta D = \hat{\omega}\Delta W$, the sum of the higher gross wages and dividends generated by the distribution of the pre-tax return c is given by the constraint

$$\Delta W + \frac{\Delta D}{1-\tau} = c \quad \Rightarrow \quad \Delta W + \frac{\hat{\omega}\Delta W}{1-\tau} = c$$

implying that

$$\Delta W = \left(\frac{1-\tau}{1-\tau+\hat{\omega}}\right)c \quad \text{and} \quad \Delta D = \left(\frac{1-\tau}{1-\tau+\hat{\omega}}\right)\hat{\omega}c$$

These changes in wages and dividends generate the following tax liabilities:

Increase in wage tax: $\tau^{w}\Delta W = \tau^{w}\left(\frac{1-\tau}{1-\tau+\hat{\omega}}\right)c$

Increase in dividend tax: $\tau^{d}\Delta D = \tau^{d}\left(\frac{1-\tau}{1-\tau+\hat{\omega}}\right)\hat{\omega}c$

Increase in corporate income tax: $\tau\Delta W = \tau\left(\frac{1-\tau}{1-\tau+\hat{\omega}}\right)\hat{\omega}c$

Adding up these changes in tax payments, we get the

Annual real tax increase generated by the distribution of the investment return:

$$\tau^w \Delta W + \tau^d \Delta D + \tau \Delta W = \tau^a c,$$

$$\tau^a \equiv \left(\frac{1-\tau}{1-\tau+\hat{\omega}} \right) \tau^w + \left(\frac{\hat{\omega}}{1-\tau+\hat{\omega}} \right) \left[\tau + \tau^d \left(1-\tau\right) \right] \tag{4.23}$$

where the average tax rate on the distributed investment return, τ^a, is seen to be a weighted average of the tax rate on labour income and the total corporate and personal tax rate on dividends, $\tau + \tau^d \left(1-\tau\right)$. Again, since *c* is a real rate of return, the stream of tax payments specified in (4.23) should be discounted at the shareholder's real discount rate *r*.

Using (4.21), (4.22) and (4.23), it follows that the present value of the future tax bill generated by the additional investment becomes

$$PVT = \int_0^\infty \left(\tau^a c - \left(\tfrac{\hat{\omega} A}{1-\tau+\hat{\omega}} \right) \left[\tau^w - \tau - \tau^d \left(1-\tau\right) \right] \right) \cdot e^{-rt} dt$$

$$- \int_0^\infty \left(\tfrac{\rho}{1-\tau+\hat{\omega}} \right) \left[\tau^w - \tau - \tau^d \left(1-\tau\right) \right] \cdot e^{-(r+\pi)t} dt \quad \Leftrightarrow$$

$$PVT = \left(\frac{c}{r} \right) \tau^a - \left(\frac{\hat{\omega} A}{r} + \frac{\rho}{r+\pi} \right) \left[\frac{\tau^w - \tau - \tau^d \left(1-\tau\right)}{1-\tau+\hat{\omega}} \right] \tag{4.24}$$

To obtain the cost of capital, we insert (4.3) and (4.24) into (4.2) and solve for *c*. After some manipulations utilizing the definition of τ^a stated in (4.23), we then find

$$c = \frac{r}{\left(1-\tau\right)\left(1-\tau^d\right)} + \left[\frac{r}{1-\tau^d} - \hat{\omega} A - \left(\frac{r}{r+\pi} \right) \rho \right] \left[\frac{\tau^w - \tau - \tau^d \left(1-\tau\right)}{\left(1-\tau+\hat{\omega}\right)\left(1-\tau^a\right)} \right] \tag{4.25}$$

This formula is identical to equation (8) in Lindhe et alia (2003, p. 9) in the case considered by those authors where $\omega = \pi = 0$, again confirming that the present framework for calculating effective tax rates is just a generalisation of that developed by previous authors.[52]

To find the *METR* on a qualified shareholder's investment financed by new equity, one may combine (4.25) with the general definition of the *METR* given in (4.1). Assuming that the discount rate is given by (4.6), one finds that (using the superscript *CHC* to indicate a closely held corporation):

$$c = \frac{r}{(1-\tau)(1-\tau^d)} \qquad \text{and} \qquad METR_n^{CHC} = \tau + \tau^d(1-\tau)$$
$$\text{for} \quad r + \pi = i(1-\tau^c), \quad \rho = i, \quad \omega = 0 \quad \text{and} \quad \tau^d = \tau^c \tag{4.26}$$

In other words, in this benchmark case involving symmetric taxation of interest and dividends, an imputed rate of return equal to the market interest rate and no wage-based allowance, a qualified shareholder's *METR* for investment financed by new equity equals the total statutory corporate and personal tax rate on distributed profits.

Qualified shareholder: finance by retained earnings

Consider next the alternative case where the shareholder chooses to finance the investment by *retained earnings*, that is, by foregoing some wage and dividend income in the year of investment. Ideally the shareholder would like to finance all of the investment through a reduction in his wage income ($\frac{\Delta W}{1+s}$), but since a lower wage reduces the normal dividend via a smaller wage-based allowance, he will have to finance part of the investment through a drop in his dividend income (ΔD). The fall in the company's gross wage bill increases the corporate tax bill by $\tau\Delta W$ while reducing the wage-based allowance (and hence the normal dividend) by the amount $\omega\frac{\Delta W}{1+s} = \hat{\omega}\Delta W$,

[52] To reproduce the formula derived by Lindhe et alia (2003), one must use (4.23) which implies that $\tau^a = \tau^w$ for $\omega = 0$.

so the total drop in the shareholder's wage and dividend income needed to finance an extra krona of investment is determined by the constraint

$$\Delta W + \Delta D = 1 + \tau \Delta W \quad \Rightarrow \quad \Delta W + \hat{\omega} \Delta W = 1 + \tau \Delta W \quad \Rightarrow$$

$$\Delta W = \frac{1}{1 - \tau + \hat{\omega}} \qquad \Delta D = \frac{\hat{\omega}}{1 - \tau + \hat{\omega}} \tag{4.27}$$

From (4.27) we obtain the

Reduction in wage tax and dividend tax in year of investment:

$$\tau^w \Delta W + \tau^d \Delta D = \frac{\tau^w + \hat{\omega} \tau^d}{1 - \tau + \hat{\omega}} \tag{4.28}$$

After-tax shareholder income foregone in year of investment:

$$\left(1 - \tau^w\right) \Delta W + \left(1 - \tau^d\right) \Delta D = \frac{1 - \tau^w + \hat{\omega}\left(1 - \tau^d\right)}{1 - \tau + \hat{\omega}} \tag{4.29}$$

To be willing to sacrifice the income stated in (4.29), the shareholder must be compensated by an after-tax capital gain which is at least as large as the net wage and dividend income foregone. For a marginal investment which is just barely worth undertaking, the pre-tax capital gain (q) on the shareholder's shares must therefore satisfy the condition

$$q\left(1 - \tau^g\right) = \left(1 - \tau^w\right) \Delta W + \left(1 - \tau^d\right) \Delta D = \frac{1 - \tau^w + \hat{\omega}\left(1 - \tau^d\right)}{1 - \tau + \hat{\omega}} \quad \Rightarrow$$

$$q = \frac{1 - \tau^w + \hat{\omega}\left(1 - \tau^d\right)}{\left(1 - \tau + \hat{\omega}\right)\left(1 - \tau^g\right)} \tag{4.30}$$

where τ^g is the effective personal tax rate on accrued capital gains on shares. In present value terms, the capital gain in (4.30) will trigger the following

Increase in personal capital gains tax liability in year of investment:

$$\tau^g q = \tau^g \left[\frac{1-\tau^w + \hat{\omega}\left(1-\tau^d\right)}{\left(1-\tau+\hat{\omega}\right)\left(1-\tau^g\right)} \right] \tag{4.31}$$

In addition, the reduction in the deductible wage payment to the shareholder generates the following

Increase in corporate income tax in year of investment: $\tau\Delta W = \dfrac{\tau}{1-\tau+\hat{\omega}}$ (4.32)

Combining (4.28), (4.31) and (4.32), we get the

Total net increase in tax bill in year of investment: $\Delta T = \tau\Delta W + \tau^g q - \tau^w \Delta W - \tau^d \Delta D \quad \Rightarrow$

$$\Delta T = \frac{\left(1-\tau^g\right)\left(\tau-\tau^w-\hat{\omega}\tau^d\right)+\tau^g\left[1-\tau^w+\hat{\omega}\left(1-\tau^d\right)\right]}{\left(1-\tau+\hat{\omega}\right)\left(1-\tau^g\right)} \tag{4.33}$$

As in the case of finance by new equity, the additional investment may increase the wage bill paid to the company's employees, thus triggering a higher wage-based allowance that raises the future normal dividend. The resulting annual real tax saving is still given by (4.22). Moreover, the income from the investment is still distributed and taxed at the average rate τ^a specified in (4.23). Using (4.22) and (4.33), we therefore obtain the following expression for the present value of the future tax bill generated by a qualified shareholder's investment financed by retained earnings:

$$PVT = \Delta T + \int_0^\infty \left(\tau^a c - \left(\tfrac{\hat{\omega}A}{1-\tau+\hat{\omega}}\right)\left[\tau^w - \tau - \tau^d\left(1-\tau\right)\right]\right)\cdot e^{-rt}dt \quad \Rightarrow$$

$$PVT = \frac{\left(1-\tau^g\right)\left(\tau-\tau^w-\hat{\omega}\tau^d\right)+\tau^g\left[1-\tau^w+\hat{\omega}\left(1-\tau^d\right)\right]}{\left(1-\tau+\hat{\omega}\right)\left(1-\tau^g\right)}$$

$$+\left(\frac{c}{r}\right)\tau^a - \left(\frac{\hat{\omega}A}{r}\right)\left(\frac{\tau^w-\tau-\tau^d\left(1-\tau\right)}{1-\tau+\hat{\omega}}\right) \tag{4.34}$$

By inserting (4.3) and (4.34) into (4.2), we can derive the cost of capital:

$$c = \frac{r}{(1-\tau)(1-\tau^g)} - \frac{\hat{\omega}A\left[\tau^w - \tau - \tau^d(1-\tau)\right]}{(1-\tau+\hat{\omega})(1-\tau^a)} \tag{4.35}$$

In the absence of the wage-based allowance ($\omega = 0$), this formula becomes identical to equation (11) on p. 10 in Lindhe et alia (2003). Specifically, when there is no wage-based allowance, one finds from (4.1) and (4.35) that the marginal effective tax rate for a qualified shareholder's investment financed by retentions simplifies to

$$METR_r^{CHC} = \tau + \tau^g(1-\tau) \qquad \text{for} \qquad \omega = 0 \tag{4.36}$$

Qualified shareholder: finance by debt

Consider finally the case where the investment is financed by *debt*. In this case too the qualified shareholder will benefit from the real annual tax reduction in (4.22) as his normal dividend will include a higher allowance for wages paid to the company's employees. Given that the investment return net of interest is paid out and taxed at the average rate τ^a and that the interest income of the suppliers of finance is taxed at the ordinary capital income tax rate τ^c, the present value of the total tax liability triggered by the project will therefore be

$$PVT = \int_0^\infty \left(\tau^a c - \left(\tfrac{\hat{\omega}A}{1-\tau+\hat{\omega}}\right)\left[\tau^w - \tau - \tau^d(1-\tau)\right]\right)\cdot e^{-rt}dt + \int_0^\infty i\left(\tau^c - \tau^a\right)\cdot e^{-(r+\pi)t}dt \quad \Rightarrow$$

$$PVT = \left(\frac{c}{r}\right)\tau^a - \left(\frac{\hat{\omega}A}{r}\right)\left(\frac{\tau^w - \tau - \tau^d(1-\tau)}{1-\tau+\hat{\omega}}\right) + \left(\frac{i}{r+\pi}\right)\left(\tau^c - \tau^a\right) \tag{4.37}$$

From (4.1), (4.3) and (4.37) one finds that the qualified shareholder's cost of capital for debt-financed investment is

$$c = \frac{r}{1-\tau^c} + \left[\frac{r}{1-\tau^c} - \left(\frac{r}{r+\pi}\right) i\right]\left(\frac{\tau^a - \tau^c}{1-\tau^a}\right) - \frac{\hat{\omega} A\left[\tau^w - \tau - \tau^d\left(1-\tau\right)\right]}{\left(1-\tau+\hat{\omega}\right)\left(1-\tau^a\right)} \tag{4.38}$$

When no wage-based allowance is granted ($\omega = 0$ and $\tau^a = \tau^w$), this expression for the cost of capital is seen to be identical to the proprietor's cost of capital for debt finance (compare (4.14) to (4.38)). Hence the proprietor and the qualified shareholder will also face the same *METR* on debt-financed investment when the qualified shareholder is not eligible for the wage-based allowance. Note also that when the discount rate is given by (4.6), the second term on the right-hand side of (4.38) drops out. In that case, and when there is no wage-based allowance, one finds from (4.1) and (4.38) that the qualified shareholder's *METR* for debt-financed investment simplifies to

$$METR_d^{CHC} = \tau^c \qquad \text{for} \qquad \omega = 0 \tag{4.39}$$

Effective tax rates on income from widely held corporations

In contrast to dividends from closely held corporations, the dividends distributed by widely held companies are never taxed as labour income. As a consequence, even if a holder of shares in such a corporation has the opportunity to receive part of his income from the company in the form of wages or salaries, he will prefer to receive dividends provided he is subject to central government tax on his labour income, given the current Swedish tax schedule described in Chapter 3. In the analysis below it is therefore assumed that all income distributed to the holders of shares in a widely held company takes the form of dividends.

Widely held corporation: finance by new equity

Since profits distributed as dividends are subject to the corporate income tax as well the personal dividend tax, a one krona investment with a pre-tax rate of return of *c*, financed by injection of *new equity* into a widely held corporation, will generate a stream of tax payments with a present value equal to

$$PVT = \int_0^{\infty} \left[\tau + \tau^d \left(1-\tau\right)\right] c \cdot e^{-rt} dt = \left(\frac{c}{r}\right)\left[\tau + \tau^d \left(1-\tau\right)\right] \tag{4.40}$$

To find the cost of capital, we insert (4.3) and (4.40) into (4.2) and solve for c to get

$$c = \frac{r}{\left(1-\tau\right)\left(1-\tau^d\right)} \tag{4.41}$$

This expression is identical to equation (1) in Lindhe et alia (2003, p. 7). Substituting (4.41) into (4.1), we get the *METR* faced by a widely held company on investment financed by new equity:

$$METR_n^{WHC} = \tau + \tau^d \left(1-\tau\right) \tag{4.42}$$

Widely held corporation: finance by retained earnings

In the alternative case where investment is financed by *retained earnings*, shareholders must forego an after-tax dividend income of $1-\tau^d$ kronar in the year of investment to enable the company to invest one additional krona. To be willing to make this sacrifice, shareholders must score a pre-tax capital gain q that generates an after-tax capital gain $q\left(1-\tau^g\right)$ which is at least as large as the net dividend foregone. For the marginal investment that is only just worth undertaking, we therefore have

Capital gain on a marginal investment:

$$q\left(1-\tau^g\right) = 1-\tau^d \quad \Leftrightarrow \quad q = \frac{1-\tau^d}{1-\tau^g} \tag{4.43}$$

Accounting for the capital gains tax, the retention of profit therefore generates the following

Net increase in personal tax bill in year of investment:

$$\tau^g q - \tau^d = \tau^g \left(\frac{1-\tau^d}{1-\tau^g} \right) - \tau^d \tag{4.44}$$

Since the future returns from the investment are distributed as dividends, the present value of the total taxes collected becomes

$$PVT = \tau^g q - \tau^d + \int_0^\infty \left[\tau + \tau^d \left(1-\tau\right) \right] c \cdot e^{-rt} dt \quad \Rightarrow$$

$$PVT = \tau^g \left(\frac{1-\tau^d}{1-\tau^g} \right) - \tau^d + \left(\frac{c}{r} \right) \left[\tau + \tau^d \left(1-\tau\right) \right] \tag{4.45}$$

Substituting (4.3) and (4.45) into (4.2), we obtain the widely held company's cost of capital for investment financed by retained earnings,

$$c = \frac{r}{\left(1-\tau\right)\left(1-\tau^g\right)} \tag{4.46}$$

which is equivalent to equation (3) in Lindhe et alia (2003, p. 7). Equations (4.1) and (4.46) imply that the *METR* on retentions-financed investment is:

$$METR_r^{WHC} = \tau + \tau^g \left(1-\tau\right) \tag{4.47}$$

Widely held corporation: finance by debt

In the case of *debt finance*, the deductibility of interest payments reduces the combined nominal corporate and dividend tax bill by $i\left[\tau + \tau^d \left(1-\tau\right) \right]$ kronor per year. At the same time the interest income is subject to the personal capital income tax rate τ^c, and each krona of investment return above the interest rate is subject to a combined corporation tax and dividend tax amounting to $\tau + \tau^d \left(1-\tau\right)$ kronor. Recalling that the interest payment is a fixed nominal amount whereas the

nominal investment return grows in line with inflation, the present value of the tax payments generated by a krona of debt-financed investment is thus equal to

$$PVT = \int_0^{\infty} \left[\tau + \tau^d \left(1-\tau\right) \right] c \cdot e^{-rt} dt + \int_0^{\infty} \left[\tau^c - \tau - \tau^d \left(1-\tau\right) \right] i \cdot e^{-(r+\pi)t} dt \quad \Leftrightarrow$$

$$PVT = \left(\frac{c}{r} \right) \left[\tau + \tau^d \left(1-\tau\right) \right] + \left(\frac{i}{r+\pi} \right) \left[\tau^c - \tau - \tau^d \left(1-\tau\right) \right] \tag{4.48}$$

From (4.2), (4.3) and (4.48) one finds the cost of capital to be

$$c = \frac{r}{1-\tau^c} + \left[\frac{r}{1-\tau^c} - \left(\frac{r}{r+\pi} \right) i \right] \left(\frac{\tau + \tau^d \left(1-\tau\right) - \tau^c}{\left(1-\tau\right)\left(1-\tau^d\right)} \right) \tag{4.49}$$

When $r + \pi = i\left(1-\tau^c\right)$, as assumed in (4.6), the second term on the right-hand side of (4.49) drops out. Equations (4.1) and (4.49) then imply the following *METR* on a widely held company's debt-financed investment:

$$METR_d^{WHC} = \tau^c \tag{4.50}$$

Effective tax rates on labour income and capital gains

The formulae for the *METR*s on corporate investment financed by retained earnings include the effective personal tax rate on accrued capital gains on shares (τ^g). This rate is lower than the statutory tax rate on realized gains (τ^{sg}), since taxpayers can defer their capital gains tax until the time of realization. Specifically, if a nominal capital gain of one unit accrues to the shareholder at time zero, and if he realizes a fraction γ of his remaining gain in all subsequent periods, the effective tax rate on the accrued gain – defined as the present value of the future tax paid on realizations – may be found as

$$\tau^g = \int_0^\infty \tau^{sg}\gamma \cdot e^{-(\gamma+r+\pi)t}dt = \frac{\tau^{sg}\gamma}{\gamma+r+\pi} \tag{4.51}$$

The parameter γ may alternatively be interpreted as the fraction of shareholders who realize (all of) their accrued gains in any given year. In that case the average holding period for shares is given by $1/\gamma$. For example, if $\gamma = 0.2$, the average investor holds his shares for five years before selling them. If the investor's nominal after-tax discount rate ($r+\pi$) is 0.1, it then follows from (4.51) that the effective tax rate on accrued capital gains is only two thirds of the statutory tax rate on realized gains.

