Tax Incentives of Corporate Mergers and Foreign Direct Investments

Karl-Markus Modén

THE INDUSTRIAL INSTITUTE FOR ECONOMIC AND SOCIAL RESEARCH

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Distribution: Almqvist & Wiksell International,

Stockholm, Sweden

IUI Dissertation Series, No. 7
ISSN1102-6057
ISBN91-7204-442-X
Printed by AB Grafiska Gruppen
Stockholm 1993

Foreword

The study of firm behavior has a long tradition at the Industrial Institute for Economic and Social Research. This dissertation by Karl-Markus Modén focuses on the influence of taxes on firms' investment decisions. Two decisions are studied: to acquire another company and to locate production abroad through foreign direct investments. These research topics are both original in design and part of the research tradition of the Institute.

The results indicate that corporate income taxes have tilted the industrial structure towards the larger segment of the size distribution. This relatively favourable tax treatment of larger firms has had a negative effect on economic growth, since competitive pressure from small and medium sized firms has been weakened.

The second study indicates that the Swedish corporate tax system in fact has adjusted quite smoothly to effective tax rates abroad. A gradually increasing statutory tax rate on companies has been compensated for by a gradual increase in incentives in the form of investment subsidies and tax credits. The international allocation of Swedish capital, however, appears to have been efficient, in the sense that it has been determined on a pretax basis.

The studies in this book were submitted as a Ph.D. thesis at the University of Pennsylvania, Philadelphia, USA. It is the 49th doctoral or licentiate dissertation completed at the Institute since its foundation in 1939. IUI would like to thank the thesis supervisor, Prof. Alan Auerbach. Financial support from the Tore Browaldh and Jan Wallander foundations, as well as The Nordic Council for Research in Taxation, is gratefully acknowledged.

Stockholm in August 1993

Gunnar Eliasson

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Acknowledgements

At the completion of an extensive project, like writing a thesis, it is time to look back and tally up the intellectual debt one has accumulated on the way. Here is the liability side of my "balance sheet."

First I want to thank my thesis supervisor at the University of Pennsylvania, Alan Auerbach. His kind criticism, and generous allocation of scarce time to discussions of my various drafts, is deeply appreciated. I'm also grateful for valuable comments from Miguel Gouveia, who served on my committee with Wilfred Ethier.

My "Swedish connection" was from the start Lennart Hjalmarsson at the University of Gothenburg; without his unswerving encouragement and help to find financial support for my sojourn in the United States, this thesis would not have been written.

When I returned from Penn to work on the second part of this thesis, I came in contact with the third important person for the completion of this study: Professor Gunnar Eliasson at the Industrial Institute for Economic and Social Research in Stockholm. His positive attitude and patience with my, at times, slow progress was invaluable for me.

There are several other people who deserve my sincere thanks; among the most deserving are (in random order): Per Lundborg, Steve Kayizzi-Mugerwa, Sten Nyberg, Pontus Braunerhjelm, Lars Oxelheim, Torbjörn Fredriksson, Gunnar Fors, Torsten Dahlquist, Thomas Lindh, Jörgen Nilson.

I have received financial support from various sources. The initial stage of my studies at Penn was financed by a Fulbright scholarship, and grants from the Royal Swedish Academy of Sciences, Göteborgs Handelshögskolefonder and Västsvenska Handelskammaren. At the dissertation writing stage I received continuing support from Tore Browaldhs foundation and Nordiska Skattevetenskapliga Forskningsrådet. I extend my sincere gratitude to all these institutions for their generous financial help.

At last I want to thank my mother for her support and encouragement during this long time.

Stockholm in August 1993

Karl-Markus Modén

Part I

Tax Incentives and Mergers in Swedish Industry

Chapter 1

Introduction

1.1 Background

Mergers and acquisitions (M&A) have historically been important means by which restructuring of industrial assets, and reallocation of ownership of these assets have taken place. It is of interest, both from a theoretical and a policy point of view, to understand the result of these processes on the long-run development of the economy. The wave of M&As and takeovers during the eighties heightened the academic interest of their causes and consequences, and a great deal of new knowledge has been accumulated. This study is a contriubtion to this body of literature.

Several basic questions have traditionally been asked about mergers. For example: Is it possible to isolate one dominating merger-motive, or are there several important motives? Are mergers beneficial for the merging firms' shareholders? Will private and social benefits (or costs) of mergers coincide? During the last merger wave much interest centered around the role that the rapid development of the capital markets, before and during that period, played with respect to the observed M&A activity.

This study will not try to answer all these questions. Instead, it will focus on one issue, namely the influence of the system of personal- and corporate-taxation on the incentive to merge. Taxation may affect the financial decisions of the firms so that investments are undertaken, which would not have been made without taxation. If acquisitions of other companies are favored, for example, the tax system is not neutral in this respect. One may call this the absence of "merger-neutrality" in the tax system. This non-neutrality can create divergences between private and social returns, and thus efficiency losses. Mergers done for tax reasons may produce efficiency losses if they, for example, result in an industrial structure which does not direct capital to uses with the highest, pre tax, returns. If, on the other hand, mergers are beneficial in their role as restructurers of the industry, a tax subsidy to mergers may be socially optimal. Implicit in this reasoning would then be that the private market system fails to produce the optimal amount of mergers.

Mergers have been studied, both in the field of industrial organization, and in finance. The "theory of the firm" can be viewed as a joint subfield to both these disciplines and it has an important bearing on the issue of merger motives. These different theoretical approaches to the explanation of mergers are discussed in section 2.

Section 3 contains a discussion of how corporate and personal income taxation affect both the investment decisions within firms, and the structure of ownership of these firms. Direct merger incentives emanating from the tax legislation is discussed in section 4, while in section 5 an empirical study for Sweden is presented and the results discussed.

Since M&As often leads to restructuring of the companies involved, they have an impact on the industrial structure. If the tax system biases investment decisions toward M&As, at the expense of other types of investments, the impact on industrial growth may be negative. We discuss a model which addresses this isssue in section 3.3, and also present some empirical evidence in section 5. The study is finally summed up by a discussion of the results.

Chapter 2

Merger Theories

Before discussing merger theories we must start with some definitions:

- A *merger* refers to the joining of two independent firms into one entity, one firm ceases to exist and the other remains.

- A *consolidation* is the same as a merger but both the old firms vanishes as legal entities and an entirely new business unit is established.

- An *acquisition* has taken place when one firm has acquired the voting stock of another firm, or its assets. The acquired firm will still exist as a legal unit, as a subsidiary in an industrial group. Sometimes a formal merger is performed later and the acquired firm will then be included as a branch unit in the acquirors organization.

- *Takeover* refers to a change of control over a target, where the acquiror gains the majority of the voting stock in a *target*.

These are the most common terms in the everyday terminology. Economists do not usually make a sharp distinction between these terms, a common term like "merger" works fine when the result is that one firm, is under the direct control of a new decision unit. Unless, of course, the different modes of acquisitions carry different costs and these costs are the objects of the investigation.

In the field of industrial organization mergers are classified in three different categories:

- *Horizontal merger.* This is a merger by two firms in the same industry and in the same stage of the production chain.

- *Vertical merger.* A merger by two firms in the same industry where the whole or part of one firm's ("upstream") production is used as an intermediate input in the production process of the other ("downstream") firm.

- *Conglomerate* or *Lateral merger.* These terms refer to the combination of two firms in unrelated industries, i.e., neither standing in an input-output relation to each other nor competing in the same output markets.

In the following three subsections we will discuss motives behind these different types of mergers, their historical importance and legislative approaches toward them, in the U.S., Europe and Sweden.

2.1 Horizontal Mergers

The effects of horizontal mergers are well known; they may be socially advantageous if they result in lower average costs through realization of economies of scale. But the result may also be harmful to consumers if the new firm has simultaneously found increased market power and uses it to raise the product price. The latter motive has been called the "market dominance" or "monopolizing" approach (see [97]). Instead of outcompeting each other by manufacturing and marketing a superior product, firms join by merger or acquisition. The "loser," i.e., disappearing owner or firm, may be overcompensated by the acquiror if the latter counts on realizing a monopoly rent by the action. The acquisition strategy has the advantage over the outcompeting strategy that the industry's productive capacity is not expanded, and therefore no downward pressure on the industry's profit margin will result. The result in both circumstances is that the concentration of producers increases.

The history of the merger movement, which is most well documented for the U.S., tells us that the merger wave around the turn of the century was primarily driven by horizontal combinations [76]. Authorities reacted negatively to this concentration tendency and legislation[1] passed which aimed to impede clearly monopolizing mergers. Subsequent merger waves, e.g., during the twenties, were nevertheless still mainly horizontal, although they may not have produced new monopolies they tended to establish an oligopoly structure in many industries. These two early merger waves have been called "mergers for monopoly" and "mergers for oligopoly," respectively ([97]).

The U.S. antitrust legislation was strengthened after the second world-war[2] and maybe as a consequence of this, horizontal mergers became less dominant. During the large merger wave of the sixties it was instead mergers of the conglomerate type that dominated, with the effect that the aggregate concentration, or concentration of ownership, increased.