When applying formula (4.51) to the case of a qualified shareholder, one must account for the fact that any capital gain exceeding the normal dividend is taxed at the personal labour income tax rate τ^{pw} rather than at the reduced capital income tax rate for qualified shareholders. For this category of shareholders, we therefore calculate the statutory tax rate on realized capital gains as

$$\tau^{sg} = f \cdot \tau^c + (1-f) \cdot \tau^{pw} \tag{4.52}$$

where f is the estimated fraction of the gain which is taxed as capital income.

The effective total tax rate on labour income appearing in the formulae for the *METR* for sole proprietorships and closely held companies includes the social security tax as well as the personal labour income tax. If *w* is the marginal taxable personal labour income after deduction for social security tax, *s* is the tax-exclusive marginal social security tax rate, and τ_m^{pw} is the marginal personal tax rate on labour income, the total marginal effective tax rate on labour income (τ_m^w) is found as

$$\tau_m^w = \frac{w(1+s) - w\left(1-\tau_m^{pw}\right)}{w(1+s)} = \frac{s+\tau_m^{pw}}{1+s} \tag{4.53}$$

APPENDIX 5.1
CALCULATION OF TAX LIABILITY
FOR A SOLE PROPRIETOR, 2007

This appendix documents the computer algorithm used in Chapter 5 to calculate the tax liability for a sole proprietor. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation will be provided.

Notation

Exogenous variables and parameters

c = capital income tax rate

e = stochastic component of business income (exogenous stochastic process)

k = ratio of equity to mean business income

s = social security contribution rate

Y^m = mean value of business income before tax

ρ = imputed rate of return on business equity

Endogenous variables

C = effective social security tax liability

K = total stock of business equity

L = accumulated business losses carried over from previous years

N = imputed normal return on business equity

S = accumulated unutilised potential for interest allocation at the end of the year

T = total tax liability

T^C = capital income tax liability

T^L = total labour income tax liability

T^P = personal labour income tax liability

w = assessed labour income

Y = business income before tax

Y^C = actual amount of taxable capital income

The Excel algorithm for calculating the tax liability of a sole proprietor includes the following relationships, where X_{-t} denotes the value of variable X recorded t years before the current year:

Income before tax and business equity

$$K = kY^m \qquad (5.1.1a)$$

$$Y = Y^m + e \qquad (5.1.1b)$$

Accumulated business loss

$$L = 0 \quad \text{if} \quad Y_{-1} \geq L_{-1} \qquad (5.1.2a)$$

$$L = L_{-1} - Y_{-1} \quad \text{if} \quad Y_{-1} < L_{-1} \qquad (5.1.2b)$$

Maximum amount of positive interest allocation

$$N = \rho K + (1+\rho) S_{-1} \qquad (5.1.3)$$

Taxable capital income (actual amount of positive interest allocation)

$$Y^C = N \quad \text{if} \quad Y - L \geq (1+s)328,600 + N \qquad (5.1.4a)$$

$$Y^C = Y - L - (1+s)328,600$$
$$\text{if} \quad (1+s)328,600 + N > Y - L \geq (1+s)328,600 \qquad (5.1.4b)$$

$$Y^C = 0 \quad \text{if} \quad Y - L < (1+s)328,600 \qquad (5.1.4c)$$

Accumulated unutilised potential for interest allocation

$$S = N - Y^C \tag{5.1.5}$$

Taxable personal labour income

$$w = \frac{Y - L - Y^C}{1+s} \quad \text{if} \quad Y - L - Y^C \geq 0 \tag{5.1.6a}$$

$$w = 0 \quad \text{if} \quad Y - L - Y^C < 0 \tag{5.1.6b}$$

Effective social security tax liability

$$C = 0 \quad \text{if} \quad w \leq 370,400 \tag{5.1.7a}$$

$$C = s \cdot (w - 370,400) \quad \text{if} \quad w > 370,400 \tag{5.1.7b}$$

Personal labour income tax liability

$$T^P = 0 \quad \text{if} \quad w \leq 31,800 \tag{5.1.8a}$$

$$T^P = 0.253 \cdot (w - 31,800) \quad \text{if} \quad 31,800 < w \leq 109,600 \tag{5.1.8b}$$

$$T^P = 19,683 + 0.316 \cdot (w - 109,600) \quad \text{if} \quad 109,600 < w \leq 328,600 \tag{5.1.8c}$$

$$T^P = 88,887 + 0.516 \cdot (w - 328,600) \quad \text{if} \quad 328,600 < w \leq 488,600 \tag{5.1.8d}$$

$$T^P = 171,447 + 0.566 \cdot (w - 488,600) \quad \text{if} \quad 488,600 < w \tag{5.1.8e}$$

Capital income tax liability

$$T^C = c \cdot Y^C \qquad (5.1.9)$$

Total tax liabilities

$$T^L = C + T^P \qquad (5.1.10a)$$

$$T = T^L + T^C \qquad (5.1.10b)$$

Disposable income

$$Y^D = Y - T \qquad (5.1.11)$$

Tax parameters

$$\rho = 0.0854 \qquad s = 0.3071 \qquad c = 0.30 \qquad (5.1.12)$$

Initial conditions

$$L_0 = 0 \qquad P_0 = 0 \qquad S_0 = 0 \qquad (5.1.13)$$

Explanatory remarks

The equations above apply to a well-established business firm which has reached a stage of maturity where the owner seeks to maintain a constant stock of business equity over time. In any year when business income is positive, the owner thus withdraws all of the income (net of depreciation) from the firm. When the firm is running a loss, the owner is assumed to inject new equity into the business in order to keep the stock of equity constant at the level K.

Income before tax and business equity

Equation (5.1.1*a*) specifies the total stock of business capital (equity) as some exogenous proportion k (which may be greater than one) of the proprietor's mean business income, where k is an indicator of the capital intensity of production. According to (5.1.1*b*), the actual business income Y fluctuates stochastically around the mean value, since e is a stochastic variable with a zero mean.

Accumulated business loss

Swedish tax law allows indefinite carry-forward of business losses, but the deduction has to be utilised as early as possible. Equation (5.1.2a) therefore assumes that whenever the previous year's taxable profit exceeds the losses accumulated until the start of the previous year, the entrepreneur will have taken the full deduction for the accumulated loss during the previous year so that no losses remain to be carried over into the current year.

Following the same logic, if the previous year's taxable profit falls short of the accumulated losses, the entrepreneur will take a loss deduction corresponding to the amount of taxable profit, leaving only the excess accumulated loss to be carried forward into the current year, as stated in equation (5.1.2*b*). Note that this equation also covers the situation where taxable profit is negative, in which case the recorded loss is added to the previously accumulated losses.

Maximum amount of positive interest allocation

For a proprietor opting for positive interest allocation, the variable N in equation (5.1.3) gives the maximum amount of income that may be taxed as capital income. This amount includes an imputed rate of return (ρ) on the firm's net equity (K) plus any accumulated unutilised potential for interest allocation carried over from the previous year (S_{-1}), where the latter amount is carried forward at the imputed rate of return.

Taxable capital income

The proprietor has the right to have his business income taxed as capital income up to a limit given by N. According to the analysis in Chapter 3, a proprietor following a tax-minimising strategy will want to take full advantage of this option whenever his total taxable business income exceeds the threshold $(1+s)328,600+N$ where he becomes liable to central government labour income tax. Hence the actual amount of taxable capital income (Y^C) is equal to N whenever total taxable business income $Y-L$ exceeds this limit, as stated in (5.1.4*a*).

If taxable business income falls below $(1+s)328,600$ kronor, the tax-minimising strategy is to have all of the income taxed as labour income income, so in this situation taxable capital income will be zero, as indicated in (5.1.4*c*). In the intermediate case covered by (5.1.4*b*), the proprietor will want the first $(1+s)328,600$ kronor earned to be taxed as labour income, so only the remaining taxable business income will be declared as capital income.

Accumulated unutilised potential for interest allocation

Since the imputed normal return for the current year includes all of the unutilised potential for interest allocation accumulated in the past (and carried forward at the imputed rate of return), there will be no unutilised potential for interest allocation left at the end of the year if current capital income equals the imputed return N. Hence the unutilised potential for interest allocation will be

positive only in so far as the declared capital income for the current year falls short of N. This is reflected in equation (5.1.5).

Assessed personal labour income

Since the proprietor is assumed to withdraw all positive net income from the business in each year (thus making no use of the expansion fund system), his taxable labour income equals the difference between total taxable business income and taxable capital income, whenever this difference is positive. When it is negative, which will only be the case when the business is running a loss, there will be no taxable labour income. These rules are captured by (5.1.6*a*) and (5.1.6*b*). Equation (5.1.6*a*) also accounts for the fact that the social security contribution levied at the tax-exclusive rate s is deductible from the amount of labour income subject to personal income tax (w).

Effective social security tax liability and corporate income tax liability

As explained in Chapter 3, the element of genuine tax in the social security contribution is deemed to be approximately zero for earned income up to a threshold of about 370,400 kronor in 2007. This assumption is reflected in equation (5.1.7*a*). When earned income exceeds the threshold of roughly 370,400 kronor, the taxpayer earns no additional social security rights in case he raises his income. He thus faces the full social security tax at the margin, as indicated in (5.1.7*b*).

Personal tax liabilities and disposable income

Personal (assessed) labour income is taxed according to the 2007 tax schedule summarised in Table A.3.1 in the appendix of Chapter 3. The tax schedule implies that the proprietor's personal labour income tax bill is given by the equations stated in (5.1.8*a*) through (5.1.8*e*). In addition, the proprietor pays a flat tax on his taxable capital income, as indicated in (5.1.9), so his total tax personal and social security tax liability is given by equation (5.1.10). Equation (5.1.11) simply defines the taxpayer's disposable income.

Exogenous variables and initial conditions

To activate the Excel program for calculating the proprietor's tax liability, the user of the program must specify the values of the imputed rate of return ρ plus the tax rates s and c. The values implied by the tax code for 2007 are stated in (5.1.12). The user of the program must also specify initial values for the dynamic variables L, P and S which evolve over time. It is natural to set the values of these variables equal to zero at the end of period 0 (i.e., at the start of period 1), as specified in (5.1.13).

In addition, the user must choose values of the exogenous variables W, K and r, thereby choosing the mean value around which the proprietor's business income fluctuates. The average magnitude of the deviations of actual business income from its mean value is given by the standard deviation of the normally distributed stochastic variable e. The Excel program allows the user to choose the size of this standard deviation which determines the degree of riskiness of the entrepreneur's income stream. It is natural to choose the standard deviation of e to be some percentage of the mean business income so that a larger average income also implies larger absolute fluctuations around the mean.

The exogenous number n of observations from the normal distribution and hence the number of income observations currently built into the program is 800, so this variable does not have to be chosen by the user.

Output from the Excel program

To generate a sequence of values of the stochastic variable e and hence a sequence of pre-tax and after-tax business income, the Excel program uses an 800-period sample of the standardised normal distribution (which has a zero mean and a standard deviation of 1). The program then calibrates the standard deviation of this sample in accordance with the standard deviation chosen by the user and calculates the mean value and the standard deviation of pre-tax income (Y) and disposable income (Y^D). The program also allows the user to track the evolution of all endogenous variables over the 800-period sample period.

As a summary measure of the average long-run tax burden on business income, the program calculates an average total tax rate by means of the following equations, where n is the number of income observations built into the program (currently 800), T^a is the average total tax liability over the 800-period sample period, Y^a is the average income before tax over that same period, and t^a is the average total tax rate:

$$T^a = \frac{1}{n}\sum_{j=1}^{n} T_j, \qquad Y^{sm} = \frac{1}{n}\sum_{j=1}^{n} Y_j, \qquad t^a = \frac{T^a}{Y^{sm}}. \tag{5.1.14}$$

In addition to the output mentioned above, the Excel program also undertakes a decomposition of the variance (= the square of the standard deviation) of pre-tax and after-tax income. To illustrate, if we use a bar above a variable to denote its mean value, the entrepreneur's disposable income and its mean value may be written as

$$Y^D = Y - T^L - T^C,$$

$$\overline{Y}^D = \overline{Y} - \overline{T}^L - \overline{T}^C.$$

Using E to indicate the expectations operator, the variance of disposable income $\left(\sigma^2_{Y^D}\right)$ is

$$\sigma^2_{Y^D} \equiv E\left[Y - T^L - T^C - \overline{Y}^D\right]^2$$

$$= \sigma^2_Y + \sigma^2_{T^L} + \sigma^2_{T^C} - 2\,\mathrm{cov}\left[Y, T^L\right] - 2\,\mathrm{cov}\left[Y, T^C\right] + 2\,\mathrm{cov}\left[T^L, T^C\right], \tag{5.1.15}$$

where σ^2_Y, $\sigma^2_{T^L}$ and $\sigma^2_{T^C}$ are the variances of Y, T^L and T^C, respectively, and where $\mathrm{cov}\left[X, Z\right]$ denotes the covariance between variables X and Z. The variance decomposition in (5.1.15) is useful for understanding how the tax system affects the riskiness of the proprietor's net income stream.

APPENDIX 5.2
CALCULATION OF TAX LIABILITY
FOR A QUALIFIED SHAREHOLDER, 2007

This appendix documents the computer algorithm used in Chapter 5 to calculate the tax liability for a qualified shareholder who is assumed to be the sole owner of a closely held corporation. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation will be provided.

Notation

Exogenous variables and parameters

a = ratio of wage bill to business equity

c = personal dividend tax rate for qualified shareholders

e = stochastic component of business income (exogenous stochastic process)

i = rate of interest at which UDP amounts are carried forward

k = ratio of business equity to mean business income

s = social security contribution rate

Y^m = mean value of business income before tax

ρ = imputed rate of return on purchase price of shares

τ = corporate income tax rate

Endogenous variables

C = effective social security tax liability

D^B = dummy variable for inclusion of wage-based allowance in normal dividend

D^{Bi} = auxiliary dummy variables for calculating D^B (i = 1,2)

D^a = dummy variable for inclusion of addition to wage-based allowance

K = total stock of business equity

L = accumulated business loss carried over from previous years

N = normal dividend

S = accumulated unutilised potential for dividend payment at the end of the year

T = total tax liability

T^B = corporate income tax liability

T^C = personal dividend tax liability

T^L = total labour income tax liability

T^P = personal labour income tax liability

Y = business income before tax

Y^C = taxable dividend income

w = wage withdrawal

The program for calculating the tax liability of a qualified shareholder includes the following relationships, where X_{-t} is the value of variable X recorded t years before the current year:

Income before tax and business equity

$$K = kY^m \qquad (5.2.1a)$$

$$Y = Y^m + e \qquad (5.2.1b)$$

Eligibility for wage-based allowance included in normal dividend

$$D^{B1} = 1 \quad \text{if} \quad w_{-1} \geq 667,500 \qquad (5.2.2a)$$

$$D^{B1} = 0 \quad \text{if} \quad w_{-1} < 667,500 \qquad (5.2.2b)$$

$$D^{B2} = 1 \quad \text{if} \quad w_{-1} \geq 267,000 + 0.05\left(w_{-1} + aK\right) \qquad (5.2.2c)$$

$$D^{B2} = 0 \quad \text{if} \quad w_{-1} < 267,000 + 0.05\left(w_{-1} + aK\right) \qquad (5.2.2d)$$

$$D^B = 1 \quad \text{if} \quad D^{B1} + D^{B2} > 0 \qquad (5.2.2e)$$

$$D^B = 0 \quad \text{if} \quad D^{B1} + D^{B2} = 0 \qquad (5.2.2f)$$

Eligibility for addition to wage-based allowance

$$D^a = 0 \quad \text{if} \quad w_{-1} + aK \le 2,670,000 \tag{5.2.3a}$$

$$D^a = 1 \quad \text{if} \quad w_{-1} + aK > 2,670,000 \tag{5.2.3b}$$

Accumulated business loss

$$L = 0 \quad \text{if} \quad Y_{-1} - (1+s) w_{-1} \ge L_{-1} \tag{5.2.4a}$$

$$L = L_{-1} - \left[Y_{-1} - (1+s) w_{-1} \right] \quad \text{if} \quad Y_{-1} - (1+s) w_{-1} < L_{-1} \tag{5.2.4b}$$

Normal dividend

$$N = \rho K + (1+i) S_{-1} + D^B 0.25 (w_{-1} + aK) + D^B D^a 0.25 (w_{-1} + aK - 2,670,000) \tag{5.2.5}$$

Taxable dividend income

$$Y^C = N \quad \text{if} \quad Y - L \ge (1+s) 370,400 + \frac{N}{1-\tau} \tag{5.2.6a}$$

$$Y^C = \left[Y - L - (1+s) 370,400 \right] (1-\tau)$$
$$\text{if} \quad (1+s) 370,400 < Y - L < (1+s) 370,400 + \frac{N}{1-\tau} \tag{5.2.6b}$$

$$Y^C = 0 \quad \text{if} \quad Y - L \le (1+s) 370,400 \tag{5.2.6c}$$

Wage withdrawal

$$w = 0 \quad \text{if} \quad Y \leq 0 \tag{5.2.7a}$$

$$w = \frac{Y}{1+s} \quad \text{if} \quad 0 < Y \leq (1+s)370,400 \tag{5.2.7b}$$

$$w = 370,400 \quad \text{if} \quad (1+s)370,400 < Y \leq (1+s)370,400 + \frac{N}{1-\tau} \tag{5.2.7c}$$

$$w = \frac{\left[Y - \left(\frac{N}{1-\tau} \right) \right]}{1+s} \quad \text{if} \quad (1+s)370,400 + \frac{N}{1-\tau} < Y \tag{5.2.7d}$$

Accumulated unutilised potential for dividend payment

$$S = N - Y^C \tag{5.2.8}$$

Effective social security tax liability

$$C = 0 \quad \text{if} \quad w \leq 370,400 \tag{5.2.9a}$$

$$C = s \cdot (w - 370,400) \quad \text{if} \quad w > 370,400 \tag{5.2.9b}$$

Corporate income tax liability

$$T^B = 0 \quad \text{if} \quad Y - w(1+s) - L \leq 0 \tag{5.2.10a}$$

$$T^B = \tau \left[Y - w(1+s) - L \right] \quad \text{if} \quad Y - w(1+s) - L > 0 \tag{5.2.10b}$$

Personal labour income tax liability

$$T^P = 0 \quad \text{if} \quad w \leq 31{,}800 \tag{5.2.11a}$$

$$T^P = 0.253 \cdot (w - 31{,}800) \quad \text{if} \quad 31{,}800 < w \leq 109{,}600 \tag{5.2.11b}$$

$$T^P = 19{,}683 + 0.316 \cdot (w - 109{,}600) \quad \text{if} \quad 109{,}600 < w \leq 328{,}600 \tag{5.2.11c}$$

$$T^P = 88{,}887 + 0.516 \cdot (w - 328{,}600) \quad \text{if} \quad 328{,}600 < w \leq 488{,}600 \tag{5.2.11d}$$

$$T^P = 171{,}447 + 0.566 \cdot (w - 488{,}600) \quad \text{if} \quad 488{,}600 < w \tag{5.2.11e}$$

Capital income tax liability

$$T^C = c \cdot Y^C \tag{5.2.12}$$

Total tax liabilities

$$T^L = C + T^P \tag{5.2.13a}$$

$$T = T^B + T^L + T^C \tag{5.2.13b}$$

Disposable income

$$Y^D = Y - T \tag{5.2.14}$$

Values of imputed rates of return

$$\rho = 0.1254 \qquad i = 0.0654 \qquad (5.2.15)$$

Tax rates

$$s = 0.3242 \qquad \tau = 0.28 \qquad c = 0.2 \qquad (5.2.16)$$

Initial conditions

$$L_0 = 0 \qquad S_0 = 0 \qquad w_0 = 0 \qquad (5.2.17)$$

Explanatory remarks[53]

In parallel to the algorithm for calculating the tax bill for a sole proprietor in Appendix 5.1, the equations above apply to a well-established 'going concern' which has reached a stage of maturity where the owner seeks to maintain a constant stock of business equity over time. Thus the owner withdraws all of the income (net of depreciation) from the company either in the form of wages or salaries or in the form of dividends.

[53] Some equations in the system (5.2.1) through (5.2.17) are identical to those included in the algorithm in Appendix 5.1 for calculating the tax liability of a sole proprietor. The explanations for these equations are repeated here for the reader's convenience.

Income before tax and business equity

Equation (5.2.1*a*) specifies the total stock of business capital (equity) as some exogenous proportion k (which may be greater than one) of the shareholder's mean business income, where k is an indicator of the capital intensity of production. According to (5.2.1*b*), the actual business income Y fluctuates stochastically around the mean value, since e is a stochastic variable with a zero mean. Note that Y measures the shareholder's business income *before* deduction for any wage or salary that he chooses to withdraw from the company. Hence the concept of pre-tax income used in the present appendix is fully comparable to the concept of income applied in the model for the sole proprietor in Appendix 5.1.

Eligibility for wage-based allowance included in normal dividend

The relationships (5.2.2*a*) through (5.2.2*f*) determine whether or not the shareholder may include a wage-based allowance in the calculation of his normal dividend for tax purposes. According to Swedish tax law for 2007, a qualified shareholder is eligible for a wage-based allowance if his wage or salary income from the company during the previous year (w_{-1}) exceeded the minimum of 667,500 kronor and the sum of 267,000 kronor plus 5 percent of the previous year's total wage bill (including the wage of the shareholder himself). Equations (5.2.2*a*) through (5.2.2*f*) imply that if and only if w_{-1} exceeded one of these amounts, the dummy variable D^B will be equal to 1, thus ensuring that the wage-based allowance gets included in the calculation of the normal dividend in equation (5.2.5).

Eligibility for addition to wage-based allowance

The dummy variable D^a in (5.2.3*a*) and (5.2.3*b*) is used to calculate the wage-based allowance included in the normal dividend. If the company's total wage bill during the previous year is less than 2,670,000 kronor, the qualified shareholder is only entitled to the basic wage-based allowance equal to 25 percent of the wage bill, but if the previous year's total wage bill exceeded 2,670,000 kronor, a further 25 percent of the excess wage bill may be added to the wage-based allowance. In

the latter case the dummy variable D^a takes a value of unity, thereby capturing whether the shareholder is entitled to the addition to the basic wage-based allowance.

Accumulated business loss

Swedish tax law allows indefinite carry-forward of business losses, but the deduction has to be utilised as early as possible. Equation (5.2.4*a*) therefore assumes that whenever the previous year's profit $Y_{-1} - (1+s)w_{-1}$ exceeded the losses accumulated until the start of the previous year, the entrepreneur will have taken the full deduction for the accumulated loss during the previous year so that no losses remain to be carried over into the current year.

Following the same logic, if last year's profit falls short of the accumulated losses, the entrepreneur will take a loss deduction corresponding to the amount of profit, leaving only the excess accumulated loss to be carried forward into the current year, as stated in equation (5.2.6*b*). Note that this equation also covers the situation where the profit is negative, in which case the recorded loss is added to the previously accumulated losses.

Normal dividend

Equation (5.2.5) specifies the shareholder's normal dividend which includes four components. The first one is the imputed return (ρ) on the acquisition price of the shares (K). The second component $(1+i)S_{-1}$ is the unutilised potential for normal dividend payments during the previous year (S_{-1}), carried forward at the interest rate i stipulated in the tax code.

The third component in the equation for the normal dividend represents the basic wage-based allowance which amounts to 25 percent of the previous year's total wage bill $(w_{-1} + aK)$, including the wage of the shareholder (w_{-1}) as well as the total wage payment to the company's employees (aK). The final term on the right-hand side of (5.2.5) reflects the addition to the basic wage-based allowance which is granted when the previous year's total wage bill exceeded 2,670,000 kronor. Of

course these components are only included in the normal dividend in so far as the shareholder is eligible for the basic and the additional wage-based allowance, respectively. The eligibility is captured by the dummy variables D^e and D^a.

Taxable dividend income

As explained in Chapter 3, the tax-minimising strategy for a qualified shareholder is to distribute all business income below (1+*s*)370,400 kronor and all income above (1+*s*)370,400+$\frac{N}{1-\tau}$ in the form of wages. In other words, a tax-minimising qualified shareholder will not want to distribute any dividends in excess of the normal dividend. This distribution policy gives rise to relations (5.2.6*a*) through (5.2.6*c*) determining taxable dividend income.

When taxable business income *Y-L* exceeds (1+*s*)370,400+$\frac{N}{1-\tau}$ kronor, taxable capital income equals the normal dividend, as specified in (5.2.6*a*). If taxable business income falls short of this threshold, (5.2.6*b*) specifies that the dividend equals the corporate profit (net of corporation tax) remaining when the shareholder has paid himself a wage of 370,400 kronor (corresponding to the threshold where he no longer earns any additional social security rights). Equation (5.2.6*c*) finally states that taxable capital income will be zero when taxable business income is lower than (1+*s*)370,400, since all income will be withdrawn as wages in this case.

The specifications in (5.2.6) account for the fact that the company cannot distribute dividends in excess of the after-tax profit recorded in the company's tax accounts. Specifically, equation (5.2.6*b*) reflects that the company's accumulated tax losses reduce the amount of dividend that may be paid.

Wage withdrawal

The shareholder's wage and salary income (*w*) from the company is determined by equations (5.2.7*a*) through (5.2.7*d*).

Equation (5.2.7*a*) assumes that whenever the company's business income is negative, the shareholder will not take out any wage income. Instead he is assumed to inject new equity in order to keep the stock of net equity constant.

The assumption of a constant stock of equity also implies that all positive business income is distributed from the firm in the form of wages or dividends. When the qualified shareholder follows the tax-minimising distribution policy described in the previous section, he will take out all positive income below (1+*s*)370,400 kronor in the form of wages, as stated in (5.2.7*b*). As income rises above that level, the shareholder will start to pay himself dividends up to the limit given by the normal dividend, and when gross business income exceeds (1+*s*)370,400 kronor plus the (grossed-up) normal dividend, the shareholder will again wish to withdraw the excess amount in the form of wages, as specified in (5.2.7*c*) and (5.2.7*d*).

Accumulated unutilised potential for dividend payment

Whenever the actual dividend distributed to the qualified shareholder (Y^C) falls short of the normal dividend (*N*), the difference represents an unutilised potential for interest allocation which may be carried forward to the subsequent year. This is reflected in equation (5.2.8).

Effective social security tax liability and corporate income tax liability

As explained in Chapter 3, the element of genuine tax in the social security contribution is deemed to be approximately zero for earned income up to a threshold of about 370,400 kronor in 2007. This assumption is reflected in equation (5.2.9*a*). When earned income exceeds the threshold of roughly 370,400 kronor, the taxpayer earns no additional social security rights in case he raises his income. He thus faces the full social security tax at the margin, as stated in (5.2.9*b*).

The corporate income tax liability is specified in (5.2.10), where $Y-\left(1+s\right)w-L$ is the taxable corporate profit.

Personal tax liabilities, total tax liabilities and disposable income

Since the shareholder never pays himself any dividend in excess of the normal dividend, his taxable labour income is simply the wage he withdraws from the company. This income is taxed according to the personal tax schedule summarised in Table A.3.1 in the appendix to Chapter 3. The tax schedule implies that the shareholder's personal labour income tax bill is given by the equations stated in (5.2.11*a*) through (5.2.11*e*). In addition, the qualified shareholder pays a flat tax on his dividend income, as indicated in (5.2.12). The total labour income tax burden is given in equation (5.2.13*a*) as the sum of the social security tax and the personal labour income tax, while equation (5.2.13*b*) defines the overall tax burden on the gross business income Y, including the corporate tax bill. Equation (5.2.14) simply defines the taxpayer's disposable income after deduction for all taxes.

Exogenous variables and initial conditions

To activate the Excel program for calculating the qualified shareholder's tax liability, the user of the program must specify the values of the imputed rates of return ρ and i as well as the tax rates s, τ and c which are all given by the tax code. Relations (5.2.15) and (5.2.16) give the relevant values for 2007. The user of the program must also specify initial values for the dynamic variables L, S and w which evolve over time. It is natural to set the values of these variables equal to zero at the end of period 0 (i.e., at the start of period 1), as specified in (5.2.17).

In addition, the user must choose values of the exogenous variables W, K, a and r, thereby choosing the mean value around which the shareholder's business income fluctuates and the wage bill paid to the company's employees.

The average magnitude of the deviations of actual business income from its mean value is given by the standard deviation of the stochastic variable e which is assumed to follow the normal distribution. The Excel program allows the user to choose the size of this standard deviation which determines the degree of riskiness of the entrepreneur's income stream. It is natural to choose the standard deviation of e to be some percentage of the mean business income so that a larger average income also implies larger absolute fluctuations around the mean.

Output from the Excel program

To generate a sequence of values of the stochastic variable e and hence a sequence of pre-tax and after-tax business income, the Excel program uses an 800-period sample of the standardised normal distribution (which has a zero mean and a standard deviation of 1). The program then calibrates the standard deviation of this sample in accordance with the standard deviation chosen by the user and calculates the mean value and the standard deviation of pre-tax income (Y) and disposable income (Y^D). The program also allows the user to track the evolution of all endogenous variables over the 800-period sample period.

In addition to the output mentioned above, the Excel program calculates the average total tax rate and undertakes a decomposition of the variance of pre-tax and after-tax income in a manner identical to the one used in the algorithm for calculating the tax liability of a sole proprietor (see equations (5.1.20) and (5.1.21) in Appendix 5.1 and the associated explanatory remarks).

APPENDIX 5.3
CALCULATION OF TAX LIABILITY FOR SHAREHOLDERS IN WIDELY HELD CORPORATIONS, 2007

This appendix documents the computer algorithm used in Chapter 5 to calculate the taxation of business income from widely held listed and unlisted corporations. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation are provided.