The *European* antimerger legislation was for very long much weaker than the U.S. counterpart and horizontal mergers have been the dominant form all along. The empirical evidence also points toward a secular increase in industrial concentration in most countries (see [51]). Of increasing importance is the EC

[1] The Sherman Act (1890) deems it illegal to "monopolize, or attempt to monopolize...any part of the trade or commerce...." [77].

[2] Cellar–Kefauver antimerger act.

competition law, which applies to non-EC based firms conducting a major part of its business in Europe. In 1990 the European Commission's received increased powers to vet large scale mergers[3], which are assumed to increase in importance as the single market project is completed.

The knowledge of the history of the *Swedish* merger movement is unfortunately not very deep, the prime reference is a study by Rydén [89], which covers the postwar period. Systematic data collection by a government agency started in 1969. A recent study, [96], has estimated that over the period 1970-1988 roughly two-third of all large mergers were of the horizontal type (circa 9% vertical and 25% conglomerate). The result is that most industries show a high degree of concentration today. The policymakers have been rather relaxed in their view of the potential perils of this development, claiming that Sweden's openness to foreign competition make comparisons with larger foreign countries immaterial.

No explicit piece of legislation exists which forbids monopolization, but just some very general rules that say that "harmful effects should be avoided." The power to ban such mergers rests in the hands of the so called "Market Court."

The level of concentration has become high even in industries sheltered from foreign competition and the resulting detrimental effects on economic efficiency has received more attention lately. A stricter antimerger legislation was announced during 1991 and some increased powers to the Market Court was instigated.[4]

2.2 Vertical Mergers

A vertical merger takes place when a firm acquires either a supplier of input goods or one of its customers, or retailers. These types of mergers cannot à priori be said to be welfare reducing. On the first hand there may exist cost savings due to a better (smoother) production planning, lower transportation, inventory carrying costs etc. This is similar to economies in scale in that the average cost of the jointly owned production is lowered. Secondly, an integrated firm probably could overcome problems of asymmetric information and moral hazard in the contractual relations. These problems entail transaction costs, in the words of Coase [25] and Williamson [105]. These costs may be particularly large if the assets of either firm are "transaction specific," i.e., are specialized to the bilateral exchange relation. In such a case the two firms are locked into a bargaining situation over the division of the total quasi-rent in the production chain. This may result in a failure to maximize joint profits; this is a cost of using the contract solution. By merging the two firms these costs can be reduced

[3] Mergers that come under the scrutiny of the Commission has to have an "EC-dimension," meaning that each of the involved firms must have sales inside the EC of at least 250 million ECU, the "bigness" criterion is that either of the involved firms has a total, worldwide, turnover of at least five billion ECU.

[4] In July 1991 the Court was given the power to break up already existing combinations that are deemed as anti-competitive.

and the contractual market mechanism is substituted for a direct control, or planning, mechanism.

The contributions by Coase and Williamson have generated the prediction that the more transaction specific and long-term a contractual relation is, the less suitable is the market solution and the more advantageous is the common ownership solution. Vertical integration may have its own cost, however, since the control span of the central headquarter increases, which results in what may be termed bureaucracy costs or internal organization costs. Coase [25] formulated an equilibrium condition for vertical integration by an individual firm that may be described as follows: "Transactions are integrated when the internal cost of exchange is less than the external cost of exchange, either the cost of using markets or the cost of contracting." [81]

According to this transaction cost, or contractual approach, the modern large corporation is an outcome of a process of economizing on transaction costs. In Chandler's [22] words: the "visible hand" of administration has been substituted for the "invisible hand" of the price mechanism, (See also Aoki [7]).

Another approach to vertical integration has been furnished by Stigler[98]. He starts from Adam Smith's famous dictum that the division of labor is limited by the extent of the market, and builds a theory of how industrial structure evolves over time. Infant industries would consist of highly integrated firms where the same workers perform different production tasks. As demand grows the production becomes more specialized as the possibility to exploit gains from division of labor increases. At some stage the industry will be able to support several independent and highly specialized stages of production, which could be organized as separate firms. So this is really a theory of vertical ***disintegration***, which takes place in maturing industries; conversely, as industries decline vertical integration again takes place. The theory thus makes a prediction about the type of industries in which one would be most likely to observe vertical mergers.

Anti-trust cases against vertical mergers have in the U.S. arisen from §7 of the Clayton Act that condemns mergers that substantially lessen competition. Vertical expansions have not been resisted to the same extent but have been challenged in a few cases when held to be exclusionary practices (see [81]). This view developed primarily after 1950 and the legal theory on which it is based is market foreclosure. This theory holds that vertical mergers harm competition in both stages by denying competitors access either to one of their suppliers or to one of their buyers. The foreclosure theory has been strongly criticized by economists [5] who claim that foreclosure would naturally occur if either party dealt with other firms before the merger, making it more of a definition than a theory. Criticism of the foreclosure theory has recently resulted in a change of attitude by the Justice Department and they are less likely to challenge a vertical merger today than they were earlier.

The EC competition law prohibits "abuse of dominant position." Examples of abuse of this type that have attracted most interest are those that have

[5] See [81] for further references.

resulted in vertical price or supply squeeze toward independent producers or retailers. However, the EC's competition law is less developed and has a more sanguine attitude toward vertical mergers than the U.S. counterpart.

The Swedish competition law does not make any distinction between different types of anti-competitive actions, they may all be stopped if they result in "harmful effects," but no special rules concerning vertical expansions exist. However contracts between a supplier and his retailers that contain resale price maintenance clauses, taking the form of a price floor, a price ceiling or both, are prohibited. One may guess that in some situations this rule may (unwittingly?) have stimulated vertical integration, since it only applies in cases of two independent parties and not to pricing within a concern.

2.3 Conglomerate Merger

Conglomerate mergers may in the framework of the "classical" firm be rationalized by the existence of "economies of scope." Two separate lines of production may use some common factor of production, with public good characteristics, such as management services or R&D results. Common ownership may be the best alternative, especially if it is not feasible to write contracts of use of the common factor and simultaneously maintaining separate ownership, or if such contracts are more expensive due to high transaction costs. In such a case the average cost of the joint production will be lower than the sum of the average cost in the separate production case, for the same total output.

In spite of the "valid" reasons for the creation of conglomerates given above, one can say that economists have tended to view them negatively while legislators have been indifferent. The reason for this split in opinions is probably economists' preoccupation with efficiency and their suspicion that many conglomerate mergers are not done for efficiency reasons, but instead for "empire building" reasons, by self-serving managers.

The neoclassical theory of the firm held that the firm, or the agent (manager) that the firm's principals (shareholders) hire, aims at maximizing profits, which is equivalent to maximizing the market value for a stock market firm. However, as was pointed out initially by Berle and Means [17], separation of ownership and control in large corporations may create room for the management to pursue their own objectives, which may be contrary to the stockholders' interest.

In contrast to the neoclassical model, which did not have any model for the processes going on inside the firm, organizational theories was developed by, most notably Simon [92]. Another important difference from the neoclassical model was that these theories started from the assumption of imperfect information and postulated that it is impossible for mangagers to reach optimal solutions, due to the limitations they have in processing all relevant information. Instead managers strive to reach satisfactory solutions, not optimal ones. Simon also predicted that managers optimal "control span," i.e., their ability to satisfactorily control the organization, puts a limit on the size of the firm.

During the sixties "managerialists," like Baumol [14] and Marris, [70] developed models where firms act like growth or size-maximizers. In these theories the management may face only a weak external rate-of-return constraint and will use excess funds for negative present value projects, using the owners discount rate. This school of thought, the managerial school, was developed at a time of a very large conglomerate merger wave when big firms looked like unchanging and invulnerable bureaucratic giants. The growth- or size-maximizing theory of the managerialists seemed compelling at the time, however, it had clear weaknesses. For example, it did not try to explain what actions the principals could take to mitigate the negative effects of self-serving managers. A framework for analyzing the relationship between principals and agents and the likely outcome of different ownership and financial structures of firms was developed by Jensen and Meckling [53]. Principals have to incur costs to monitor the agent's performance and the greater these costs the less will the stock market value be. Jensen and Meckling argue that it is in the interest of the agent to convince investors that the firm will have an institutional structure that will minimize agency costs. Arrangements that will reduce agency costs could be: (1) monitoring expenditures (outside directors or auditors); (2) bonding devices (leverage) and (3) incentive compensation (stock options). Neoclassical economists, following Jensen and Meckling, put great faith in market forces in generating optimal institutional structures and contracts.

The Coase-Williamson transaction cost based theory of the firm has also something to contribute to the explanation of conglomerate mergers. Williamson draws on work by Chandler in American business historyAmerican business historyAmerican business history [22], and claims that conglomerates of the multidivisional, or M-form, variety, are efficient forms of organization. The M-form functions like a miniature internal capital market, where central management quickly can transfer resources to their best uses within the conglomerate. Indeed, because they do not face the problem of asymmetric information, internal capital markets are more efficient than external ones.