Notation

Exogenous variables and parameters

D^W = dummy variable for payment of wage to shareholder

e = stochastic component of business income (exogenous stochastic process)

k = ratio of business equity to mean business income

p = performance-related fraction of wage to shareholder

r = mean rate of return on business capital

s = social security contribution rate

Y^m = mean value of business income before tax

τ = corporate income tax rate

τ^d = personal tax rate on dividends

Endogenous variables

C = effective social security tax liability

L = accumulated business loss carried over from previous years

T = total tax liability

T^B = corporate income tax liability

T^C = personal dividend tax liability

T^L = total labour income tax liability

T^P = personal labour income tax liability

W = income generated by the labour of the entrepreneur

Y = business income before tax

w = wage withdrawal

The Excel computer program for calculating the total tax on income from widely held corporations includes the following relationships, where X_{-t} is the value of variable X recorded t years before the current year:

Business income and wage income before tax

$$W = Y^m\left(1 - rk\right) \qquad (5.3.1a)$$

$$Y = Y^m + e \qquad (5.3.1b)$$

Deductible wage and salary paid to shareholder

$$w = D^W \cdot \left(\frac{W}{1+s}\right)\left[1 + p \cdot \left(\frac{Y - Y^m}{Y^m}\right)\right] \quad \text{if} \quad \left(\frac{W}{1+s}\right)\left[1 + p \cdot \left(\frac{Y - Y^m}{Y^m}\right)\right] \le 370,400 \qquad (5.3.2a)$$

$$w = D^W \cdot 370,400 \quad \text{if} \quad \left(\frac{W}{1+s}\right)\left[1 + p \cdot \left(\frac{Y - Y^m}{Y^m}\right)\right] > 370,400 \qquad (5.3.2b)$$

Accumulated business loss

$$L = 0 \quad \text{if} \quad Y_{-1} - \left(1+s\right) w_{-1} \ge L_{-1} \qquad (5.3.3a)$$

$$L = L_{-1} - \left[Y_{-1} - \left(1+s\right) w_{-1}\right] \quad \text{if} \quad Y_{-1} - \left(1+s\right) w_{-1} < L_{-1} \qquad (5.3.3b)$$

Corporate income tax liability

$$T^B = \tau\left[Y-(1+s)w-L\right] \quad \text{if} \quad Y-(1+s)w \geq L \tag{5.3.4a}$$

$$T^B = 0 \quad \text{if} \quad Y-(1+s)w-L < L \tag{5.3.4b}$$

Dividend tax

$$T^C = \tau^d\left[Y-(1+s)w-L-T^B\right] \quad \text{if} \quad Y-(1+s)w-L-T^B \geq 0 \tag{5.3.5a}$$

$$T^C = 0 \quad \text{if} \quad Y-(1+s)w-L-T^B < 0 \tag{5.3.5b}$$

Effective social security tax liability

$$C = 0 \quad \text{if} \quad w \leq 370,400 \tag{5.3.6a}$$

$$C = s\cdot(w-370,400) \quad \text{if} \quad w > 370,400 \tag{5.3.6b}$$

Personal labour income tax liability

$$T^P = 0 \quad \text{if} \quad w \leq 31,800 \tag{5.3.7a}$$

$$T^P = 0.253\cdot(w-31,800) \quad \text{if} \quad 31,800 < w \leq 109,600 \tag{5.3.7b}$$

$$T^P = 19,683+0.316\cdot(w-109,600) \quad \text{if} \quad 109,600 < w \leq 328,600 \tag{5.3.7c}$$

$$T^P = 88,887+0.516\cdot(w-328,600) \quad \text{if} \quad 328,600 < w \leq 488,600 \tag{5.3.7d}$$

$$T^P = 171,447+0.566\cdot(w-488,600) \quad \text{if} \quad 488,600 < w \tag{5.3.7e}$$

Total tax liabilities

$$T^L = C + T^P \qquad (5.3.8a)$$

$$T = T^B + T^L + T^C \qquad (5.3.8b)$$

Disposable income

$$Y^D = Y - T \qquad (5.3.9)$$

Tax rates

$$\tau = 0.28 \qquad (5.3.10a)$$

$$s = 0.3242 \qquad (5.3.10b)$$

$$\tau^d = 0.3 \quad \text{for a listed corporation} \qquad (5.3.10c)$$

$$\tau^d = 0.25 \quad \text{for an unlisted corporation} \qquad (5.3.10d)$$

Initial condition

$$L_0 = 0 \qquad (5.3.11)$$

Explanatory remarks[54]

The equations above apply to a well-established company which has reached a stage of maturity where the owners seek to maintain a constant stock of business equity over time. Whenever profits (net of depreciation) are positive, they are therefore assumed to be paid out as dividends. When the company is running a loss, shareholders are assumed to inject new equity in order to keep the stock of equity constant at the level K.

The following paragraphs briefly explain the individual equations.

Business income and mean wage income before tax

Equation (5.3.1a) specifies the mean gross wage of the shareholder in case he receives part of his income from the company in the form of labour income. When the mean value of the company's business income is Y^m, the stock of equity is kY^m (by definition of the parameter k). Assuming an exogenous pre-tax rate of return r on equity, it follows that the amount W specified in (5.3.1a) represents that part of total mean business income which may be said to stem from the shareholder's work effort. Equation (5.3.1a) thus assumes that the shareholder's average wage or salary reflects the average value of his labour input into the company.

According to (5.3.1b), the actual business income Y fluctuates stochastically around the mean value, since e is a stochastic variable with a zero mean.

Deductible wage and salary paid to shareholder

When the dummy variable D^W is equal to one, the shareholder receives some of his income from the company in the form of management wages or salaries, whereas $D^W = 0$ reflects the case where the shareholder has arranged to receive all of his income in the form of dividends. The parameter p

[54] Some equations in the system (5.3.1) through (5.3.11) are identical to those included in the algorithm in the two previous appendices to this chapter. The explanations for these equations are repeated here for the reader's convenience.

allows for the fact that a part of the shareholder's wage or salary income may be related to the company's performance. Specifically, equation (5.3.2*a*) assumes that the shareholder's total labour income from the company (net of social security tax levied at the tax-exclusive rate *s*) is given by

$$w = \frac{D^W}{1+s}\left[p \cdot \left(\frac{Y}{Y^m} \right) W + (1-p) W \right] = D^W \left(\frac{W}{1+s} \right) \left[1 + p \cdot \left(\frac{Y - Y^m}{Y^m} \right) \right] \qquad (5.3.12)$$

A part of the shareholder's compensation thus takes the form of a bonus $p \cdot \frac{Y}{Y^m} \cdot W$ which varies in proportion to the company's income (before deduction for management compensation), while the remaining part takes the form of a fixed wage payment $(1-p)W$ (before deduction for social security tax). Note that when company earnings Y are at their average level Y^m, (5.3.12) implies that the shareholder receives a gross compensation equal to the average contribution of his work effort to the company's income (W).[55]

When personal labour income w exceeds about 370,400 kronor, the social security contribution becomes a genuine tax that is no longer offset by increased social security entitlements. As stated in Table 3.1 of Chapter 3, the effective marginal tax rate on labour income therefore rises to 63.5 percent when gross labour income exceeds (1+*s*)370,400 kronor. It is therefore more attractive for shareholders to receive business income above this level in the form of dividends which only bear a total corporate and personal tax burden of 46 percent (in private corporations) or 49.6 percent (in public corporations). Hence equations (5.3.2*a*) and (5.3.2*b*) assume that the company never pays its shareholders a personal wage exceeding the level where the social security tax starts to "bite".

Accumulated business loss

The recorded taxable profit of the company (before any deduction for losses carried over from previous years) is equal to $Y - (1+s)w$.

[55] In the calculations presented in Chapter 5 the value of p has been set to zero. A sensitivity analysis has revealed that the total effective tax burden is not very sensitive to the value of p, given the optimal distribution policy described by (5.3.2).

Swedish tax law allows indefinite carry-forward of business losses, but the deduction has to be utilised as early as possible. Equation (5.3.3*a*) therefore assumes that whenever the previous year's taxable profit exceeds the losses accumulated until the start of the previous year, the company will have taken the full deduction for the accumulated loss during the previous year so that no losses remain to be carried over into the current year.

Following the same logic, if the previous year's taxable profit falls short of the accumulated losses, the company will claim a loss deduction corresponding to the amount of taxable profit, leaving only the excess accumulated loss to be carried forward into the current year, as stated in equation (5.3.3*b*). Note that this equation also covers the situation where taxable profit is negative, in which case the recorded loss is added to the previously accumulated losses.

The corporate income tax and the personal tax on dividends

Equations (5.3.4.*a*) and (5.3.4*b*) specify the corporate income tax bill as the corporate tax rate times taxable profit whenever the latter is positive, and as zero whenever taxable profit is negative.

Equations (5.3.5.*a*) and (5.3.5*b*) assume that all of the company's after-tax profit is paid out as dividends and taxed as such in the hands of the individual shareholders.

Effective social security tax liability

As explained in Chapter 3, the element of genuine tax in the social security contribution is deemed to be approximately zero for earned income up to a threshold of about 370,400 kronor in 2007. This assumption is reflected in equation (5.3.6*a*). When earned income exceeds the threshold of roughly 370,400 kronor, the taxpayer earns no additional social security rights in case he raises his income. He thus faces the full social security tax at the margin, as stated in (5.3.6*b*).

Labour income tax and total tax

The company's shareholders earn taxable labour income w only to the extent that they receive some of the income from the company in the form of management wages or salaries (D^W=1). Labour income is taxed according to the 2007 personal tax schedule summarised in Table A.3.1 in the appendix to Chapter 3. The tax schedule implies that the shareholder's personal labour income tax bill is given by the equations stated in (5.3.7*a*) through (5.3.7*e*). The total tax on the shareholders' labour income from the company is the sum of the social security tax and the personal labour income tax, as stated in equation (5.3.8*a*). Equation (5.3.8*b*) gives the total corporate and personal tax burden on the company and its shareholders, and equation (5.3.9) specifies the shareholders' disposable income from the company left after deduction for all taxes paid.

Exogenous variables and initial conditions

To activate the Excel program for calculating the total tax on income from widely held corporations, the user of the program must specify the value of the corporate income tax rate (28 percent in 2007, as stated in (5.3.10*a*), the tax-exclusive social security tax rate (32.42 percent for 2007, as indicated in (5.3.10*b*)), and the personal tax rate on dividend income. As specified in (5.3.10*c*) and (5.3.9*b*), the dividend tax rate equals the 30 percent tax rate on capital income when the dividend is distributed from a listed company, whereas the dividend tax rate is only 25 percent when the dividend is paid by an unlisted company. The user of the program must also choose the initial value of the dynamic variable L which evolves over time. It is natural to set the value of this variable equal to zero at the end of period 0 (i.e., at the start of period 1), as specified in (5.3.11).

In addition, the user must choose values of the exogenous variables W, K and r, thereby choosing the mean value around which the income from the company fluctuates. The average magnitude of the deviations of actual income from its mean value is given by the standard deviation of the normally distributed stochastic variable s. The Excel program allows the user to choose the size of this standard deviation which determines the degree of riskiness of the entrepreneur's income stream. It is natural to calibrate the standard deviation of e to be some percentage of the mean income so that a larger average income also implies larger absolute fluctuations around the mean.

Finally, the user must choose the value of the dummy variable D^W (zero or one) and the value of the parameter p determining the bonus-related fraction of the shareholder's wage.

Output from the Excel program

To generate a sequence of values of the stochastic variable e and hence a sequence of pre-tax and after-tax business income, the Excel program uses an 800-period sample of the standardised normal distribution (which has a zero mean and a standard deviation of 1). The program then calibrates the standard deviation of this sample in accordance with the standard deviation chosen by the user and calculates the mean value and the standard deviation of pre-tax income (Y) and disposable income (Y^D). The program also allows the user to track the evolution of all endogenous variables over the 800-period sample period.

In addition to this output, the Excel program calculates the average total tax rate in a manner identical to the one used in the algorithms for calculating the tax liabilities of a sole proprietor and a qualified shareholder (see equation (5.1.18) in Appendix 5.1 and the associated explanatory remarks). The program also undertakes a decomposition of the variance of pre-tax and after-tax income. Using a bar above a variable to denote its mean value, the entrepreneur's disposable income and its mean may be written as

$$Y^D = Y - T^L - T^B - T^C,$$

$$\overline{Y}^D = \overline{Y} - \overline{T}^L - \overline{T}^B - \overline{T}^C.$$

With E indicating the expectations operator, the variance of disposable income $\left(\sigma^2_{Y^D}\right)$ is

$$\sigma^2_{Y^D} \equiv E\left[Y - T^L - T^B - T^C - \overline{Y}^D\right]^2$$

$$= \sigma^2_Y + \sigma^2_{T^D} + \sigma^2_{T^C} - 2\operatorname{cov}\left[Y, T^D\right] - 2\operatorname{cov}\left[Y, T^C\right] + 2\operatorname{cov}\left[T^D, T^C\right], \qquad (5.3.13)$$

where σ_Y^2, $\sigma_{T^D}^2$ and $\sigma_{T^C}^2$ are the variances of Y, T^D and T^C, respectively; where $\text{cov}[X,Z]$ denotes the covariance between variables X and Z, and where we have used the fact that any variance and covariance involving T^L is zero since this variance is a non-stochastic constant (because W is constant). The variance decomposition in (5.3.13) is useful for understanding the degree to which the corporation tax and the dividend tax as well as the interaction between these two taxes contribute to reducing the variability of after-tax income.

APPENDIX 5.4
CALCULATING RISK PREMIA ON RISKY INCOME STREAMS

This appendix explains the method used in Chapter 5 to compare alternative income streams with different degrees of riskiness. The method is standard for calculating the risk premium that will make an investor indifferent between a risky and a safe income stream.

Suppose the entrepreneur's utility (welfare) *u* during some period depends on his level of income *y* earned during that period. If the entrepreneur is risk averse, his marginal utility of income is declining, that is, he will value a gain less than he values avoiding a loss of a similar magnitude. In formal terms, this means that

$$u = u(y), \qquad u' > 0, \qquad u'' < 0 \tag{1}$$

If the income stream *y* is uncertain but with a known probability distribution and the entrepreneur's preferences satisfy certain plausible axioms (see, e.g., Silberberg and Suen (2001, Chapter 13)), he will value that income stream in terms of the *expected* utility that it yields. To take a simple case, if *y* either takes the value y_1 with probability *p* or the value y_2 with probability 1-*p*, the entrepreneur's expected utility $E[u]$ will be

$$E[u] = pu(y_1) + (1-p)u(y_2), \qquad 0 \le p \le 1 \tag{2}$$

Consider now an uncertain business activity generating a random annual income stream equal to

$$y = \overline{y} + x\overline{y} \tag{3}$$

where $\overline{y}$ is the mean value of income and *x* is a random variable with mean zero and a constant variance σ^2, that is (using *E* to denote the expectations operator),

$$E[x] = 0, \qquad E\left[x^2\right] = \sigma^2 \tag{4}$$

The standard deviation σ, defined as the positive square root of σ^2, measures the proportional or *relative* risk associated with the income stream considered, since (3) implies that the variance of *y* is

$$E\left[\left(y-\overline{y}\right)^2\right]=E\left[\left(x\overline{y}\right)^2\right]=\overline{y}^2E\left[x^2\right]=\overline{y}^2\sigma^2 \tag{5}$$

so that the standard deviation of *y* is $\overline{y}\sigma$. In other words, σ measures the standard deviation relative to the mean income level.

Faced with the risky business income stream with the properties (3) and (4), the question is what fraction of the mean income $\overline{y}$ the entrepreneur would be willing to sacrifice to fully avoid the fluctuations around the mean income level? This fraction, denoted by *P*, is the proportional risk premium that would make the entrepreneur indifferent between receiving the uncertain income stream with a mean of $\overline{y}$ and a standard deviation σ and an alternative safe income stream with mean $\overline{y}-P\overline{y}$ and a zero standard deviation. Hence *P* must satisfy the equation

$$u\left(\overline{y}-P\overline{y}\right)=E\left[u\left(\overline{y}+x\overline{y}\right)\right] \tag{6}$$

Taking a first-order Taylor approximation on the left and a second-order approximation on the right-hand side of this equation, we obtain

$$u\left(\overline{y}\right)-P\overline{y}\cdot u'\left(\overline{y}\right)\approx E\left[u\left(\overline{y}\right)+x\cdot\overline{y}\cdot u'\left(\overline{y}\right)+\tfrac{1}{2}\cdot x^2\cdot\overline{y}^2\cdot u''\left(\overline{y}\right)\right] \tag{7}$$

Using (4), this expression reduces to

$$\begin{aligned} &u\left(\overline{y}\right)-P\cdot\overline{y}\cdot u'\left(\overline{y}\right)=u\left(\overline{y}\right)+\tfrac{1}{2}\cdot\overline{y}^2\cdot\sigma^2\cdot u''\left(\overline{y}\right) \qquad \Rightarrow \\ &P=\frac{\sigma^2}{2}\cdot CRRA, \qquad\qquad CRRA\equiv-\frac{\overline{y}u''\left(\overline{y}\right)}{u'\left(\overline{y}\right)}>0 \end{aligned} \tag{8}$$

The magnitude *CRRA* is the Coefficient of Relative Risk Aversion. It is called so because the entrepreneur's or investor's required relative risk premium *P* is proportional to *CRRA*. We also see from (8) that the relative risk premium is proportional to the riskiness of the income stream, measured by its variance.

By construction, the safe income flow $\bar{y} - P\bar{y}$ generates (approximately) the same welfare as the risky income stream with mean $\bar{y}$ and variance σ^2. The risk-adjusted ('certainty-equivalent') value of the latter income flow, denoted by *CE*, is therefore given by

$$CE = \bar{y} - P\bar{y}, \qquad P \equiv \frac{\sigma^2}{2} \cdot CRRA \tag{9}$$

where we are treating *CRRA* as a constant parameter reflecting the entrepreneur's attitude towards risk-taking. The estimates of risk-adjusted income streams presented in Chapter 5 were calculated by means of equation (9).

When *CRRA* is a constant that is independent of the entrepreneur's mean income level, it follows from (9) that if a risky income stream with mean $\bar{y}$ and variance σ^2 is subject to a purely proportional income tax with full loss offsets – so that a loss triggers a refundable tax credit equal to the tax rate *t* times the loss – the resulting stream of after-tax income will have a risk-adjusted value CE^d equal to

$$CE^d = (1-t)(\bar{y} - P\bar{y}) \tag{10}$$

since the proportional tax reduces the disposable mean income level to $(1-t)\bar{y}$. The result in (10) holds for any values of the mean and variance of the income flow. With constant Relative Risk Aversion and strictly proportional taxation, the entrepreneur's ranking of alternative streams of after-tax income will therefore be the same as his ranking of the corresponding flows of pre-tax income, since the ratio $(1-t)$ of risk-adjusted disposable income to risk-adjusted pre-tax income will be the same for all income streams. Hence taxation will affect the relative ranking of different income streams only to the extent that it deviates from strict proportionality.