2.3.1 Diversification Motive

A central problem in the principal agent relationship is that (risk-averse) managers may not be able to hold a well-diversified portfolio and this, in turn, may influence their decision making inside the firm. Managers are inherently overinvested in the firm they serve for several reasons (See Coffee [26]):

- The employment contract in the firm has a higher present value to the manager than contracts with other firms, due to acquired firm-specific knowledge.
- Incentive schemes such as stock options lead to a higher than optimal weight in the portfolio of the own firm.
- Managers may have personal liability in case of corporate insolvency.

These factors point toward a strong motivation for the manager to pursue investment policies that reduce diversifiable, or unsystematic, risk. A conglomerate merger is a mean toward that end.

The question may be asked if the diversification rendered by a conglomerate merger will be valued positively by the shareholders. The answer is generally negative since shareholders can accomplish the desired diversification of their own portfolios by simply purchasing stocks in different firms. However, diversification can produce gains to the stockholders if:

- Diversification decreases the unsystematic variability at lower costs than by investors via adjustments of personal portfolios.
- Diversification reduces risk and thereby increases debt capacity.

The first possibility seems quite unlikely and we will therefore focus on the second. This possibility was first suggested by Lewellen [65]; he called it the "co-insurance" effect: A combination of two companies whose cash flows are not perfectly correlated, will decrease the probability that either company will go bankrupt. The combined entity would have a higher debt capacity, and could therefore obtain cheaper debt finance, which in turn will increase the market value of the firm.

The coinsurance effect has been criticized from several standpoints; Higgins and Schall [45] for example, point out that the lower risk of bankruptcy will mainly be to the benefit of debtholders. This is contrary to the view that it is the shareholders interest that is foremost in the mind of management. The coinsurance effect is an interesting theoretical possibility, but does not seem to be important in practice according to empirical studies performed in the U.S., by Scott [90] and Kim and McConnell [60].

2.4 Takeovers

During the last decade the merger debate has changed focus somewhat. More attention has been given to agency problems and how the development of capital markets has influenced merger and acquisition activities. While the old style merger or acquisition, usually involved two producing firms, one much bigger than the other, a new type of acquisition has emerged. Single individuals, or small syndicates of individual investors, have in several circumstances been able to raise large funds to finance *takeovers* of existing, well established, corporations. In both of these types of takeovers, as well as in more traditional acquisitions, the bid-premia (i.e., the excess of the tender-offer prices over the pre takeover announcement prices) paid to the target companies' shareholder has often been substantial, (see [54]). The debate in financial economics has mainly focused on the main sources of these bid-premia.

One school of thought, led by Michael Jensen, holds that the new takeover movement is an essential complement to product markets for the working of

Adam Smith's "invisible hand." Slothful managements, in charge of companies enjoying near monopoly positions in product markets, are forced to be efficient by the threat of being replaced by a "raider" or another management team. Management that is not vigilant enough will soon lose its prestigious role as leaders of industrial firms. This "efficiency increasing" school holds that the size of the bid-premium mainly reflects the undervaluation of the shares of the target due to inefficient management. The bid-premia will in these circumstances be welfare increasing since the extra value created comes from enhanced production possibilities, and is not a transfer of resources from one group to another.

The contrary point of view, represented by Shleifer and Summers [91], claims that the new takeovers are mainly redistributive in their effects. That is, shareholders gain on the expense of debtholders and employees. The mechanism through which the bid-premia are generated, in their model, is the breakup of so called "implicit contracts" between managements and employees, or other stakeholders of the firm. To the extent that such breakup of implicit contracts increases uncertainty, it could have a negative effects on the productivity of the firm, and therefore be efficiency reducing. The market value of the firm's equity will still increase, but this is only through the appropriation of rents by the shareholders.

The "tax-synergy" view is close to Shleifer and Summers's view, in that the observed bid-premia can be explained by tax savings, which are transfers from tax payers to shareholders.

A crucial question for tax policy analysis is whether the private and social consequences of takeovers, or M&As in general, will coincide. Bulow, Summers and Summers [21] point out that it is only the consequences for third parties that warrant public action. If a pro-merger bias exists in the tax system it will warrant concern only if negative external effects are apparent. We have already mentioned the negative effects on consumers of monopolizing mergers; however, a strict enough anti-trust legislation may hinder such unwanted concentration effects. Bulow, Summers and Summers point out other negative effects:

- "Crowding out" of other forms of investment activities. Investment will in general have positive external effects, and certain types, such as investment in R&D, are considered as having particularly beneficial consequences.
- "Reputational externalities" associated with breaches of implicit contracts, as was describe above.
- To the extent that takeover are financed by debt, a takeover boom may result in "excessive leverage" which may exacerbate the effect of an economic downturn, due to the repercussion effects throughout the financial system.

Against these negative effects one should weigh the positive effects, e.g., the efficieny improvements stressed by Jensen [52]. It is an open question how the cost and benefits will balance out in different cases, our purpose is to investigate if one can find evidence of pro-merger bias in the tax system in the first place.

To accomplish this task we start by studying the theory of capital income taxation, which tries to explain how capital income taxation influences behavior of both firms and households.

Chapter 3

Capital Income Taxation

In this section we review the theory of capital income taxation. The purpose is to provide a background for the discussion of tax incentives for mergers. What we will discuss is the effects of an *income* tax; this requires a careful definition of income from capital. The most commonly used definition is the so called Haig-Simon income measure: Economic income equals cash flow plus accretion to wealth during a specified period. This is sometimes defined as the amount that could be consumed during a period without a decline wealth. The pertinent question is how such a tax affects the behavior of firms and owners of capital in their investment decisions.

It is common to assume that their is no separation between the firm, or its management, and its owners. This means that the firm will act in the owners' interest, taking their opportunity cost as its cost of capital (before tax). It also implies that it would be logical to consider the taxes paid by the firm as a pre-payment of personal taxes on the owners capital income. However, most countries tax the same income twice, once at the firm level and once again at the personal level.

In the frictionless neoclassical world the typical firm maximizes its value by accepting all investment projects with a positive net present value of future cash flows. Define x_t as cash-flow available to shareholders after payment of replacement investments and r as the opportunity cost of capital, then the value of the firm at the beginning of time $t = 0$ is:

$$V_0 = \sum_{t=0}^{T} x_t (1+r)^{-(t+1)} \tag{3.1}$$

where it is assumed that each period's cash-flow accrues at the end of the period. A firm which does not expect to grow, it may have reached its long run equilibrium capital stock, can be modelled as having a constant, expected, cashflow over the entire future. Writing x_t as a constant: $\bar{x}$, and T goes to infinity we get:

$$\lim_{T\to\infty} V_0 = \frac{\bar{x}}{r} \tag{3.2}$$

Therefore, with constant perpetual cash-flow the firm's value will not change, so the rate of return $\bar{x}/V = r$. If the firm's cash-flow instead is expected to change in the future, the cash-flow in each period plus the capital gain over the period must equal the required rate of return:

$$x_t + \Delta V_t = rV_{t-1} \tag{3.3}$$

This is an equilibrium condition that determines the firm's value at time $t-1$. From this, so called arbitrage equation, one determine current value by solving forward until a terminal period, or to infinity. We may also observe that condition (3.3) gives us the Haig & Simon definition of an asset's income: the cash-flow it generates plus the change in its value over the period.

If a tax (τ) is levied on corporate income, as defined by Haig-Simon, the after-tax cash-flow is $x_t - \tau(x_t + \Delta V_t)$, and the equilibrium condition becomes in this case: $(x_t + \Delta V_t)(1-\tau) = rV_{t-1}$. The income tax has the effect that the firm's discount rate becomes $r/(1-\tau)$, which is also the firm's cost of capital in the presence of an income tax. The cost of capital determines a cut off rate for the firm's investments. Investment project may be ranked in order of profitability, the most profitable being undertaken first and so on. At some point the last investment project considered will have an internal rate of return which fall below the cost of capital, and will not be accepted. If one think of projects as perfectly divisible one may say that the firm should invest until the rate of return of the last dollar invested equals the cost of capital. This is the neoclassical interpretation and in that theory the cost of capital determines, not the rate of investment, per se, but the level of the capital stock. Changes in the components of the cost of capital, such as the interest rate on safe bonds, and the various tax rates will, however, change the optimum capital stock, and therefore cause a change in net investments.

3.1 Personal Taxation, the Cost of Capital and the Firm's Financial Policy

If all forms of corporate income were taxed at the same rate and if corporate and personal income taxes were fully integrated, it would be unnecessary to consider the personal income tax separately. These conditions are rarely met in practice though, and the personal income tax must therefore be considered when the effect of taxation on the investment decision of firms is considered. Several common features of existing tax systems are important; e.g.:

- Capital gains are usually taxed at lower rates than dividends and interest payments, and only when realized;

- Corporations can deduct interest payments fully, but dividends only partially or not at all;
- Personal income is usually taxed at progressive marginal rates, whereas the corporate income tax is proportional.