Notice also that the variance of disposable income under a purely proportional tax system is

$$E\left[\left((1-t)\,y-(1-t)\,\bar{y}\right)^2\right]=(1-t)^2\,E\left[\left(y-\bar{y}\right)^2\right]=(1-t)^2\,E\left[\left(x\bar{y}\right)^2\right]=(1-t)^2\,\bar{y}^2\sigma^2 \qquad (11)$$

Hence the standard deviation of disposable income is $(1-t)\,\bar{y}\sigma$, so a proportional tax does not affect the ratio σ of the standard deviation to the mean.

APPENDIX 6.1
VALUE OF A FIRM STARTED UP BY A SOLE PROPRIETOR, 2007

This appendix documents the computer algorithm used in Chapter 6 to calculate the value of a firm started up by a sole proprietor. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation will be provided.

Notation

Exogenous variables and parameters

c= capital income tax rate

$CRRA$ = coefficient of relative risk aversion

f= fraction of capital gain stemming from sale of real estate

g= length of expansion phase (number of years)

k= capitalisation factor applied at the time of sale of the firm

K^s = initial equity invested by the entrepreneur at the time of start-up (end of year -1)

n = length of start-up phase (number of years before the firm breaks even)

p= probability of bankruptcy at the end of start-up phase

r = marginal rate of return on business equity

δ = discount rate

ρ = imputed rate of return on business equity

s = rate of social security contribution

y^e= annual increase in income during expansion phase

Y_0^s = business loss during the first year of operation

Endogenous variables

C= effective social security tax liability

G= taxable capital gain

K= business equity at the end of the year

K^b = year-end business equity in the absence of tax

L = accumulated loss carry-over at the end of the year

N = maximum amount of positive interest allocation

P = relative risk premium

R= revenue from sale of firm at the end of expansion phase

S = accumulated unutilised potential for interest allocation at the end of the year

t^e = risk-adjusted average effective tax rate

T^P = personal labour income tax liability

T^C = capital income tax liability

T = total tax liability

Y^e = business income before tax during expansion phase

Y^{eb} = retained business income during expansion phase in the absence of tax

y^s = annual increase in income during start-up phase

Y^s = business income before tax during start-up phase

Y^C = amount of positive interest allocation

V= risk-adjusted present value of the firm at the time of start-up

V^a= risk-adjusted present value of the firm in the absence of tax

V^e= risk-adjusted present value of net cash flow during expansion phase

V^s= present value of net cash flow during start-up phase

w = personal labour income after deduction for social security contribution

σ = relative standard deviation of net cash flow during expansion phase

In all equations, the subscript t indicates the time period (year), so X_t is the value of variable X in year t. The firm is assumed to be started up at the beginning of year zero, and the expected present value of the firm is calculated at that time. All stock variables are dated at the end of the period.

The Excel computer program for calculating the value of a firm started up by a sole proprietor includes the following relationships:

Income growth during start-up phase

$$y^s = -\left(\frac{Y_0^s}{n}\right) \qquad (6.1.1)$$

Income before tax during start-up phase

$$Y_t^s = Y_0^s + t \cdot y^s, \qquad t = 0,1,.....,n \qquad (6.1.2)$$

Status at the end of start-up phase

$$L_n = -\sum_{t=0}^{n} Y_t^s \qquad (6.1.3.a)$$

$$K_n = K^s \qquad (6.1.3.b)$$

$$S_n = K^s\left[(1+\rho)^{n+1} - 1\right] \qquad (6.1.3.c)$$

Income before tax during expansion phase

$$Y_t^e = (t-n)\, y^e + rK_{t-1}, \qquad t = n+1,.....,n+g \qquad (6.1.4)$$

Maximum amount of positive interest allocation during expansion phase

$$N_t = \rho K_{t-1} + (1+\rho) S_{t-1}\ , \qquad t = n+1,.....,n+g \qquad (6.1.5)$$

Taxable capital gain during expansion phase

$$G_t = 0 \quad \text{for} \quad t = n+1,\ldots\ldots,n+g-1 \tag{6.1.6.a}$$

$$G_{n+g} = k \cdot Y^e_{n+g} - K_{n+g-1} \tag{6.1.6.b}$$

Actual amount of positive interest allocation during expansion phase

For $t = n+1,\ldots\ldots,n+g$ we have

$$Y^C_t = N_t \quad \text{if} \quad Y^e_t + (1-f)G_t - L_{t-1} \geq (1+s)328,600 + N_t \tag{6.1.7.a}$$

$$Y^C_t = Y^e_t + (1-f)G_t - L_{t-1} - (1+s)328,600$$
$$\text{if} \quad (1+s)328,600 + N_t > Y^e_t + (1-f)G_t - L_{t-1} \geq (1+s)328,600 \tag{6.1.7.b}$$

$$Y^C_t = 0 \quad \text{if} \quad Y^e_t + (1-f)G_t - L_{t-1} < (1+s)328,600 \tag{6.1.7.c}$$

Taxable personal labour income during expansion phase

For $t = n+1,\ldots\ldots,n+g$ we have

$$w_t = \frac{Y^e_t + (1-f)G_t - L_{t-1} - Y^C_t}{1+s} \quad \text{if} \quad Y^e_t + (1-f)G_t - L_{t-1} - Y^C_t \geq 0 \tag{6.1.8.a}$$

$$w_t = 0 \quad \text{if} \quad Y^e_t + (1-f)G_t - L_{t-1} - Y^C_t < 0 \tag{6.1.8.b}$$

Effective social security tax during expansion phase

For $t = n+1,\ldots\ldots,n+g$ we have

$$C_t = 0 \quad \text{if} \quad w_t \leq 370,400 \tag{6.1.9.a}$$

$$C_t = s \cdot (w_t - 370,400) \quad \text{if} \quad w_t > 370,400 \tag{6.1.9.b}$$

Capital income tax liability during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^C = c \cdot \left(Y_t^C + f \cdot 0.9 \cdot G_t \right) \qquad \text{if} \quad G_t \geq 0 \qquad (6.1.10.a)$$

$$T_t^C = c \cdot Y_t^C + c \cdot \left[f \cdot 0.63 + (1-f) \cdot 0.7 \right] \cdot G_t$$
$$\text{if} \quad G_t < 0 \quad \text{and} \quad Y_t^C + \left[f \cdot 0.63 + (1-f) \cdot 0.7 \right] \cdot G_t \geq 0 \qquad (6.1.10.b)$$

$$T_t^C = 0 \qquad \text{if} \quad G_t < 0 \quad \text{and} \quad Y_t^C + \left[f \cdot 0.63 + (1-f) \cdot 0.7 \right] \cdot G_t < 0 \qquad (6.1.10.c)$$

Personal labour income tax during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^P = 0 \quad \text{if} \quad w_t \leq 31,800 \qquad (6.1.11a)$$

$$T_t^P = 0.253 \cdot (w_t - 31,800) \quad \text{if} \quad 31,800 < w_t \leq 109,600 \qquad (6.1.11b)$$

$$T_t^P = 19,683 + 0.316 \cdot (w_t - 109,600) \quad \text{if} \quad 109,600 < w_t \leq 328,600 \qquad (6.1.11c)$$

$$T_t^P = 88,887 + 0.516 \cdot (w_t - 328,600) \quad \text{if} \quad 328,600 < w_t \leq 488,600 \qquad (6.1.11d)$$

$$T_t^P = 171,447 + 0.566 \cdot (w_t - 488,600) \quad \text{if} \quad 488,600 < w_t \qquad (6.1.11e)$$

Total tax liability during expansion phase

$$T_t = C_t + T_t^P + T_t^C, \qquad t = n+1, ..., n+g \qquad (6.1.12)$$

Evolution of equity during expansion phase

$$K_t = K_{t-1} + Y_t^e - T_t, \qquad t = n+1, ..., n+g-1 \qquad (6.1.13.a)$$

$$K_{n+g} = K_{n+g-1} \qquad (6.1.13.b)$$

Accumulated unutilised potential for interest allocation during expansion phase

$$S_t = N_t - Y_t^C, \qquad t = n+1, ..., n+g-1 \qquad (6.1.14.a)$$

$$S_{n+g} = 0 \qquad (6.1.14.b)$$

Accumulated loss carry-over during expansion phase

For $t = n+1, ..., n+g$ we have

$$L_t = L_{t-1} - Y_t^e \quad \text{for} \quad Y_t^e \le L_{t-1} \qquad (6.1.15.a)$$

$$L_t = 0 \quad \text{for} \quad Y_t^e > L_{t-1} \qquad (6.1.15.b)$$

Relative risk premium and relative standard deviation

$$P = \left(\frac{p}{1-p}\right)\left(\frac{CRRA}{2}\right) \qquad (6.1.16.a)$$

$$\sigma = \sqrt{\left(\frac{p}{1-p}\right)}, \qquad \sigma > 0 \qquad (6.1.16.b)$$

Present value of net cash flow during start-up phase

$$V^s = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s \qquad (6.1.17)$$

Present value of risk-adjusted net cash inflow in last year of expansion phase

$$R = k \cdot Y_{n+g}^e \qquad (6.1.18.a)$$

$$V^e = \frac{(1-P)(1-p)\left(Y_{n+g}^e + R - T_{n+g}\right)}{(1+\delta)^{n+g+1}} \qquad (6.1.18.b)$$

Risk-adjusted present value of the firm at the time of start-up

$$V = V^s + V^e \qquad (6.1.19)$$

Evolution of income in the absence of tax (expansion phase)

$$Y_t^{eb} = (t-n)\, y^e + rK_{t-1}^b, \qquad t = n+1, ..., n+g \qquad (6.1.20)$$

Evolution of equity in the absence of tax (expansion phase)

$$K_n^b = K^s \qquad (6.1.21.a)$$

$$K_t^b = K_{t-1}^b + Y_t^{eb}, \qquad t = n+1, ..., n+g-1 \qquad (6.1.21.b)$$

Risk-adjusted present value in the absence of tax

$$V^a = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s + \left(\frac{(1-P)(1-p)(1+k)Y_{n+g}^{eb}}{(1+\delta)^{n+g+1}} \right) \qquad (6.1.22)$$

Risk-adjusted average effective tax rate

$$t^e = \frac{V^a - V}{V^a + K^s} \qquad (6.1.23)$$

Exogenous variables and parameters in benchmark scenario

$K^s = 500,000$	$Y_0^s = -500,000$	$y^e = 100,000$
$n = 4$	$g = 5$	
$r = 0.1$	$\delta = 0.02$	$k = 10$
$p = 0.1$	$f = 0$	
$\rho = 0.0854$	$s = 0.3071$	$c = 0.3$

Explanatory remarks

The equations above describe a stylized scenario where a firm goes through a start-up phase with gradually declining losses followed by an expansion phase with gradually increasing profits. At the beginning of the start-up phase (the start of year zero) the entrepreneur injects an amount of equity K^s into the firm. As the firm makes losses during the start-up phase, the entrepreneur injects new equity in order to maintain the firm's net equity at the initial level K^s. The end of the start-up phase is defined as the year in which the firm just manages to break even. During the expansion phase the firm's profit rises steadily every year, and all of the after-tax profit is assumed to be reinvested in the firm until the last year of the expansion phase where the firm is sold to a new owner. Since the analysis in Chapter 6 suggested that use of the expansion fund system is generally not a tax-minimising strategy for a proprietor who wishes to build up equity by reinvesting the firm's after-tax profits, it is assumed that the proprietor allows the firm's profit to be taxed as if it were distributed during the expansion phase. However, since all of the after-tax profit is injected as new equity into the firm at the end of each year, the entrepreneur does not make any net withdrawal of cash from the firm until the year it is sold at the end of the expansion phase. At the end of that year the proprietor withdraws the profit earned during the year plus the revenue from the sale of the firm minus the total tax liability for the year. Implicitly this assumes that he has other sources of income or that he is able to borrow to finance his consumption until the time of sale of the firm.

To introduce the element of risk in a simple manner, it is assumed that the entrepreneur faces a probability p that the firm goes bankrupt at the end of the start-up phase. Thus the probability that the firm will survive into the expansion phase is 1-p.

Income growth and income before tax during start-up phase

During the first year of its existence (year zero), the firm makes a (negative) profit amounting to Y_0^s. In each of subsequent n years of the start-up phase, the profit is assumed to rise by the constant amount y^s. The time of transition between the start-up phase and the expansion phase is defined as the end of the year where the firm ceases to make losses. The specification in equation (6.1.1) ensures that the firm will indeed just break even in the last year of the start-up phase, i.e., that it will

earn a zero profit during year *n*. Given the first-year business income Y_0^s and the constant annual income growth y^s, it follows immediately that pre-tax business income during the start-up phase will be given by equation (6.1.2).

Status at the end of the start-up phase

By definition, the accumulated business loss at the end of the start-up phase is the sum of the losses made during each year of that phase, as stated in equation (6.1.3.*a*). Equation (6.1.3.*b*) reflects the assumption that the entrepreneur injects new equity into the firm during the start-up phase to keep the firm's capital stock constant despite the losses incurred each year. Hence the stock of (equity) capital at the end of year *n* $\left(K_n\right)$ will equal the initial stock of equity $\left(K^s\right)$.

The accumulated unutilised potential for interest allocation (*S*) at the end of the start-up phase is given by (6.1.3.*c*). Since the firm is running losses throughout the start-up phase, no positive interest allocation is made in any year during that phase, so the value of *S* at the end of any year in the start-up phase equals the maximum potential amount of positive interest allocation for that year. Since any unutilised potential for interest allocation may be carried forward into the next year at the imputed rate of return ρ, and since the imputed return on the firm's capital stock is ρK^s throughout the start-up phase, the value of *S* at the end of each year in the start-up phase is given by the following expressions:

End of year 0: $S_0 = \rho K^s$

End of year 1: $S_1 = \rho K^s + (1+\rho) S_0 = \rho K^s \left[1 + (1+\rho)\right]$

End of year 2: $S_2 = \rho K^s + (1+\rho) S_1 = \rho K^s \left[1 + (1+\rho) + (1+\rho)^2\right]$

End of year *t*: $S_t = \rho K^s + (1+\rho) S_{t-1} = \rho K^s \left[1 + (1+\rho) + (1+\rho)^2 + ... + (1+\rho)^t\right]$

From the last line above it follows that

$$S_n = \rho K^s \left[1 + (1+\rho) + (1+\rho)^2 + ... + (1+\rho)^n \right] \qquad \Rightarrow$$

$$(1+\rho) S_n = \rho K^s \left[(1+\rho) + (1+\rho)^2 + ... + (1+\rho)^{n+1} \right]$$

Subtracting the former equation from the latter and isolating S_n on the left-hand side, one obtains equation (6.1.3.*c*).

Income before tax during expansion phase

Equation (6.1.4) specifies the evolution of business income during the expansion phase. During this phase earnings are assumed to grow partly as a result of the gradual increase in the firm's capital stock as profits are ploughed back into the firm, and partly as a result of the passage of time. The latter effect is captured by the term $(t-n)\, y^e$ which implies that for any given capital stock, profits will grow by the constant amount y^e every year. The former effect is reflected in the term rK_{t-1} which assumes that a unit increase in the capital stock existing at the start of the year increases profit by the constant marginal rate of return *r*. Note that the length of the expansion phase is *g* years, so the expansion phase lasts until the end of year $n+g$, given that the transition to that phase takes place at the end of year *n*.

Maximum amount of interest allocation during expansion phase

The maximum amount of business income that may be taxed as capital income in any year *t* equals the imputed return on the net equity existing at the end of the previous year (K_{t-1}) plus the unutilised potential for interest allocation accumulated at the end of the previous year (S_{t-1}), carried forward at the imputed rate of return. This rule is specified in equation (6.1.5).

Taxable capital gain during expansion phase

Since the entrepreneur does not sell the firm until the end of year $n+g$, there is no taxable capital gain during the previous years of the expansion phase, as stated in (6.1.6.*a*). Equation (6.1.6.*b*) assumes that the revenue from the sale of the firm is proportional to the recorded profit Y_{n+g}^{e} during the last year of the expansion phase, with a proportionality factor k. The taxable capital gain at the end of year $n+g$ equals the revenue from the sale of the firm $\left(k \cdot Y_{n+g}^{e}\right)$ minus the firm's net equity at the end of the previous year, as specified in equation (6.1.6.*b*).

Actual amount of positive interest allocation during expansion phase

As already mentioned, we assume that the proprietor does not make use of the expansion fund system during the expansion phase, so all of his business income during the expansion phase is taxed as if it were distributed from the firm. In equations (6.1.7.*a*) through (6.1.7.*c*), the parameter f is the fraction of the proprietor's capital gain which arises from the sale of business real estate and is hence taxed as capital income, so 1-f is the fraction of the gain which is included in ordinary taxable business income. Accounting for loss offsets, taxable business income in year t of the expansion phase is thus equal to $Y_t^e + (1-f)G_t - L_{t-1}$. According to the analysis in section 3.9 of Chapter 3, a tax-minimising proprietor subject to the social security contribution rate s will want all business income below the threshold (1+s)328,600 kronor to be taxed as labour income. When income falls below this level, he will thus make no positive interest allocation at all, as stated in (6.1.7.*c*). On the other hand the analysis in Chapter 3 implies that whenever taxable business income exceeds (1+s)328,600 + N_t kronor, the proprietor will want to make the maximum amount of interest allocation allowed by the tax code $\left(N_t\right)$, so in this case the amount of business income that will be taxed as capital income $\left(Y_t^C\right)$ is equal to N_t, as indicated in (6.1.7.*a*). In the intermediate case covered by (6.1.7.*b*) where taxable business income falls between the two thresholds mentioned, all income up to the lower threshold will be taxed as labour income, and the remaining income will be declared as capital income, in accordance with the proprietor's tax-minimising strategy described in Chapter 3.