To illustrate the effect of taxation of capital gains, we define t_p as the personal tax on dividends and interest income and c as the accrual equivalent tax rate on capital gains. If we consider an equity-financed investment, and assume that all after corporate tax cash-flow is distributed as dividends, the after tax cash-flow to the investor in period t is $x_t(1-\tau)(1-t_p) - c\Delta V_t$. The equilibrium condition may now be written:

$$x(1-t_p)(1-\tau) + (1-c)\Delta V_t = rV_{t-1} \tag{3.4}$$

i.e., the total after-tax reward must deliver a rate of return equal to the investors opportunity cost, r. The value of the firm at time 0, may now be expressed as:

$$V_0 = \sum_{t=1}^{T}\left(1+\frac{r}{1-c}\right)^{-t}\left(\frac{1-t_p}{1-c}\right)(1-\tau)x_t + \left(1+\frac{r}{1-c}\right)^{-T} V_T \tag{3.5}$$

If

$$\lim_{T\to\infty}\left(1+\frac{r}{1-c}\right)^{-T} V_T = 0 \tag{3.6}$$

we get:

$$V_0 = \sum_{t=1}^{\infty}\left(1+\frac{r}{1-c}\right)^{-t}\left(\frac{1-t_p}{1-c}\right)(1-\tau)x_t \tag{3.7}$$

In the case of constant perpetual cash-flow this reduces to:

$$V_0 = \frac{\bar{x}}{r}(1-t_p)(1-\tau) \tag{3.8}$$

The firm's cost of capital now becomes $r/((1-t_p)(1-\tau))$. The capital gains tax term disappears since the firm's value is kept constant over time. If, on the other hand, either one of the two tax rates change, unexpectedly, the owner will enjoy a capital gain (or loss). This change in wealth is of a lump-sum nature and will not influence the investment decision of the firm. However, if for example the personal tax rate is lowered, the firm's cost of capital is also lowered and the firm wants to expand its capital stock, and the rate of investment will therefore increase. If such an outcome is desired from a public point of view; the wealth transfer effect should also be borne in mind as an income distribution issue.

3.2 Firms' Financial Policy

3.2.1 Capital Structure Policy

Equity and retained earnings are two sources of finance for a firm, and a third source is debt. The valuation formulas shown above all assumed equity finance, the question is now how the firm's value changes with a switch over (partially or fully) to debt finance. The answer to this question was provided by Modigliani & Miller [74] in their famous theorem, which asserts that under certain conditions the firm's value is independent of the proportions of debt and equity in its capital structure. Most existing tax systems discriminate against equity and favor debt finance, due to the deductibility of interest at nominal rates and the non-deductibility of dividends. If we again consider the case of constant perpetual cash-flow, $\bar{x}$, available to shareholders and bondholders. This will be separated so that bondholders receive $r_b B$ and shareholders receive $\bar{x} - r_b B$, these cash-flows are discounted by the interest rate r_b and the required rate of return on equity r_e, respectively, to add up to the total value of the firm:

$$\begin{aligned} V &= \frac{(\bar{x} - r_b B)}{r_e} + \frac{r_b B}{r_b} \\ &= S + B \\ &= \frac{\bar{x}}{r_0} \end{aligned} \tag{3.9}$$

where r_0 is a weighted average discount rate composed of r_e and r_b with the proportion of equity and debt as weights, respectively, and S is the market value of equity.

With corporate taxes, the cash-flow going to stockholders and bondholders is $\bar{x}(1 - \tau) + \tau r_b B$. The second term is called the ***tax shield of debt*** and shows the tax savings on the corporate level due to the deductibility of interest. The value of a levered firm with corporate taxes can be calculated by discounting the after tax cash-flow at the appropriate discount rate for an all equity firm after corporate tax, ρ, and by discounting the tax shield by the interest rate, r_b:

$$\begin{aligned} V_L &= \frac{\bar{x}(1 - \tau)}{\rho} + \frac{\tau r_b B}{r_b} \\ &= V_U + \tau B \end{aligned} \tag{3.10}$$

Equation (3.10) says that the value of a levered firm (V_L) equals the value of an equivalent unlevered firm (V_U) plus the tax shield of debt, which rises linearly with the level of debt it applies. Therefore, the prediction of this tax-amended version of the MM-theorem is that the firm will never use equity as a marginal source of fund. The other side of this proposition is that the firm's total cost of capital, or the weighted discount rate, is lower the higher the proportion of debt. With no taxes it is always constant.

Personal taxation introduces yet another twist to the problem of finding out the optimal capital structure. To see this, we assume that dividends are taxed at the rate t_e and interests on bonds at the rate t_b. Now, shareholders receive, $(\bar{x} - r_b B)(1-\tau)(1-t_e)$ net of all taxes and bondholders, $r_b B(1-t_b)$. Collecting all terms including $r_b B$, we can rearrange these cash-flow definitions:

$$\bar{x}(1-\tau)(1-t_e) + r_b B(1-t_b)\left[1 - \frac{(1-\tau)(1-t_e)}{1-t_b}\right] \tag{3.11}$$

The first term is the cash-flow that reaches the shareholders, which should be discounted by ρ, the after tax discount rate for an all equity firm. The second term is cash flow that reaches bondholders, which should be discounted by $r_b(1-t_b)$, the after tax interest rate. The value of the levered firm can now be expressed as:[1]

$$V_L = V_U + B\left[1 - \frac{(1-\tau)(1-t_e)}{1-t_b}\right] \tag{3.12}$$

When $t_e = t_b$ (3.12) equals (3.10), but, in general, the value of the levered firm depends on the relationship between $1-t_b$, and $(1-\tau)(1-t_e)$; e.g., if these terms are equal the second term on the right-hand side of (3.12) is zero and we are back to the MM world without taxes. An obvious situation where this situation could arise is when there is perfect integration of corporate and personal dividend taxes and dividends are taxed at the same rate as interest. In other realistic cases we would expect to have the situation: $1-t_b > (1-\tau)(1-t_e)$, which implies that V_L is positively related to the level of debt.

3.2.2 Dividend Policy

Besides introducing a new way of looking at the question of capital structure, Modigliani & Miller provided an answer to the question of the firm's optimal dividend policy (see [75]). Their answer had the same flavor as the answer to the capital structure question: the dividend policy doesn't matter. Their argument rests on the assumptions of perfect capital markets and no transaction costs, and of course, no taxes. Under these circumstances individual investors can furnish their own desired dividends by selling (long or short) parts of their stock-holdings each period. So what the firm does can be undone costlessly by the individual and, therefore, the firm's dividend decision is not important.

Personal taxes will make a difference to the above conclusion concerning dividend policy, especially if capital gains are tax-favored compared to dividends, which is generally the case. A firm, which can invest some of its earnings in capital assets yielding the same returns as the old assets (an assumption of constant return to scale in production), can increase next year's level of dividends by not paying out all of the current earnings. A common example (see [10]) is to assume that the firm pays out only a constant fraction, p, of its current earnings

[1] This formula was first derived by Miller [72].

each year and reinvests the rest. Next year's cash-flow, available for dividends, is thus increased by: $\bar{x}(1-\tau)(1-p)$. If we call this term g, the dividend at time t will be: $Div_t = Div_1(1+g)^t$. Using the so called "Gordon's growth model"[2] the value of the firm at time 0 can be expressed as:

$$V_0 = \frac{\bar{x}(1-\tau)p}{\rho - g} \tag{3.14}$$

Setting $V_0 = 1$ and solving for $\bar{x}$, yields the cost of capital:

$$\bar{x} = \frac{\rho}{(1-\tau)[1-(pt_e + (1-p)c)]} \tag{3.15}$$

From (3.15) its is apparent that if $c < t_e$ the cost of capital can be reduced if p is reduced, i.e., if the firm retains more and pays out less.

The discussion above about debt versus equity in the firm's capital structure revealed that the choice depended on the personal tax rates on interest and dividend income. However, the valuation formula (3.12) does not include the cost of capital when capital gains are considered, equation (3.15). To incorporate all three sources of finance into one cost of capital formula, we consider a fully debt financed project. In this case, under certainty, the whole cash-flow from a marginal project is absorbed by interest charges, i.e., $x = r_b B$. Since interest is fully deductible no taxes are paid. Furthermore, it follows that the cost of capital under debt financing is simply the interest rate r_b, which may now be combined with the cost of capital expression for an all equity financed project (3.16) to derive a cost of capital for a project that is financed by a combination of debt and equity. This weighted average cost of capital can be expressed as:

$$x = \lambda r_b + (1-\lambda) \cdot \frac{\rho}{(1-\tau)[1-(pt_e + (1-p)c)]} \tag{3.16}$$

where λ is the proportion of debt used at the margin.

The question is now why, under certainty, a firm would want to use both debt and equity if the MM-theorem does not hold due to taxes. Shouldn't it use simply the cheapest source? If one marginal tax rate applies to all income levels, the after tax return to debt holders is $(1-t_b)r_b$ that must be equal to ρ, the after tax required return to shareholders. In comparing equity and debt-finance one could test whether r_b is greater or smaller than the right-hand side of (3.15). If it is greater, equity finance is preferred, debt finance if it is smaller. Substituting

[2] According to Gordon's growth model the value of a firm with a constantly growing cash-flow equals:

$$V_0 = \frac{Div_1}{\rho - g} \tag{3.13}$$

for ρ in 3.15 gives the result that equity is at least as good as debt if and only if:

$$(1 - t_b) \leq (1 - \tau)[1 - (pt_c + (1 - p)c)] \tag{3.17}$$

If this condition is satisfied depends on the effective marginal tax rate parameters and is not easily derivable. However, the recent trend in many countries of equalization of average statutory tax rates, together with lowered deductions, has probably made it more nearly satisfied than before. A problematic feature of the (3.17) is that it predicts that we would see either only debt finance or only equity finance (with a suitably low payout ratio). This result is of course contingent on there being no bankruptcy or agency costs that would produce a need for some equity finance even in the debt regime. The problem with this prediction is that it is not consonant with empirical evidence.

3.2.3 Miller Equilibrium

Miller [72] suggested a mechanism through which the coexistence of debt and equity can be explained. He noted that the personal tax-rate schedule is graduated so that, depending on the marginal tax rates, some investors prefer to provide funds to the firm through debt and others through equity.

Following Miller we assume that the capital gains tax rate, c, equals zero, and that the tax on interest income, t_p, has a progressive rate schedule. Since debt is deductible, the after-corporate tax cost of debt is $(1 - \tau)r_b$ but since equity is not deductible, the after-tax cost of equity is r_e. It follows that the firm could pay an interest rate of: $r_b = \frac{r_e}{(1-\tau)}$, at which point the two modes of finance are equally costly. Now, the after-personal tax return to debt is $r_b(1 - t_p)$ and that to equity r_e. It is clear that for low-tax bracket investors (e.g., tax exempt institutions) $r_b(1 - t_p) > r_e$ and vice versa for high-tax bracket investors.

The resulting equilibrium (called "Miller equilibrium") will be "segmented"; high income-bracket investors hold equity, while low income-bracket investors hold debt. It should be clear that the marginal, or indifferent group of investors is the one for which $t_p = \tau$. The cost of capital for each firm is the weighted average of its cost of equity and debt, but each source has the same cost, the interest rate; i.e., the before tax return on highly taxed securities will adjust so that the after tax return is equal for all types of securities. There will not exist optimal, internal, debt-equity ratios for the individual firms. Each firm will choose one form of finance to attract a certain "clientèle"; it will, however, exists an optimal debt-equity ratio for the manufacturing sector as a whole. This debt-equity ratio is determined by the progressivity of the personal tax schedule.

3.2.4 The "New View" of Equity Finance

The Miller equilibrium is a way of reconciling the MM-theory and reality. However, the predicted segmentation is not observed, but this may not be damaging since uncertainty has not been considered. Portfolio diversification may prompt investors to hold shares of firms that cater to different clièntele s.

The existence of dividends, in spite of the high taxation of dividends compared with capital gains, is another fact that is contrary to the predictions of the theory described above. Stiglitz [99] predicted that the optimal strategy for an owner of a firm is to retain all cash-flows and realize the capitalized value of these retentions at the terminal period. In the case of an owner-managed firm this may be the time of retirement. The realization could take place through the sale of the whole firm or its assets. Auerbach ([10]), however, points out that these options are not equivalent; if the physical assets of the firm are sold, this will be at prices determined by their remaining productivity, the sale of a firm's *shares* need not realize the same price. The crucial point is, as Auerbach puts it: "...that as long as the firm's owner cannot realize capital gains except by selling shares in the firm to another taxable investor, there exist no arbitrage mechanism that automatically equates these values."

These points may be illustrated in terms of Tobin's q (the ratio of a firm's market value to the replacement cost of its assets). In the original q-theory, the equilibrium value of marginal-q is unity. If q is greater than one, the firm should issue new shares, which is wealth increasing. However, if q is less than one, the firm should repurchase its own shares. The tax argument discussed above implies that the equilibrium value of q is below unity. Furthermore, share-repurchases are illegal in most countries (like in Sweden), which implies that equity becomes "trapped" inside the firm.

If share repurchases are ruled out, the value of marginal q can fall until it reaches a value of $(1-t_p)/(1-c)$. We can see this by the following argument: \$1 of distributed profits yields $(1-t_p)$ of after-tax personal income, \$1 of retained profits yields $q(1-c)$ after capital gains taxes, therefore at a value of q equal to $(1-t_p)/(1-c)$ the firm is indifferent between paying dividends and retaining. The equilibrium value of q in any period will depend on the demand for investment funds by the firm. For values of q between $(1-t_p)/(1-c)$ and 1, the firm will retain all its profits, and new equity is only issued if $q > 1$, dividends will be paid only when q is at its lower bound, i.e., when the investment demand is very low. This theory is called the "new view" of equity finance (see [10]), and it implies that the cost of capital differs according to which of the three "regimes" (i.e., values of q) the firm is in currently and in the future.

An important implication of the new view is that the cost of capital does not depend directly on the personal income tax rate if firms pay dividends. An unannounced change in this tax rate will not affect the incentive to invest; it is a neutral, non-distorting tax of a similar nature of the so-called consumption, or cash flow tax.

3.3 Growth by Acquisition vs. Internal Investment

The traditional q theory of investment describes the growth of existing firms, through internal expansion, but it can be extended to explain birth of new and death of old firms. A model to this effect is developed by King [62] who starts from the empirical observation that the main cause of corporate death is acquisition by another company. King assumes that new ideas must be embodied in new investment; some of these ideas may be developed by existing firms and some by individual inventors. In the second case an inventor may create a new company and sell equity to outsiders or he/she may sell the idea to an existing firm.

Since equity is "trapped," when the initial investment outlay has been incurred, the creation of a new company involves an additional tax cost that is not born by existing firms. That is, the equity value of a new idea, embodied in a new company, is only a fraction q of the profit it generates. An existing firm, on the other hand, could offer more for the idea than the inventor could get in the first alternative. If there were no specific costs of implementing new ideas in existing firms, the establishment of new firms would always be inferior. King, however, assumes that such costs, e.g., agency- and/or bureaucracy costs, do exist (called c) and that there exists a critical value of c (called c^*) which determines the proportions of new ideas being implemented in new companies and in existing ones, respectively. The critical value of c^*, below which new ideas are implemented in existing firms is:

$$c^* = 1 - q^*, \qquad \text{or,} \quad q^* = 1 - c^* \tag{3.18}$$

i.e., when a dollar invested in a new firm, giving q^*, equals the net return, $1 - c^*$, in implementing in an existing firm.

The most important conclusion from this analysis is that the fraction of ideas that lead to investments, and in what form, depends on the corporate tax system and the joint distribution of profits and costs. Taxes thus influence both the structure of industry and its rate of expansion, in this theory.

3.3.1 Growth by Acquisition

If an additional unit of capital to the parent-firm is equally productive whether it takes the form of an acquired existing unit or of a newly created unit, we will get the condition for optimality that: $F_K = c_I = c_A$; where F_K is the marginal product of capital, c_I is the marginal cost of new investment and c_A that of acquisitions.

According to the new view of equity finance a dollar in the hands of a company is undervalued because of the double taxation of profit income and is only "worth" q^*. Therefore, the opportunity cost of a dollar raised through reduction of dividends, and used to buy a new investment good is $q^*[1 + (1 - \tau)c_I]$. In equilibrium this is equal to the discounted profits from the marginal investment project, q, or

$$q = q^*[1 + (1 - \tau)c_I] \tag{3.19}$$

The term $1 + (1 - \tau)c_I$ in equation 3.19 is the out-of-pocket cost per dollar of new investment goods. If instead the same piece of investment good had been acquired through the stock purchase of another company, the out-of-pocket cost would have been $q + (1 - \tau)c_A$. The adjustment costs are assumed to be immediately tax deductible while the cost of the investment good is not. Indifference between these two alternatives requires that

$$1 + (1 - \tau)c_I = q + (1 - \tau)c_A \tag{3.20}$$

Combining equations 3.19 and 3.20 yields

$$c_I = \frac{1}{1 - \tau}\left(\frac{q - q^*}{q^*}\right) \tag{3.21}$$

$$c_A = \frac{q}{1 - \tau}\left(\frac{1 - q^*}{q^*}\right) \tag{3.22}$$

Equation 3.22 may be interpreted as a decision rule for a would be acquiror: "grow through acquistions up to the point where the net marginal adjustment cost of the acquisition equals the value of an additional unit of capital multiplied by "the undervaluation" percentage $(1/q^* - 1)$," [62].

Chapter 4

Corporate Income Taxation and Merger Incentives

As we noted in section 1 mergers may have a multitude of motives, one such motive is tax-savings, or "tax-synergies," which could be achieved only through a merger between two firms. The existence of such tax-synergies depends on the idiosyncrasies of the particular tax system in which the two firms and their owners are confined. However, most existing tax systems try to apply the Haig-Simon income concept and thus share many common traits. In this section we will first discuss tax motives for mergers in a general income tax system, sharing some common institutional features with existing tax systems. We then move on to consider and compare the specific tax rules in existence in the U.S. and in Sweden, in order to make a pre-assessment of how "merger-biased" these tax systems are.