Taxable personal labour income during expansion phase

Equation (6.1.8.*a*) simply states that taxable personal labour income for tax purposes equals total business income minus the amount of positive interest allocation and minus the mandatory social security contribution, provided the resulting labour income is non-negative. If the latter condition is not met – which will be the case when taxable business income is negative – the proprietor's taxable labour income will be zero, as reflected in (6.1.8.*b*).

Effective social security tax and capital income tax liability during expansion phase

As explained in Chapter 3, the effective social security tax rate is estimated to be zero for taxable personal labour income below 370,400 kronor, as indicated in (6.1.9.*a*), whereas income above this level bears the full social security tax, as stated in (6.1.9.*b*).

The proprietor's taxable capital income equals 90 percent of any realised capital gain arising from the sale of real estate plus the amount of positive interest allocation, as specified in equation (6.1.10.*a*), where f is the fraction of the proprietor's capital gain stemming from the sale of real estate. If the proprietor realises a loss, he may deduct 63 percent of the loss on real estate and 70 percent of a loss on other business assets against other capital income earned during the year of realisation. This rule is reflected in (6.1.10.b). Finally, if the deductible capital loss is so large that taxable capital income becomes negative, the capital income tax bill will be zero, as stated in equation (6.1.10.c) which assumes that the proprietor does not have any capital income from sources outside the firm against which he can deduct his loss.

Personal labour income tax and total tax liability during expansion phase

The tax schedule for personal labour income given in appendix 3.1 implies that the proprietor's personal labour income tax bill is given by the equations in (6.1.11). Equation (6.1.12) simply defines his total tax bill as the sum of the (effective) social security tax, the personal labour income tax and the capital income tax.

Evolution of equity during expansion phase

Equation (6.1.13.*a*) reflects the assumption that all of the proprietor's after-tax profit is reinvested in the firm until the last year of the expansion phase. During that year the proprietor withdraws all of the net profit, so at the end of year $n+g$ the firm's capital stock is the same as it was at the end of the previous year, as stated in (6.1.13.*b*).

Accumulated unutilised potential for interest allocation and accumulated loss carry-over during expansion phase

By definition, the unutilised potential for interest allocation accumulated at the end of year t equals the maximum amount of positive interest allocation for that year minus the actual amount of interest allocation made in year t. By the time he has sold the firm, the proprietor can no longer carry any unutilised potential for interest allocation forward, so at that time the value of S becomes zero. These facts are stated in (6.1.14.*a*) and (6.1.14.*b*).

Equations (6.1.15.*a*) and (6.1.15.*b*) reflect the rule that the entrepreneur must offset previously accumulated business losses as soon as possible. In that case the loss to be carried into the next year will equal the loss carried over from the previous year minus the profit earned during the current year. If the latter is larger than the former, there is no remaining loss to be carried forward.

Relative risk premium and relative standard deviation

The net cash flow received at the end of the expansion phase is associated with risk, since it will accrue only if the firm avoids bankruptcy. Equation (6.1.16.a) specifies the relative risk premium used to convert this risky cash flow into its certainty-equivalent value along the lines explained in Appendix 5.4. To derive (6.1.16.a), let y denote the risky net cash flow received at the end of the expansion phase. With a probability of bankruptcy p, the stochastic variable y will assume a value of zero with probability p. The probability that the firm survives is $1-p$, and in that case we assume

that the entrepreneur will receive the net cash flow Y^n when he sells the firm. Thus the expected value of the net cash flow received during that year is

$$\bar{y} \equiv E[y] = p \cdot 0 + (1-p) \cdot Y^n = (1-p) Y^n$$

Now consider a stochastic variable *x* with the properties

$$x = -1 \qquad \text{with probability } p$$

$$x = \frac{p}{1-p} \qquad \text{with probability } 1-p$$

We may then specify the risky cash flow *y* as

$$y = \bar{y} + x\bar{y}$$

since the properties of our variable *x* ensures that *y* will assume a value of zero with probability *p* and a value of Y^n with probability 1-*p*. The *x*-variable measures the relative deviation of *y* from its mean and it has the following mean and variance:

$$\bar{x} \equiv E[x] = p \cdot (-1) + (1-p) \cdot \left(\frac{p}{1-p} \right) = 0$$

$$\sigma^2 \equiv E\left[(x - \bar{x})^2 \right] = E\left[x^2 \right] = p \cdot (-1)^2 + (1-p) \cdot \left(\frac{p}{1-p} \right)^2 = \frac{p}{1-p}$$

From equation (8) in Appendix 5.4 it then follows that the relative risk premium that may be used to convert the stochastic cash flow *y* into its certainty-equivalent value is given by equation (6.1.16.a), where *CRRA* is the Coefficient of Relative Risk Aversion introduced in Appendix 5.4. Equation (6.1.16.b) simply calculates the standard deviation corresponding to the variance σ^2.

Present value of cash flows

The present value of the net cash flows during the start-up phase is given in (6.1.17) as the discounted value of the income streams during that period minus the equity injected at the start of the period. Note that no taxes are paid during the start-up phase because the firm is running losses.

According to (6.1.16.*a*) the revenue from the sale of the firm at the end of the last year of the expansion phase equals the pre-tax business income earned during that year multiplied by the capitalization factor *k*. The entrepreneur's net cash inflow at the end of the last year of the expansion phase is the sum of that year's after-tax business income plus the revenue from the sale of the firm, $(1-p)\left(Y^{e}_{n+g}+R-T_{n+g}\right)$. According to equation (9) in Appendix 5.4, we may multiply this expected value by the factor 1-*P* to get the certainty-equivalent value of the risky cash flow. By doing so, we obtain the numerator in the fraction on the right-hand side of (6.1.18.b), and by discounting this magnitude back to the start-up date, we get the risk-adjusted present value of the net cash flow in the last year of the expansion phase, stated in equation (6.1.16.*b*). Note that since the numerator in that equation is specified in certainty-equivalent terms, the relevant discount rate δ is the risk-free interest rate on 'safe' assets.

Adding the present values of the entrepreneur's cash flows during the two phases considered, one finally ends up with the risk-adjusted present value of the firm at the time of start-up, given in (6.1.19).

The value of the firm in the absence of tax and the risk-adjusted average effective tax rate

In the absence of tax, the evolution of business income would be given by equation (6.1.20). As specified in (6.1.21), the variable K^{b} appearing in (6.1.20) is the capital stock that would result from the reinvestment of all of the pre-tax profit, as opposed to the previous variable *K* which measures the capital stock resulting from reinvestment of the actual after-tax profit.

Equation (6.1.22) gives the firm's risk-adjusted present value in a hypothetical situation without tax where all of the pre-tax profit is reinvested during the expansion phase. The term $(1-p)(1+k)Y^{eb}_{n+g}$

is the expected value of the income earned during the last year of the expansion phase, Y_{n+g}^{eb}, plus the revenue kY_{n+g}^{eb} from the sale of the firm at the end of that year.

Equation (6.1.23) finally defines the risk-adjusted average effective tax rate imposed on the entrepreneur as the amount by which taxation reduces the risk-adjusted present value of the firm (the numerator), measured relative to the risk-adjusted present value of the pre-tax cash flows that it generates after the start-up date (the denominator). This concept of effective tax rate is the dynamic equivalent of the static measure of the RAETR introduced in Chapter 5.

This completes the description of the Excel computer program calculating the value of a firm started up by a sole proprietor. To activate the program, the user must specify the values of the various exogenous variables and parameters listed after equation (6.1.23).

APPENDIX 6.2
VALUE OF A FIRM STARTED UP BY A QUALIFIED SHAREHOLDER, 2007

This appendix documents the computer algorithm used in Chapter 6 to calculate the value of a firm started up by a qualified shareholder. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation will be provided.

Notation

Exogenous variables and parameters

a = ratio of wage bill to stock of business capital

c= tax rate on income from qualified shares

$CRRA$ = coefficient of relative risk aversion

D^B = dummy variable for inclusion of wage-based allowance in normal dividend

D^{Bi} = auxiliary dummy variables for calculating D^B (i = 1,2)

D^a = dummy variable for inclusion of addition to wage-based allowance

g= length of expansion phase (number of years)

i= interest rate used in carry-forward of unutilised distribution potential

k= capitalisation factor applied at the time of sale of the shares

K^s = initial equity invested by the shareholder at the time of start-up (end of year -1)

n = length of start-up phase (number of years before the firm breaks even)

p= probability of bankruptcy at the end of start-up phase

r = marginal rate of return on business capital

δ = discount rate

ρ = imputed rate of return on basis value of shares

s = rate of social security contribution

τ = corporate income tax rate

y^e= annual increase in income during expansion phase

Y_0^s = business loss during the first year of operation

Endogenous variables

C= effective social security tax liability

D= dividend paid to qualified shareholder

E= basis value of shares at the end of the year

G= total taxable capital gain on shares

G^C= capital gain included in taxable income from shares

G^L= capital gain included in taxable personal labour income

K= stock of business capital at the end of the year

K^b = year-end business equity in the absence of tax

L = accumulated loss carry-over at the end of the year

N = normal dividend

P = relative risk premium

R= revenue from sale of shares at the end of expansion phase

S = accumulated unutilised distribution potential at the end of the year

t^e = average effective tax rate

T^B = corporate income tax liability

T^C = tax bill on capital income taxed reduced rate

T^{CS} = tax bill on capital income taxed at standard rate

T^P = personal labour income tax liability

T = total tax liability

Y^e = business income before tax during expansion phase

Y^{eb} = retained business income during expansion phase in the absence of tax

Y^s = business income before tax during start-up phase

V= risk-adjusted present value of the firm at the time of start-up

V^a= risk-adjusted present value of the firm in the absence of tax

V^e= risk-adjusted present value of net cash flow during expansion phase

V^s= present value of net cash flow during start-up phase

w= wage and salary income of qualified shareholder net of social security contribution

σ = relative standard deviation of net cash flow during expansion phase

In all equations, the subscript t indicates the time period (year), so X_t is the value of variable X in year t. The firm is assumed to be started up at the beginning of year zero, and the expected present value of the firm is calculated at that time. All stock variables are dated at the end of the period.

The Excel computer program for calculating the value of a firm started up by a qualified shareholder includes the following relationships:

Income growth during start-up phase

$$y^s = -\left(\frac{Y_0^s}{n}\right) \qquad (6.2.1)$$

Income before tax during start-up phase

$$Y_t^s = Y_0^s + t \cdot y^s, \qquad t = 0,1,.....,n \qquad (6.2.2)$$

Status at the end of start-up phase

$$L_n = -\sum_{t=0}^{n} Y_t^s \qquad (6.2.3.a)$$

$$K_n = K^s \qquad (6.2.3.b)$$

$$S_n = \frac{\rho K^s}{i}\left[(1+i)^{n+1} - 1\right] \qquad (6.2.3.c)$$

$$E_n = K^s + L_n \qquad (6.2.3.d)$$

$$w_n = 0 \qquad (6.2.3.e)$$

Income before tax during expansion phase

$$Y_t^e = (t-n)\,y^e + rK_{t-1}, \qquad t = n+1,.....,n+g \qquad (6.2.4)$$

Eligibility for inclusion of wage-based allowance in normal dividend during expansion phase

For $t = n+1,.....,n+g$ we have

$$D_t^{B1} = 1 \quad \text{if} \quad w_{t-1} \geq 667,500 \qquad (6.2.5.a)$$

$$D_t^{B1} = 0 \quad \text{if} \quad w_{t-1} < 667,500 \qquad (6.2.5.b)$$

$$D_t^{B2} = 1 \quad \text{if} \quad w_{t-1} \geq 267,000 + 0.05\left(w_{t-1} + aK_{t-1}\right) \qquad (6.2.5.c)$$

$$D_t^{B2} = 0 \quad \text{if} \quad w_{t-1} < 267,000 + 0.05\left(w_{t-1} + aK_{t-1}\right) \qquad (6.2.5.d)$$

$$D_t^{B} = 1 \quad \text{if} \quad D_t^{B1} + D_t^{B2} > 0 \qquad (6.2.5.e)$$

$$D_t^{B} = 0 \quad \text{if} \quad D_t^{B1} + D_t^{B2} = 0 \qquad (6.2.5.f)$$

Eligibility for addition to wage-based allowance during expansion phase

For $t = n+1,.....,n+g$ we have

$$D_t^{a} = 0 \quad \text{if} \quad w_{t-1} + aK_{t-1} \leq 2,670,000 \qquad (6.2.6.a)$$

$$D_t^{a} = 1 \quad \text{if} \quad w_{t-1} + aK_{t-1} > 2,670,000 \qquad (6.2.6.b)$$

Normal dividend during expansion phase

$$N_t = \rho E_{t-1} + (1+i) S_{t-1} + D_t^B 0.25 (w_{t-1} + aK_{t-1})$$

$$+ D_t^B D_t^a 0.25 (w_{t-1} + aK_{t-1} - 2,670,000), \qquad t = n+1, ..., n+g \qquad (6.2.7)$$

Taxable capital gain during expansion phase

$$G_t = 0 \quad \text{for} \quad t = n+1, ..., n+g-1 \qquad (6.2.8.a)$$

$$G_{n+g} = k \cdot Y_{n+g}^e - E_{n+g-1} \qquad (6.2.8.b)$$

Actual dividend during expansion phase

$$D_t = 0 \quad \text{for} \quad t = n+1, ..., n+g-1 \qquad (6.2.9.a)$$

For $t = n+g$ we have

$$D_{n+g} = 0 \quad \text{if} \quad G_{n+g} \geq N_{n+g}$$

$$D_{n+g} = 0 \quad \text{if} \quad G_{n+g} < N_{n+g} \quad \text{and} \quad Y_{n+g}^e \leq (1+s) 370,400 \qquad (6.2.9.b)$$

$$D_{n+g} = (1-\tau) \left[Y_{n+g}^e - (1+s) 370,400 \right]$$

$$\text{if} \quad G_{n+g} < N_{n+g} \quad \text{and} \quad (1+s) 370,400 < Y_{n+g}^e \leq (1+s) 370,400 + \left(\frac{N_{n+g} - G_{n+g}}{1-\tau} \right) \qquad (6.2.9.c)$$

$$D_{n+g} = N_{n+g} - G_{n+g}$$

$$\text{if} \quad G_{n+g} < N_{n+g} \quad \text{and} \quad Y_{n+g}^e > (1+s) 370,400 + \left(\frac{N_{n+g} - G_{n+g}}{1-\tau} \right) \qquad (6.2.9.d)$$

Wage withdrawal during expansion phase

For $t = n+1, ..., n+g-1$ we have

$$w_t = \frac{Y_t^e}{1+s} \quad \text{if} \quad Y_t^e \le (1+s)328,600 \qquad (6.2.10.a)$$

$$w_t = 328,600 \quad \text{if} \quad Y_t^e > (1+s)328,600 \qquad (6.2.10.b)$$

For $t = n+g$ we have

$$w_{n+g} = \frac{Y_{n+g}^e - \left(\frac{D_{n+g}}{1-\tau}\right)}{1+s} \qquad (6.2.10.c)$$

Capital gain taxed at reduced rate during expansion phase

$$G_t^C = 0 \quad \text{for} \quad t = n+1, ..., n+g-1 \qquad (6.2.11.a)$$

For $t = n+g$ we have

$$G_{n+g}^C = N_{n+g} \quad \text{if} \quad G_{n+g} \ge N_{n+g} \qquad (6.2.11.b)$$

$$G_{n+g}^C = G_{n+g} \quad \text{if} \quad 0 \le G_{n+g} < N_{n+g} \qquad (6.2.11.c)$$

$$G_{n+g}^C = 0 \quad \text{if} \quad G_{n+g} < 0 \qquad (6.2.11.d)$$

Capital gain included in taxable personal labour income during expansion phase

$$G_t^L = 0 \quad \text{for} \quad t = n+1,.....,n+g-1 \qquad (6.2.12.a)$$

For $t = n+g$ we have

$$G_{n+g}^L = 0 \quad \text{if} \quad G_{n+g} < N_{n+g} \qquad (6.2.12.b)$$

$$G_{n+g}^L = G_{n+g} - N_{n+g} \quad \text{if} \quad N_{n+g} \le G_{n+g} \le N_{n+g} + 4,590,000 \qquad (6.2.12.c)$$

$$G_{n+g}^L = 4,590,000 \quad \text{if} \quad G_{n+g} > N_{n+g} + 4,590,000 \qquad (6.2.12.d)$$

Corporate income tax liability during expansion phase

For $t = n+1,.....,n+g$ we have

$$T_t^B = \tau\left[Y_t^e - (1+s) w_t - L_{t-1} \right] \quad \text{if} \quad Y_t^e - (1+s) w_t - L_{t-1} \ge 0 \qquad (6.2.13.a)$$

$$T_t^B = 0 \quad \text{if} \quad Y_t^e - (1+s) w_t - L_{t-1} < 0 \qquad (6.2.13.b)$$