4.1 Merger Incentives in a General Tax System

4.1.1 Tax Law Asymmetries

Most tax systems treat gains and losses in an asymmetric way. A symmetric system would give an immediate refund equal to the tax rate times the net operating loss, NOL, (this product will be called "tax loss"). In some countries tax losses may be *carried back* for a number of years and used to offset previous taxable income; the resulting tax refund will be equal to the statutory tax rate times the current loss reported on the tax return. To the extent that previous taxable income is greater than, or equal to, the current loss, the system is symmetric. But if the loss exceeds the previous income it has to be *carried forward* to be offset against future taxable income, up to a maximum number of years. In this case an asymmetry is introduced which is more severe the shorter the carry-back and carry-forward periods are, and if the tax-losses carried forward are not indexed nor permitted to be capitalized at the going rate of interest.

Tax motives for mergers connected with tax loss carry forwards arise if the tax loss of one company can be transferred to another company that can use them up faster than the first company. We illustrate this first by a simple numerical example: Firm A has currently (at the beginning of period one) a NOL carry-forward of $100, and expected taxable income of $50 accruing at the end of period one and $100 in all succeeding periods. Firm B has no NOLs and expected future taxable income of $100 per period. The after-tax discount rate is 10% for both firms and the corporate tax rate is 50%.

Firm A's value at the beginning of period one is: $V_A = 520.66$[1] and Firm B's: $V_B = 500$; the combined value is thus: $V_{AB} = \$1020.66$. Assume that A and B merge; the combined taxable income in the current period is now $150 before tax, current taxes are $(150 - 100) \cdot 0.5 = 25$ and cash-flow after tax is thus $125. The combined value is now: $V_{AB} = \$1022.73$. The small increase in the combined value stems from the ability to use half the tax loss carry forward one period earlier through the merger.

In addition to *NOLs*, firms may have other tax deductions or credits, which they may not be able to use to their full extent in a single period, due to limited loss-offset. Just like *NOLs* these deductions and credits can constitute a source of tax savings through mergers, if they can be transferred between firms.

As an example, assume that $\bar{L}$ is the current maximum deduction and the current tax savings associated wherewith is: $\tau \cdot \bar{L}$. Firms with low expected cash-flow before tax deductions, will not expect to be able to use all their available deductions. These, excess or redundant, deductions have a positive market value, and if they can be legally transferred between firms they will be a source of merger premium.

With a symmetric income tax system the value of a firm is the present value of future after-tax cash-flows:

$$V_t = \sum_{s=t}^{\infty} [x_s - \tau(x_s - \bar{L}_s)](1+\rho)^{-(s-t)} \tag{4.1}$$

The first term on the right-hand side is the present value of the before tax cash-flows, which we will call Y, and the second term is the present value of future tax payments, T. If two firms, with independent operations, are pooled together, "value additivity" implies that the total value is the sum of the separate values: $\widetilde{V} = Y_1 + Y_2 - (T_1 + T_2)$.

If gains and losses are treated asymmetrically for tax purposes, taxes paid each period can be written

$$T_t = \tau \cdot \max[x_t - \bar{L}_t, 0] \tag{4.2}$$

[1]The current cash-flow after tax is assumed to be current taxable income minus taxes due. Since the tax loss shields the current taxable income no tax is currently paid, in the next period the tax loss shields $50 \cdot 0.5 = 25$ of the tax flow, so cash flow is 75; in subsequent periods cash flow is constant at 50. Firm A's value may be calculated as the present value of an infinite stream of $50 plus present value of the extra tax savings of $25 at the end of period two.

The taxes paid by the combined firm in each period now become:

$$T_t = \tau \cdot \max[x_1 + x_2 - (\bar{L}_1 + \bar{L}_2), 0] \tag{4.3}$$

Proposition 4.1 shows that the expected combined tax liability cannot exceed the sum of the expected tax liabilities of the separate firms.[2]

Proposition 4.1.1 *The total tax payments of the merged firms are less than or equal to the sum of the tax payments of the separate firms, holding investment policies constant. I.e.,*

$$\tau \cdot \max[x_1 + x_2 - (\bar{L}_1 + \bar{L}_2), 0] \quad \leq \quad \tau\{\max[x_1 - \bar{L}_1, 0] + \max[x_2 - \bar{L}_2, 0]\}$$

PROOF: Define $D_1 = x_1 - \bar{L}_1$ and $D_2 = x_2 - \bar{L}_2$. By the linear property of the max-operator we have:

$$\begin{aligned} \tau \cdot [\max\{D_1, 0\} + \max\{D_2, 0\}] &= \tau \cdot \max\{D_1 + \max(D_2, 0), \max(D_2, 0)\} \\ &\geq \tau \cdot \max\{D_1 + \max(D_2, 0), 0\} \\ &\geq \tau \cdot \max\{D_1 + D_2, 0\} \end{aligned}$$

∎

In present value terms we have that:

$$\widetilde{V} \geq Y_1 + Y_2 - (T_1 + T_2) \tag{4.4}$$

which means that value additivity does not hold.

Equation 4.2 can be viewed as an ex ante relationship. The ex ante viewpoint has been stressed by for example Green & Talmor [39] Cooper & Franks [28] and Majd & Myers [68]. Due to the tax asymmetry, the government's tax claim is equivalent to a portfolio of call options, one on each year's operating cash flow. The point of doing this comparison is that one can use the theory of option pricing to value the tax claim. The value of a call option increases with the variance of the underlying asset. Therefore, since the value of the firm is the present value of the operating cash flows minus the value of the tax option, actions that reduce the variance of the operating cash flow will increase the value of the firm, ex ante.

Green & Talmor point out that this tax motive for mergers is different from the incentive to take advantage of one firms loss-deductions, *after* the fact; an ex post consideration. This argument is thus a rationalization of the corporate insurance motive for conglomerate mergers.

[2] This proof is due to Cooper & Franks, [28].

4.1.2 Tax Shield from Debt

Another often mentioned tax motive for mergers is the increase in debt capacity that it may entail. We saw in section 2 that the feature common to most tax systems that interest on debt is deductible when taxable income is computed and dividends are not, introduces a bias in favor of debt finance.

The tax shield of debt is: τD, the corporate tax rate times the market value of debt. To explain why mergers should increase the potential for a higher combined leverage we must introduce cost of financial distress, which include costs connected with bankruptcy and agency costs. It is assumed that bankruptcy proceedings are not costless, therefore, real resources are spent, which does not accrue as income to either share- or bondholders. Lenders will after some point demand higher interest rates on additional loans as the expected cost of bankruptcy (the cost times the probability of bankruptcy) increases.

If a merger decreases the variability of the combined cash-flow, in line with the "co-insurance" effect discussed in section 2, the probability of bankruptcy will decrease and lenders may therefore offer additional loans on better terms than to either firm before the merger. As was discussed in section 2, the coinsurance effect has been criticized as a motive for mergers since it is not clear that it will involve an increase in total value. It may instead result in an increase in the market value of debt at the expense of shareholders. The critical point here is the existence of cost of bankruptcy. However, the increased tax shield may produce gains to a merger that increase the debt capacity in the mentioned way, which in principle could be shared between debt- and shareholders. If such sharing does take place is ultimately an empirical question.

4.1.3 Asset churning

"Churning" of assets, thereby they are sold when they, due to accelerated depreciation deductions, have a book value which is much lower than their market value, is a way to "write-off" the same asset several times. This can only be accomplished if the acquiror can ***step-up the basis*** of the assets, i.e., the book value from which the yearly depreciation deductions are calculated. The rules for such step-up of basis varies a great deal between different tax and civil laws. If the law permits it, the change of ownership of a whole firm, may lead to a step-up in basis of all the acquired assets. If this is not possible, but step-up of individual assets are permitted, one would expect to see firms sold piecewise instead of wholesale. Unless, of course, transaction costs of the first alternative are prohibitive.

4.1.4 Trapped Equity

The fourth general, tax related, merger motive is connected with another common bias in most tax systems, namely the higher taxation of dividends compared to capital gains. This feature was seen in section 3 to imply that, most, companies would have low payout ratios and would try to distribute cash to their shareholders in other ways than dividends. Share repurchases would be one such way for mature companies not having positive net present value projects to invest their cash-flow in. However, such repurchases are sometimes illegal and, if not, often deemed as equivalent to dividends if done on a *pro rata* basis. If share-repurchases are blocked, acquisition of another firm could be an alternative way of distributing cash to the market.

The hypothesis of M&As as a device for distributing cash is closely connected with the new view of equity finance and dividends that was discussed in section 3. A premise of this view was that the equilibrium q-value will fall below one, and equity will be "trapped" inside the firm if dividends are the only means by which cash can be distributed to the stock market.

As an illustration[3] of the effect of the undervaluation of shares due to different tax treatments of different types of distributions, consider a situation where investors expect that distributions from firms only will be in the form of dividends. The market value of equity is then given by:

$$V_t = \left(\frac{1-t_p}{1-c}\right)[K_t - B_t] \tag{4.5}$$

where K_t is the replacement value of the firm's capital stock and B_t the market value of debt. Note that in terms of the q-model, the ratio:

$$\frac{V_t}{K_t - B_t} \tag{4.6}$$

is the ratio of market value to net worth at replacement values, which is equal to average-q. Under linear homogeneity of the production- and adjustment cost-functions, average-q will equal marginal-q, which in turn equals the undervaluation ratio, due to the difference in tax rates[4].

Assume now that there exist two firms, A and B, and that A increases it's debt by the amount, $\widetilde{B}_B = V_B$, to buy B's shares. The new market value of A is now:

$$\begin{aligned} \widetilde{V}_A &= \left(\frac{1-t_p}{1-c}\right)(K_A + K_B - B_A - B_B - \widetilde{B}_A) \\ &= V_A + V_B - \left(\frac{1-t_p}{1-c}\right)V_B \\ &= V_A + \left(\frac{t_p - c}{1-c}\right)V_B \end{aligned} \tag{4.7}$$

If $t_p > c$ the market value of A increases while that of B is unchanged. The net gain for A:s shareholders, after capital gains taxes, is:

$$(\widetilde{V}_A - V_A)(1-c) = (t_p - c)V_B \tag{4.8}$$

[3] This example is due to Sinn [93].

[4] See Hayashi [44].

The combined market value of the two firms has thus increased through the substitution of the dividend tax for the capital gains tax. If t_p is 0.6 and c is 0.2, the value of the tax savings is $(0.6 - 0.2) = 0.4$ of the market value of the target firm. This is a considerable merger premium.

Discussion. It is obvious that repurchases of own shares and purchases of shares of other firms have the same consequences for an individual shareholder if he/she owns shares in both firms involved; if not it is less obvious. Atkinson & Stiglitz [8] claim that even in the latter case the two options may be considered equivalent if individuals rebalance their portfolios, but they do not give an example of how this may be accomplished. One way of thinking about this is that firm's are categorized by the market as potential targets and likely acquirors over the relevant time horizon. Each potential acquiror-target combination is assigned a subjective probability and each investor forms his own portfolio subject to these beliefs.

As an example, consider firms A and B again. A is a big firm with high growth behind it but has now matured. It is time for A to start paying dividends, since it has run out of internal positive present value projects. B is a smaller, mature, firm which makes zero net investment and pays out all its free cash-flow in dividends. The dividend tax rate is 0.2 and the capital gains tax rate is zero. It follows that $B's$ q-value equals 0.8. Assume now that A acquires B and pays $B's$ shareholders the replacement value of the assets; the shareholders will enjoy a tax-free capital gain of 0.2 times what they invested in B. However, it is not in the spirit of the market efficiency doctrine to believe that an acquisition would come as a total surprise. Investors might have targeted B as a likely acquisition candidate and the share-price of B would in such a case exceed 0.8. E.g., if the likelihood that B should be acquired in the current period is 0.5, the q-value will increase to 0.9.

The trapped equity model seems to be valid only for predesignated acquirors, these may be big firms with a dominant position in each industry, with a long history of acquisitions behind them. Targets may, on the other hand, be fringe firms with short expected life-spans, which enter the market continuously. These fringe firms will not be assumed ever to pay the dividend tax and will not be undervalued.

4.2 Specific Tax Motives for Mergers: the U.S. and Sweden

4.2.1 USA

The presence of tax gains from an acquisition in the U.S. depends on whether it will be considered *taxable* or *tax-free* [5]. In the former case the shareholders of the acquired firm are considered to have discontinued their ownership interest

[5] As a part of the big tax reform of 1986, the legislation concerning acquisitions also changed. The rules described here pertains to the pre-1986 situation.

in the (new) firm by selling their shares. They will therefore be liable for taxation on their capital gains or loss. In the latter case they have a ***continuity of interest*** since they have received shares in the new firm (the acquiror or a newly established firm) in exchange for the old, and can defer capital gains taxes until they sell the new shares.

If an acquisition is deemed as taxable or tax-free depends on the type of consideration received. Taxable transactions are usually cash-acquisitions, tax-free transactions are always for new shares in the acquiring company.[6] If there were no taxes at all, no transaction costs nor agency-cost considerations, the choice of medium of exchange would be immaterial, no value gains would be possible. How is it then, that taxable acquisitions, those for cash, are ever used? The answer to this question is that the assets of the acquired company can be revalued, or stepped up in basis as discussed above, in the case of a taxable acquisition. Therefore, one would expect to see cash-acquisition in cases where the difference between book-value of the target firm's assets and their true value is particularly large, and where the acquiror has much room to absorb the extra depreciation deductions against its own pretax income. In practice the acquiror can elect to treat the acquired firm as absorbed into the parent with its tax attributes intact, or first liquidated and then received in the form of its component assets. If the first avenue is chosen, the acquisition will be tax-free, but a taxable transaction can be of either type. If it is of the second type, the acquired assets could be stepped-up in depreciable basis. In this case, a so called ***recapture tax*** on the stepped-up value must be paid, i.e., treated as taxable income, immediately. Typically, therefore, the acquiror will find it to its advantage to elect the first type of acquisition.

Tax-free acquisitions will presumably be chosen if the step-up in basis is not important and/or the recapture tax wipes out the gains. However, for the target firm's shareholder the tax-free form would be advantageous due to the possibility to defer the capital gains tax liability and to time the realization according to their own individual needs. Furthermore, since tax-free acquisitions are based on the notion of continuity, although after a reorganization, the new firm simply takes over the target's tax attributes as they are. As was pointed out above, this means no step-up of basis but instead the possibility to use tax credits or tax losses that the target could not use itself. This could be the case if the target has low current and expected income, and the acquiror higher income than it could offset by its own current deductions and credits.

An acquisition may not be the only way of marketing unused tax shields, the use of leasing may be an alternative. This possibility was recognized by the legislators in 1981 in connection with the concurrent tax reform, when, so called, "safe-harbor leasing was introduced, which simplified for companies to trade unused tax shields. The idea was that this would decrease acquisitions driven by this motive; however it had negative side effects of its own and was soon abandoned.

[6] Tax-free status requires that at least fifty percent of the consideration is in the form of stock in the acquiring corporation, the remainder can be cash, debt, stock warrants etc.

An additional important point with respect to the choice of medium of exchange is that tax-free mergers require approval of the stockholders of the acquired corporation. Consequently, such acquisitions will not be amenable for unfriendly takeovers; these are also usually financed by a combination of debt and cash.

4.2.2 Sweden

Tax related motives for mergers in Sweden will focus mostly on the potential to use available non-interest tax deductions by the two firms involved in a merger. The specific rules and the actual use of these deductions are discussed in more detail below; here we will start by discussing some basic principles of company taxation that are important with respect to tax motivations for mergers.

Group Taxation. In order for the deductions mentioned above to classify as merger motives, at least in the ex post sense discussed in section 4.1, it must be possible to transfer these deductions between the involved firms. However, the basic principle of corporate group taxation in Sweden is that each member of the group is taxed separately, so, superficially at least, A acquiring the voting majority of B, will not affect either companies' tax position. An exception to this rule is the possibility of making so called *group contributions.*[7] One can show that these contributions are alternatives to full group taxation, since it makes it possible to average out the taxable income among the individual companies in a group. If the tax system was symmetric, and proportional, it would obviously not be possible to lower the total tax burden in this way. However, if at least one company in a group has more deductions than it has positive pre-deduction income, and the reverse is true for at least one other company, the latter can make, a tax deductible, contribution to the former, resulting in more efficient use of the total stock of deduction within the group. [8]

Besides the legal type of income transfers, with tax reducing effects, there is always the scope for income transfer through internal transfer pricing. Since this type of income averaging is not accepted by the tax authorities, it is difficult, or impossible, to gauge how widespread it is. However, since it is presumably easier to agree on such schemes in a parent-subsidiary relationship, it is a potential way by which one company's redundant deductions can be taken advantage of through a merger.

Tax Consequences of Legal Mergers. A legal merger is an acquisition where the target company is dissolved, and seize to exist as a legal entity. The most common situation for a legal merger is between a parent and a subsidiary within an industrial group. The target company is usually first incorporated into the group and later dissolved, and maybe becoming a branch of the parent instead

[7] "Koncernbidrag" in Swedish.

[8] Group contributions are restricted in various ways; e.g., way cannot exceed what is legally available for paying dividends each year, which is the after-tax profit plus accumulated retained after-tax profits from earlier years that has not been allocated to equity capital. Furthermore, they are only tax deductible for the contributor if the parent firm in the group, have owned at least 90% of the subsidiary involved in the transaction, for the entire taxation year.

of an independent legal entity. A company that is terminated within a legal merger, and where all its assets and liabilities are transferred to the acquiror, is, in principle, liable to pay a ***recapture-tax***[9] of 40% on the difference between the initial share capital and the value of consideration its shareholders received. This tax was introduced to stop companies from accumulating untaxed reserves, and liquidate themselves. Without these rules, all corporate taxes could be avoided, by successive rounds of liquidations and restructurings.

Since the legislators recognized that this tax might hinder socially advantageous mergers, rules were introduced which permitted the acquiror to take over, and postpone, the payment of this tax in certain circumstances. However, these rules are quite restrictive[10] and does not seem to be applicable in most of the cases considered in empirical study. However, in cases that do not pass the formal rules directly, a special permission has to be obtained from the tax authorities to postpone this tax.