Effective social security tax during expansion phase

For $t = n+1,.....,n+g$ we have

$$C_t = 0 \quad \text{if} \quad w_t \le 370,400 \qquad (6.2.14.a)$$

$$C_t = s \cdot (w_t - 370,400) \quad \text{if} \quad w_t > 370,400 \qquad (6.2.14.b)$$

Personal labour income tax during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^P = 0 \quad \text{if} \quad w_t + G_t^L \le 31,800 \tag{6.2.15.a}$$

$$T_t^P = 0.253 \cdot \left(w_t + G_t^L - 31,800 \right) \quad \text{if} \quad 31,800 < w_t + G_t^L \le 109,600 \tag{6.2.15.b}$$

$$T_t^P = 19,683 + 0.316 \cdot \left(w_t + G_t^L - 109,600 \right) \quad \text{if} \quad 109,600 < w_t + G_t^L \le 328,600 \tag{6.2.15.c}$$

$$T_t^P = 88,887 + 0.516 \cdot \left(w_t + G_t^L - 328,600 \right) \quad \text{if} \quad 328,600 < w_t + G_t^L \le 488,600 \tag{6.2.15.d}$$

$$T_t^P = 171,447 + 0.566 \cdot \left(w_t + G_t^L - 488,600 \right) \quad \text{if} \quad 488,600 < w_t + G_t^L \tag{6.2.15.e}$$

Capital income tax liability during expansion phase

$$T_t^C = 0, \qquad t = n+1, ..., n+g-1 \tag{6.2.16.a}$$

$$T_{n+g}^C = c \cdot \left(D_{n+g} + G_{n+g}^C \right) \qquad \text{if} \qquad G_{n+g} \ge 0 \tag{6.2.16.b}$$

$$T_{n+g}^C = c \cdot D_{n+g} + 0.3 \cdot 0.7 \cdot \left(\frac{2}{3} \right) \cdot G_{n+g} \qquad \text{if} \qquad G_{n+g} < 0 \tag{6.2.16.c}$$

$$T_t^{CS} = 0, \qquad t = n+1, ..., n+g-1 \tag{6.2.16.d}$$

$$T_{n+g}^{CS} = 0 \qquad \text{if} \qquad G_{n+g} \le N_{n+g} + 4,590,000 \tag{6.2.16.e}$$

$$T_{n+g}^{CS} = 0.3 \cdot \left(G_{n+g} - N_{n+g} - 4,590,000 \right) \qquad \text{if} \qquad G_{n+g} > N_{n+g} + 4,590,000 \tag{6.2.16.f}$$

Total tax liability during expansion phase

$$T_t = C_t + T_t^B + T_t^C + T_t^{CS} + T_t^P, \qquad t = n+1, ..., n+g \qquad (6.2.17)$$

Evolution of capital stock during expansion phase

$$K_t = K_{t-1} + Y_t^e - T_t, \qquad t = n+1, ..., n+g-1 \qquad (6.2.18.a)$$

$$K_{n+g} = K_{n+g-1} \qquad (6.2.18.b)$$

Evolution of the basis value of shares during expansion phase

$$E_t = E_{t-1} + (1+s)\, w_t - C_t - T_t^P, \qquad t = n+1, ..., n+g-1 \qquad (6.2.19.a)$$

$$E_{n+g} = 0 \qquad (6.2.19.b)$$

Accumulated unutilised distribution potential during expansion phase

$$S_t = N_t, \qquad t = n+1, ..., n+g-1 \qquad (6.2.20.a)$$

$$S_{n+g} = 0 \qquad (6.2.20.b)$$

Accumulated loss carry-over during expansion phase

For $t = n+1, ..., n+g$ we have

$$L_t = L_{t-1} - Y_t^e \quad \text{for} \quad Y_t^e \le L_{t-1} \qquad (6.2.21.a)$$

$$L_t = 0 \quad \text{for} \quad Y_t^e > L_{t-1} \qquad (6.2.21.b)$$

Relative risk premium and relative standard deviation

$$P = \left(\frac{p}{1-p}\right)\left(\frac{CRRA}{2}\right) \qquad (6.2.22.a)$$

$$\sigma = \sqrt{\left(\frac{p}{1-p}\right)}, \qquad \sigma > 0 \qquad (6.2.22.b)$$

Present value of net cash flow during start-up phase

$$V^s = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s \qquad (6.2.23)$$

Present value of risk-adjusted net cash inflow in last year of expansion phase

$$R = k \cdot Y_{n+g}^e \qquad (6.2.24.a)$$

$$V^e = \frac{(1-P)(1-p)\left(Y_{n+g}^e + R - T_{n+g}\right)}{(1+\delta)^{n+g+1}} \qquad (6.2.24.b)$$

Risk-adjusted present value of the firm at the time of start-up

$$V = V^s + V^e \qquad (6.2.25)$$

Evolution of income in the absence of tax (expansion phase)

$$Y_t^{eb} = (t-n)\, y^e + rK_{t-1}^b, \qquad t = n+1, ..., n+g \qquad (6.2.26)$$

Evolution of equity in the absence of tax (expansion phase)

$$K_n^b = K^s \qquad (6.2.27.a)$$

$$K_t^b = K_{t-1}^b + Y_t^{eb}, \qquad t = n+1, ..., n+g-1 \qquad (6.2.27.b)$$

Risk-adjusted present value in the absence of tax

$$V^a = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s + \left(\frac{(1-P)(1-p)(1+k) Y_{n+g}^{eb}}{(1+\delta)^{n+g+1}} \right) \qquad (6.2.28)$$

Risk-adjusted average effective tax rate

$$t^e = \frac{V^a - V}{V^a + K^s} \qquad (6.2.29)$$

Exogenous variables and parameters in benchmark scenario

$K^s = 500,000$	$Y_0^s = -500,000$	$y^e = 100,000$
$n = 4$	$g = 5$	$\tau = 0.28$
$r = 0.1$	$\delta = 0.02$	$k = 10$
$p = 0.1$	$a = 0$	$i = 0.0654$
$\rho = 0.1254$	$s = 0.3242$	$c = 0.2$

Explanatory remarks

The pre-tax cash flows generated by the firm are exactly the same as those assumed in the case of a sole proprietorship described in Appendix 6.1. At the beginning of year zero the entrepreneur injects an amount of equity K^s into the new company. The firm then goes through a start-up phase with gradually declining losses. At the end of the start-up phase the company faces a fixed probability of bankruptcy. If the firm survives, it enters an expansion phase with gradually increasing profits. At the end of this phase the shares in the firm are sold to a new owner. As the firm makes losses during the start-up phase, the entrepreneur injects new equity in order to maintain the firm's net equity at the initial level K^s. The end of the start-up phase is defined as the year in which the firm just manages to break even. During the expansion phase the firm's profit rises steadily every year, and all of the after-tax income derived from the firm is assumed to be reinvested in the firm right until the shareholder sells his shares. The qualified shareholder is assumed to pay himself a wage or salary and to reinject his after-tax labour income into the company whenever this leads to a lower overall tax bill than retention of profits in the company. As in the case of the sole proprietor in Appendix 6.1, the qualified shareholder does not make any net withdrawal of cash from the firm until the year it is sold. Again this implicitly assumes that he has other sources of income or that he is able to borrow to finance his consumption until the time of sale of the firm.

The start-up phase

The amount of income before tax and the growth of this income are specified in equations (6.2.2) and (6.2.1) in exactly the same manner as in the case of the sole proprietorship in Appendix 6.1.

The accumulated loss and the capital stock at the end of the start-up phase are also the same for the qualified shareholder as for the sole proprietor (see equations (6.2.3.*a*) and (6.2.3.*b*)).

The qualified shareholder's accumulated unutilised distribution potential (S) at the end of the start-up phase is given by (6.2.3.*c*), where i is the interest rate at which the unutilised distribution potential may be carried forward. Since the shareholder receives no dividends or capital gains

during the start-up phase, the value of *S* at the end of each year in that phase is given by the following expressions, where ρ is the imputed rate of return to the basis value of the shares, and where the latter equals the initial equity K^s injected in the company:

End of year 0: $S_0 = \rho K^s$

End of year 1: $S_1 = \rho K^s + (1+i) S_0 = \rho K^s \left[1 + (1+i) \right]$

End of year 2: $S_2 = \rho K^s + (1+i) S_1 = \rho K^s \left[1 + (1+i) + (1+i)^2 \right]$

End of year *t*: $S_t = \rho K^s + (1+i) S_{t-1} = \rho K^s \left[1 + (1+i) + (1+i)^2 + ... + (1+i)^t \right]$

From the last line above it follows that

$$S_n = \rho K^s \left[1 + (1+i) + (1+i)^2 + ... + (1+i)^n \right] \qquad \Rightarrow$$

$$(1+i) S_n = \rho K^s \left[(1+i) + (1+i)^2 + ... + (1+i)^{n+1} \right]$$

Subtracting the former equation from the latter and isolating S_n on the left-hand side, one obtains equation (6.2.3.*c*).

Equations (6.2.3.*d*) and (6.2.3.*e*) state the basis value of shares and the qualified shareholder's wage from the company at the end of the start-up phase, since these data are needed to calculate taxable income during the first year of the expansion phase. Note from (6.2.3.*d*) that the shareholder is allowed to add his injections of new equity during the loss-making start-up phase (L_n) to the original basis value of his shares for the purpose of calculating future capital gains or losses.

Income before tax during expansion phase

Equation (6.2.4) specifies the evolution of business income during the expansion phase in the same manner as for the sole proprietorship considered in Appendix 6.1. During this phase earnings are assumed to grow partly as a result of the gradual increase in the firm's capital stock as profits are ploughed back into the firm, and partly as a result of the passage of time. The latter effect is captured by the term $(t-n)\,y^e$ which implies that for any given capital stock, profits will grow by the constant amount y^e every year. The former effect is reflected in the term rK_{t-1} which assumes that a unit increase in the capital stock existing at the start of the year increases profit by the constant marginal rate of return *r*.

Eligibility for wage-based allowance during expansion phase

The dummy variables in (6.2.5) capture the rules that the qualified shareholder will be eligible for inclusion of a wage-based allowance in the calculation of his normal dividend either if he received a wage from the company exceeding 667,500 kronor during the previous year or if his wage from the company during that year exceeded 267,000 kronor plus five percent of the company's total wage bill. The wage bill for the company's employees is assumed to make up a fraction *a* of the firm's capital stock.

The dummy variable in (6.2.6) accounts for the rule that the qualified shareholder is eligible for an addition to the wage-based allowance if the company's total wage bill during the previous year exceeded 2,670,000 kronor.

Normal dividend during expansion phase

As stated in (6.2.7), the qualified shareholder's normal dividend (the amount of dividend or capital gain that may be taxed as capital income) consists of the imputed return to the basis value of the shares at the end of the previous year (ρE_{t-1}) plus the unutilised distribution potential from the

previous year, carried forward with interest $\left((1+i)S_{t-1}\right)$, and plus the wage-based allowance. The latter in turn consists of the basic allowance amounting to 25 percent of the previous year's total wage bill and a possible additional allowance equal to 25 percent of that part of last year's wage bill which exceeded 2,670,000 kronor.

Taxable capital gain during expansion phase

Since the shareholder does not sell his shares in the firm until the end of year $n+g$, there is no taxable capital gain during the previous years of the expansion phase, as stated in (6.2.8.*a*). In line with the case of a sole proprietorship, equation (6.2.8.*b*) assumes that the revenue from the sale of the shares is proportional to the recorded profit Y^e_{n+g} during the last year of the expansion phase, with a proportionality factor k. The taxable capital gain at the end of year $n+g$ equals the revenue from the sale of the firm $\left(k \cdot Y^e_{n+g}\right)$ minus the basis value of shares at the end of the previous year $\left(E_{n+g-1}\right)$, as specified in equation (6.2.8.*b*).

Actual dividend during expansion phase

Since dividends are subject to double taxation whereas retained profits are only subject to the corporate income tax as long as the shareholder does not realize any capital gains, the qualified shareholder will not want to pay himself any dividend during the period when all after-tax income is reinvested in the firm. This is reflected in equation (6.2.9.*a*).

In the last year of the expansion phase the qualified shareholder is assumed to realize his income from the company in the form that will minimise his tax bill. If his taxable capital gain from the sale of shares exceeds the normal dividend so that any dividend received will be taxed as labour income, he will not take out any dividend during the last year of the expansion phase, since wage income from the company (which is not subject to double taxation) will be more lightly taxed.[56] This fact is

[56] Actually a normal dividend is only imputed to a qualified shareholder if the company has distributed some amount of dividend. However, even a purely symbolic dividend of just one krona suffices for this purpose, so in practice this rule

captured by the first line in (6.2.9.*b*). If the capital gain from the shares is less than the normal dividend, it will still not be profitable for the qualified shareholder to pay himself a dividend so long as the company's pre-tax income does not exceed $(1+s)370,400$ kronor, since income below this threshold is taxed more lightly if it is distributed to the shareholder as wage income, as explained in section 3.9 of Chapter 3. Again, the shareholder will thus not want to receive any dividend, as stated in the second line of (6.2.9.*b*). However, if the company's pre-tax income exceeds $(1+s)370,400$ kronor, it becomes profitable for the shareholder to receive any excess amount in the form of a dividend rather than as wages, provided the dividend is taxed as capital income. The shareholder will then pay himself a dividend up to the limit given by the smaller of normal dividend and the excess of after-tax company profits over the $(1+s)370,400$ kronor threshold. This behaviour is reflected in equations (6.2.9.*c*) and (6.2.9.*d*).

Wage withdrawal during expansion phase

Equations (6.2.10.*a*) and (6.2.10.*b*) describe the tax-minimising wage policy up until the last year of the expansion phase. Whenever the company's pre-tax income falls below $(1+s)328,600$ kronor, the shareholder will want to distribute that income as a wage, since this leaves a larger amount of after-tax income to be reinvested in the firm than if the profit had been retained and subjected to corporation tax. This is captured by (6.2.10.*a*). If the company's pre-tax income exceeds $(1+s)328,600$ kronor, the tax-minimising strategy is to pay the shareholder a wage of 328,600 kronor (after deduction of social security contribution) and to retain the remaining profit in the company, as stated in (6.2.10.*b*).

During the last year of the expansion phase we assume – in parallel to the assumption made for the sole proprietor in Appendix 6.1 – that the profit in that year is distributed to the owner in the most tax-efficient manner. As stated in (6.2.10.*c*), this means that the wage to the shareholder equals the pre-tax business income minus the tax-minimising dividend (measured on a tax-inclusive basis) specified in (6.2.9).

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has no importance. The equations in (6.2.9) 4 therefore assume that a normal dividend is imputed to the shareholder even though no dividend is paid in year $n+g$.

Note that it would not make any difference for the shareholder's after-tax outcome if he chose instead to leave the last year's profit in the company, assuming that the sales price of the shares would then go up by a corresponding amount. In that case the dividend policy specified in (6.2.9.*b*) through (6.2.9.*d*) would imply that the marginal income from the (sale of the) company would still be taxed as labour income, just as (6.2.10.*c*) implies that the marginal income distributed from the firm is taxed as labour income.

Taxation of capital gain at the end of expansion phase

The capital gain on shares realized at the end of the last year of the expansion phase is taxed as capital income at the reduced rate of 20 percent, provided it does not exceed the shareholder's normal dividend for that year. If it does, the excess gain is taxed as labour income, up to a limit of 4,590,000 kronor (100 inkomstbasbelopp, 2007 level). These rules are specified in (6.2.11) and (6.2.12).

Tax liabilities

The corporate income tax is levied on business income net of the shareholder's wage and net of the accumulated business loss, as stated in (6.2.13). As explained in Chapter 3, the effective social security tax rate is estimated to be zero for taxable personal labour income below 370,400 kronor, as indicated in (6.2.14.*a*), whereas income above this level bears the full social security tax, as stated in (6.2.14.*b*).

The tax schedule for personal labour income given in Appendix 3.1 implies that the shareholder's personal labour income tax bill is given by the equations in (6.2.15). (6.2.16.*b*) specifies the capital income taxed at the reduced rate (*c*) at the end of the expansion phase as the sum of the shareholder's dividend income and that part of his capital gain which qualifies for taxation at the reduced rate. As explained in section 3.4 of Chapter 3, if a shareholder realizes a capital loss on a qualified share, and if he cannot offset the loss against gains on other shares, he is entitled to a tax

credit equal to 2/3 times the 30 percent capital income tax rate times the deficit recorded on his capital income account, where the deficit is calculated as 70 percent of the realized loss. Equation (6.2.16.*c*) captures this rule.[57] Equations (6.1.16.*d*) through (6.16.*f*) finally specify that, in so far as the excess of the capital gain over the normal dividend $\left(G_{n+g} - N_{n+g}\right)$ is larger than 4,590,000 kronor (100 inkomstbasbelopp), the gain beyond this cap is taxed at the standard 30 percent capital income tax rate.

Equation (6.2.17) defines the total tax bill as the sum of the corporation tax, the (effective) social security tax, the personal labour income tax and the capital income tax.

Evolution of capital stock and basis value of shares during expansion phase

Equation (6.2.18.*a*) reflects the assumption that all of the shareholder's after-tax income from the company (including retained profit) is reinvested in the firm until the last year of the expansion phase. During that year the shareholder withdraws all of the net profit, so at the end of year $n+g$ the firm's capital stock is the same as it was at the end of the previous year, as stated in (6.2.18.*b*).

By analogy, equation (6.2.19.*a*) reflects that whenever the shareholder receives wage income from the company during the expansion phase, all of the after-tax wage income is reinjected as new equity in the company, thereby increasing the basis value of his shares.

Accumulated unutilised distribution potential and accumulated loss carry-over during expansion phase

By definition, the unutilised distribution potential accumulated at the end of year t equals the normal dividend for that year minus the actual amount of dividends and realized capital gains in year t. Since actual dividends and capital gains are zero up until the last year of the expansion phase, the unutilised distribution potential simply equals the normal dividend up until that year. By

[57] The tax credit for that part of the loss which exceeds 100,000 kronor is actually 30 percent lower than the credit granted for losses below that amount. We do not account for this complication here since our analysis does not consider cases with large losses during the expansion phase.

the time he has sold his shares, the entrepreneur no longer has any unutilised distribution potential to carry forward, so at that time the value of *S* becomes zero. These facts are recorded in (6.2.20.*a*) and (6.2.20.*b*).

Equations (6.2.21.*a*) and (6.2.21.*b*) reflect the rule that the company must offset previously accumulated business losses as soon as possible. In that case the loss to be carried into the next year will equal the loss carried over from the previous year minus the profit earned during the current year. If the latter is larger than the former, there is no remaining loss to be carried forward.

Present value of cash flows and average effective tax rate

Equations (6.2.22.*a*) through (6.2.29) are identical to the analogous equations determining the present value of cash flows when the firm is organised as a sole proprietorship (see Appendix 6.1).

This completes the description of the Excel computer program calculating the value of a firm started up by a qualified shareholder. To activate the program, the user must specify the values of the various exogenous variables and parameters listed after equation (6.2.29).

APPENDIX 6.3
VALUE OF A WIDELY HELD START-UP COMPANY, 2007

This appendix documents the computer algorithm used in Chapter 6 to calculate the value of a start-up firm organised as a widely held corporation. Following a presentation of the notation and the full set of equations included in the algorithm, some explanatory remarks on each equation will be provided.

Notation

Exogenous variables and parameters

$CRRA$ = coefficient of relative risk aversion

D^L = dummy variable for listed company

D^W = dummy variable for payment of wage to shareholder

g= length of expansion phase (number of years)

k= capitalisation factor applied at the time of sale of the shares

K^s = initial equity invested by the shareholder at the time of start-up (end of year -1)

n = length of start-up phase (number of years before the firm breaks even)

p= probability of bankruptcy at the end of start-up phase

r = marginal rate of return on business capital

δ = discount rate

s = rate of social security contribution

τ = corporate income tax rate

y^e= annual increase in income during expansion phase

Y_0^s = business loss during the first year of operation

Endogenous variables

C= effective social security tax liability

D= dividend

E= basis value of shares at the end of the year

G= taxable capital gain on shares

K= stock of business capital at the end of the year

K^b = year-end business equity in the absence of tax

L = accumulated loss carry-over at the end of the year

P = relative risk premium

R= revenue from sale of shares at the end of expansion phase

t^e = average effective tax rate

T^B = corporate income tax liability

T^C = capital income tax liability

T^P = personal labour income tax liability

T = total tax liability

Y^e = business income before tax during expansion phase

Y^{eb} = retained business income during expansion phase in the absence of tax

Y^s = business income before tax during start-up phase

V= risk-adjusted present value of the firm at the time of start-up

V^a= risk-adjusted present value of the firm in the absence of tax

V^e= risk-adjusted present value of net cash flow during expansion phase

V^s= present value of net cash flow during start-up phase

w= wage and salary income of shareholder net of social security contribution

σ = relative standard deviation of net cash flow during expansion phase

In all equations, the subscript t indicates the time period (year), so X_t is the value of variable X in year t. The firm is assumed to be started up at the beginning of year zero, and the expected present value of the firm is calculated at that time. All stock variables are dated at the end of the period.

The Excel computer program for calculating the value of a widely held start-up company includes the following relationships:

Income growth during start-up phase

$$y^s = -\left(\frac{Y_0^s}{n}\right) \qquad (6.3.1)$$

Income before tax during start-up phase

$$Y_t^s = Y_0^s + t \cdot y^s, \qquad t = 0,1,.....,n \qquad (6.3.2)$$

Status at the end of start-up phase

$$L_n = -\sum_{t=0}^{n} Y_t^s \qquad (6.3.3.a)$$

$$K_n = K^s \qquad (6.3.3.b)$$

$$E_n = K^s + L_n \qquad (6.3.3.c)$$

Income before tax during expansion phase

$$Y_t^e = (t-n)\, y^e + rK_{t-1}, \qquad t = n+1,.....,n+g \qquad (6.3.4)$$

Taxable capital gain during expansion phase

$$G_t = 0 \quad \text{for} \quad t = n+1,.....,n+g-1 \qquad (6.3.5.a)$$

$$G_{n+g} = k \cdot Y_{n+g}^e - E_{n+g-1} \qquad (6.3.5.b)$$

Wage withdrawal during expansion phase

For $t = n+1, ..., n+g-1$ we have

$$w_t = D^W \cdot \left(\frac{Y_t^e}{1+s} \right) \quad \text{if} \quad Y_t^e \le (1+s)328,600 \qquad (6.3.6.a)$$

$$w_t = D^W \cdot 328,600 \quad \text{if} \quad Y_t^e > (1+s)328,600 \qquad (6.3.6.b)$$

For $t = n+g$ we have

$$w_{n+g} = D^W \cdot \left(\frac{Y_{n+g}^e}{1+s} \right) \quad \text{if} \quad Y_{n+g}^e \le (1+s)370,400 \qquad (6.3.6.c)$$

$$w_{n+g} = D^W \cdot 370,400 \quad \text{if} \quad Y_{n+g}^e > (1+s)370,400 \qquad (6.3.6.d)$$

Dividend during expansion phase

$$D_t = 0 \quad \text{for} \quad t = n+1, ..., n+g-1 \qquad (6.3.7.a)$$

$$D_{n+g} = (1-\tau)\left[Y_{n+g}^e - (1+s) w_t \right] \qquad (6.3.7.b)$$

Corporate income tax liability during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^B = \tau \left[Y_t^e - (1+s) w_t - L_{t-1} \right] \quad \text{if} \quad Y_t^e - (1+s) w_t - L_{t-1} \ge 0 \qquad (6.3.8.a)$$

$$T_t^B = 0 \quad \text{if} \quad Y_t^e - (1+s) w_t - L_{t-1} < 0 \qquad (6.3.8.b)$$

Effective social security tax during expansion phase

For $t = n+1, ..., n+g$ we have

$$C_t = 0 \quad \text{if} \quad w_t \le 370,400 \tag{6.3.9.a}$$

$$C_t = s \cdot (w_t - 370,400) \quad \text{if} \quad w_t > 370,400 \tag{6.3.9.b}$$

Capital income tax liability during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^C = \left[D^L 0.3 + (1 - D^L) 0.25 \right] \cdot (D_t + G_t) \quad \text{if} \quad G_t \ge 0 \tag{6.3.10.a}$$

$$T_t^C = \left[D^L 0.3 + (1 - D^L) 0.25 \right] \cdot D_t + 0.3 \cdot 0.7 \cdot \left[D^L + \left(\frac{5}{6} \right) (1 - D^L) \right] \cdot G_t$$

if $G_t < 0$ (6.3.10.b)

Personal labour income tax during expansion phase

For $t = n+1, ..., n+g$ we have

$$T_t^P = 0 \quad \text{if} \quad w_t \le 31,800 \tag{6.3.11.a}$$

$$T_t^P = 0.253 \cdot (w_t - 31,800) \quad \text{if} \quad 31,800 < w_t \le 109,600 \tag{6.3.11.b}$$

$$T_t^P = 19,683 + 0.316 \cdot (w_t - 109,600) \quad \text{if} \quad 109,600 < w_t \le 328,600 \tag{6.3.11.c}$$

$$T_t^P = 88,887 + 0.516 \cdot (w_t - 328,600) \quad \text{if} \quad 328,600 < w_t \le 488,600 \tag{6.3.11.d}$$

$$T_t^P = 171,447 + 0.566 \cdot (w_t - 488,600) \quad \text{if} \quad 488,600 < w_t \tag{6.3.11.e}$$

Total tax liability during expansion phase

$$T_t = C_t + T_t^B + T_t^C + T_t^P, \qquad t = n+1, ..., n+g \qquad (6.3.12)$$

Evolution of capital stock during expansion phase

$$K_t = K_{t-1} + Y_t^e - T_t, \qquad t = n+1, ..., n+g-1 \qquad (6.3.13.a)$$

$$K_{n+g} = K_{n+g-1} \qquad (6.3.13.b)$$

Evolution of the basis value of shares during expansion phase

$$E_t = E_{t-1} + (1+s)\, w_t - C_t - T_t^P, \qquad t = n+1, ..., n+g-1 \qquad (6.3.14.a)$$

$$E_{n+g} = 0 \qquad (6.3.14.b)$$

Accumulated loss carry-over during expansion phase

For $t = n+1, ..., n+g$ we have

$$L_t = L_{t-1} - Y_t^e \quad \text{for} \quad Y_t^e \le L_{t-1} \qquad (6.3.15.a)$$

$$L_t = 0 \quad \text{for} \quad Y_t^e > L_{t-1} \qquad (6.3.15.b)$$

Relative risk premium and relative standard deviation

$$P = \left(\frac{p}{1-p} \right) \left(\frac{CRRA}{2} \right) \qquad (6.3.16.a)$$

$$\sigma = \sqrt{\left(\frac{p}{1-p} \right)}, \qquad \sigma > 0 \qquad (6.3.16.b)$$

Present value of net cash flow during start-up phase

$$V^s = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s \qquad (6.3.17)$$

Present value of risk-adjusted net cash inflow in last year of expansion phase

$$R = k \cdot Y_{n+g}^e \qquad (6.3.18.a)$$

$$V^e = \frac{(1-P)(1-p)\left(Y_{n+g}^e + R - T_{n+g}\right)}{(1+\delta)^{n+g+1}} \qquad (6.3.18.b)$$

Risk-adjusted present value of the firm at the time of start-up

$$V = V^s + V^e \qquad (6.3.19)$$

Evolution of income in the absence of tax (expansion phase)

$$Y_t^{eb} = (t-n)\, y^e + rK_{t-1}^b, \qquad t = n+1, ..., n+g \qquad (6.3.20)$$

Evolution of equity in the absence of tax (expansion phase)

$$K_n^b = K^s \qquad (6.3.21.a)$$

$$K_t^b = K_{t-1}^b + Y_t^{eb}, \qquad t = n+1, ..., n+g-1 \qquad (6.3.21.b)$$

Risk-adjusted present value in the absence of tax

$$V^a = \sum_{t=0}^{n} \frac{Y_t^s}{(1+\delta)^{t+1}} - K^s + \left(\frac{(1-P)(1-p)(1+k)Y_{n+g}^{eb}}{(1+\delta)^{n+g+1}} \right) \qquad (6.3.22)$$

Risk-adjusted average effective tax rate

$$t^e = \frac{V^a - V}{V^a + K^s} \qquad (6.3.23)$$

Exogenous variables and parameters in benchmark scenario

$K^s = 500,000$	$Y_0^s = -500,000$	$y^e = 100,000$
$n = 4$	$g = 5$	$\tau = 0.28$
$r = 0.1$	$\delta = 0.02$	$k = 10$
$p = 0.1$		$s = 0.3242$
$D^W = 1$	$D^L = 0$	

Explanatory remarks

The pre-tax cash flows generated by the firm are exactly the same as those assumed in the cases of a sole proprietor and a qualified shareholder described in appendices 6.1 and 6.2. However, the tax rules are now simpler, since dividends and capital gains on shares in a widely held company are always taxed as capital income, so there are no rules for income splitting.

The start-up phase

The amount of income before tax and the growth of this income are specified in equations (6.3.2) and (6.3.1) in exactly the same manner as in the cases of the sole proprietor and the qualified shareholder.

The accumulated loss, the capital stock and the basis value of shares at the end of the start-up phase are also the same for the widely held as for the closely held company (see equations (6.3.3.*a*) through (6.3.3.*c*)).

Income during expansion phase

Equation (6.3.4) specifies the evolution of business income during the expansion phase in the same manner as for the two other organizational forms.

Since the shareholder does not sell his shares in the firm until the end of year $n+g$, there is no taxable capital gain during the previous years of the expansion phase, as stated in (6.3.5.*a*). In line with the two previous appendices, equation (6.3.5.*b*) assumes that the revenue from the sale of the shares is proportional to the recorded profit Y^e_{n+g} during the last year of the expansion phase. The taxable capital gain at the end of year $n+g$ equals the revenue from the sale of the firm $\left(k \cdot Y^e_{n+g}\right)$ minus the basis value of shares at the end of the previous year $\left(E_{n+g-1}\right)$, as indicated in (6.3.5.*b*).

The dummy variable D^W in equations (6.3.6.*a*) through (6.3.6.*d*) allows for the possibility that the shareholder is active in the company, thus receiving part of its income in the form of wages. As in the case of the qualified shareholder, the tax-minimising wage policy is to pay out all of the company's pre-tax income as wages when business income falls below $(1+s)328,600$ kronor, since this leaves a larger amount of after-tax income to be reinvested in the firm than if the profit had been retained and subjected to corporation tax. This is captured by (6.3.6.*a*). If the company's pre-tax income exceeds $(1+s)328,600$ kronor, the tax-minimising strategy is to pay the shareholder a wage of 328,600 kronor (after deduction of social security contribution) and to retain the remaining profit in the company, as stated in (6.3.6.*b*).

During the last year of the expansion phase we assume – in parallel to the assumptions made for the sole proprietor and for the qualified shareholder – that the profit in that year is distributed to the owners in the most tax-efficient manner. As stated in (6.3.6.*c*), this means that if the company's pre-tax income does not exceed $(1+s)370,400$ kronor, it will be distributed as wage income, since labour income below this threshold is taxed more lightly than double-taxed dividends and capital gains. If the company's pre-tax income exceeds $(1+s)370,400$ kronor, it becomes profitable for the shareholder to receive any excess amount in the form of a dividend rather than as wages, given that the dividend is taxed as capital income. This distribution policy is reflected in (6.3.6.*d*) and (6.3.7.*b*).

Tax liabilities

The corporate income tax is levied on business income net of the shareholder's wage and net of the accumulated business loss, as stated in (6.3.8.*a*). As explained in Chapter 3, the effective social security tax rate is estimated to be zero for taxable personal labour income below 370,400 kronor, as indicated in (6.3.9.*a*), whereas income above this level bears the full social security tax, as stated in (6.3.9.*b*).

The dummy variable D^L in (6.3.10) takes the value of one for a listed company and zero for an unlisted company, thus accounting for the fact that dividends and capital gains from unlisted

companies are only taxed at the rate of 25 percent. As explained in Chapter 3, if a shareholder realizes a capital loss on an unlisted share in a widely held company, and if he cannot offset the loss against gains on other shares, he is only entitled to a tax credit equal to 5/6 times the 30 percent capital income tax rate times 70 percent of the realized loss, whereas if the share is listed, the tax credit amounts to the full 30 percent capital income tax rate times 70 percent of the loss. Equation (6.3.10.*b*) captures this rule.[58]

The tax schedule for personal labour income given in appendix 3.1 implies that the shareholder's personal labour income tax bill is given by the equations in (6.3.11).

Equation (6.3.12) defines the total tax bill as the sum of the corporation tax, the (effective) social security tax, the personal labour income tax and the capital income tax.

Evolution of capital stock and basis value of shares during expansion phase

Equation (6.3.13.*a*) reflects the assumption that all of the shareholder's after-tax income from the company (including retained profit) is reinvested in the firm until the last year of the expansion phase. During that year the shareholder withdraws all of the net profit, so at the end of year $n+g$ the firm's capital stock is the same as it was at the end of the previous year, as stated in (6.3.13.*b*).

By analogy, equation (6.3.14.*a*) reflects that whenever the shareholder receives wage income from the company during the expansion phase, all of the after-tax wage income is reinjected as new equity in the company, thereby increasing the basis value of his shares.

Accumulated loss carry-over during expansion phase

Equations (6.3.15.*a*) and (6.3.15.*b*) capture the rule that the company must offset previously accumulated business losses as soon as possible. In that case the loss to be carried into the next year

[58] For listed as well as unlisted shares, the tax credit for that part of the loss which exceeds 100,000 kronor is actually 30 percent lower than the credit granted for losses below that amount. We do not account for this complication here since our analysis does not consider cases with large losses during the expansion phase.

will equal the loss carried over from the previous year minus the profit earned during the current year. If the latter is larger than the former, there is no remaining loss to be carried forward.

Present value of cash flows and average effective tax rate

Equations (6.3.16.*a*) through (6.3.23) are identical to the analogous equations determining the present value of cash flows when the firm is owned by a sole proprietor or by a qualified shareholder.

This completes the description of the Excel computer program calculating the value of a firm started up as a widely held company. To activate the program, the user must specify the values of the various exogenous variables and parameters listed after equation (6.3.23).

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