If such a postponement is not granted it may not be profitable to perform a legal merger of a subsidiary. However, if a legal merger of a wholly owned subsidiary is undertaken, the parent has the right to use the subsidiary's investment fund as well as any available loss carry-forward. In some circumstances it is thus possible that the value of these deductions to the parent outweighs the cost of the recapture tax.

Tax Deductions and Dividends. Tax depreciation in excess of the ordinary book depreciation as well as inventory write-downs, must be recorded on the liability side of companies' balance sheets. If these reserves are dissolved, e.g., when the asset is sold, corporate tax has to be paid on the dissolved amount. Therefore part of these ***untaxed reserves***, as they are called, is a latent tax liability. This tax liability may also be considered as a source of debt finance that is interest free, and would thus be a preferred source of finance.

If tax debt is the cheapest form of finance, why is it then that not all firms always use it to the maximum extent possible? [11] An explanation of this may be the rules in the Company Act of 1975, which prohibits firms from distributing dividends in excess of after-tax reported profits. As explained in section 3.2 dividends are a tax disadvantaged form of distribution of funds to shareholders, unless they are tax-exempt, but publicly traded firms do regularly pay dividends despite this. The most common explanation is the signaling function of dividends in the face of asymmetric information about the firm's true earning potential, between management and shareholders. The upshot of this theory is that firms have to pay some dividends, due to the lack of any other, credible, signaling device. Given this explanation one may proceed from a given level of dividends as a binding constraint on the level of before tax reported profits.

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[9] This is called "utskiftningsskatt" in Swedish. This tax is now abolished, but was in operation during the sample period.

[10] The target must have been owned by acquiror, with at least 90% of its share capital, since its birth; or the acquiror must have owned at least 90% of the target since 1940

[11] In the sample of companies used in the empirical studies, we found that on average 50% of the available deductions were left unused.

Asset Churning. The guiding principle in the Swedish tax law, with respect to tax effects when an asset changes ownership, is the ***continuity principle*** [66]. This means that an asset will keep its own attributes intact, so in principle, an asset cannot be depreciated twice. If the amount paid for the shares of a subsidiary's exceeds its (book) equity capital, the difference is called "goodwill," and should be reported as a separate entry in the groups consolidated balance sheet. This item is only depreciable on the books, but not for tax purposes.

Share-repurchases. According to the Company Act[12], companies cannot repurchase their own shares. This rule has a couple of exceptions, which have to do with situations where a company receives own shares as payments for a debt that some person owes to the company. The company must sell this share as soon as possible, if it can be done without incurring a loss. These are obviously special circumstances and cannot be used systematically to reap tax benefits.

[12] "Aktiebolagslagen," 1975, Chapter 12, §1, 1:st moment.

Chapter 5

Empirical Evidence

5.1 Mergers in Sweden: An Historical Background

There does not exist a long, comprehensive, time-series on merger and acquisitions in Sweden; it was not until 1969 that a government agency [1] started to collect such data. [2] Rydén [89] collected data on mergers for the postwar period up to 1969. Neither one of these series provide a measure of the total value of assets changing ownership, both count the number of mergers, not their sizes. This is an important restriction to bear in mind since one giant merger could literally equal 1000 small ones. The number series is given in figure I.A.2 in Appendix I.A. The number of employees in acquired companies is a measure of the size of an acquired company, and has been recorded since 1970. For comparability over time, this series is divided by the total number of employed in all industrial sectors each year, this series is plotted in figure I.A.1. It is clear from these figures that total merger activity increased slowly up to 1980 and accelerated after that and peaked in 1988.

We now turn to publicly traded companies, on the Stockholm stock exchange. Trade started at the beginning of the century, with 165 registered companies in 1901. In subsequent decades entry of new companies did not keep up with the exits, which occurred for various reasons. During the postwar period, up to 1970, the average number of companies hovered around 100. The number of exits between 1945 and 1960 was only 18 and during the sixties the number of acquisitions was 29. The stock market thus seems to have been leading a tranquil existence during this period. Therefore, and for the better availability of data, we will focus on the period 1970-1989, when the relative merger activity started to increase.

[1] SPK (Statens Pris och Konkurrensverk)

[2] The historical information in this section emanates from three sources; Rydén [89], SOU 1990:1 [96] and Hägg (1988) [48].

During the period 1970-1979, 38 disappearances from the stock market due to acquisition were recorded. The pace picked up considerably in the eighties, especially after 1983, the total number of acquisitions, 1980-1989, was 137.

The above numbers should be related to the total number of traded firms on the stockexchange over the period. In 1969 this number was 110, if one considered the two main trading lists (called AI and AII respectively), a number that fell slowly throughout the following decade to 96 at the of 1979. It was not until 1982-83 then entries started to outpace exits significantly and at the end of 1987 the number of companies peaked at 157, to fall back to 120 in 1989, after the peak acquisition year of 1988. The number of smaller firms on secondary lists increased even faster, presently the total number is over 300, including for example OTC-companies, which are quoted on the Stockholm stock-exchange.

The increase in numbers is mirrored in the development of total market value (all companies), which is given in figure I.A.3. One may speculate whether the big increase in the number of stock market companies was mainly due to institutional shifts. Examples of those are: more benevolent rules for introduction on the stock market, tax exemption for savings in stock funds, the increased tendency for institutional investors to include more risky assets in their portfolios etc. The general economic upswing does seem to have played an equally important role, however. An indication of this is that the total number of newly established industrial enterprises, which made a quantum leap upwards in 1983 and sustained that higher level through 1988. [3]

A striking feature of development of the stock market is that a core of big and old companies has remained intact for a long time. Of the 120 companies in 1989 only 27 existed in 1970, among these, ten had a market value exceeding 1% of the total market capitalization the same year; in 1989 the number of such companies was 16. The value of the "survivors" represented in 1970 approximately 36.9% of the total market value, a proportion that had increased to 43.2% in 1989. However, the "Big-10" of 1970 declined from 30.4% to 20.7% over the period. This last result suggests that the relative positions within the survival group have changed considerably, some initially dominating firms have declined, and a couple of very fast growers have managed to improve their relative positions considerably. The largest companies thus seem to have been standing solidly through the "acquisition war" of the late eighties. This point is important since we may predesignate that group as acquirors, which prey on an ever changing pool of game (targets).

5.2 Data and Sample

The main data sample consists of mergers between Swedish firms during the period 1983 to 1987. Companies from the manufacturing and service industries

[3] The series is from the Census Bureau's (Statistics Sweden) company register; it is not presented here since it consists of two subseries that are not directly comparable, but tell the same qualitative story.

Table 5.1: Distribution of acquirors in different size groups.

	Number firms	Percentage of total	Group mean	Standard deviation	$\bar{y}_i$
Size Groups:					
0-999	59	44	466.3	265.3	0.310
1,000-4,999	31	23	2,540.2	1,224.2	0.204
5,000-9,999	16	12	6,838.4	1,246.1	0.157
10,000-19,999	15	11	15,806.0	2,679.2	0.152
20,000-	13	10	42,799.8	15,095.2	0.053

Note: Size is measured by book value of total assets, in million 1987 Swedish Crowns. $\bar{y}_i$ is defined as (size of target)/(size of acquiror).

were included, excluding banks, insurance companies, other financial companies whose main purpose was portfolio management, and state owned companies. The original sample was drawn from SPK's[4] register of mergers. All mergers where the target had at least 200 employees the year before the merger, and where the ratio of the target's to the acquirors (book value) assets was at least 0.01, were included. The size of this sample was originally 185 mergers. Due to difficulties to obtain reliable data on some (smaller) mergers, this sample was ultimately reduced to 134. Table 5.1 gives a tabulation of acquiring firms into different size groups[5], as well as group means and standard deviations. The mean ratio of target size to acquiror size within each group is also given. The overall mean of this indicator was 0.107, suggesting that the average acquiror was about ten times bigger than its target. Table 5.2 gives a tabulation of targets into size groups, here, however, the size groups used has been scaled down by a factor of ten.

The variables included in the data set are compiled from companies' annual reports. From this source one can get information about book-values of assets and liabilities, investments in physical and financial assets, cash-flow from aggregate firm activity and total taxes paid. The ideal source of tax information is tax returns filed to the tax authorities, however, tax returns are confidential, and cannot be used. Annual reports do, however, contain some useful tax information. The reason is that firms have to report, on their balance sheets, both the remaining tax basis of an assets as well as its estimated "true" value (often this is not adjusted for inflation so it is usually an underestimation). As well as each years depreciation deductions for tax purposes. Because of this fact it is possible to estimate tax consequences of mergers from this data set.

The main sample consists of both publicly traded and privately owned com-

[4] SPK="Statens Pris- och Konkurrensnämnd" ("The State Price and Competition Commission.")

[5] Size is measured by book value of assets in constant, 1987, Swedish Crowns.

Table 5.2: Distribution of targets in different size groups.

	Number of firms	Percentage of total	Group mean	Std. deviation
Size Groups:				
0-99	50	37	52.9	30.0
100-499	43	32	225.6	108.0
500-999	17	13	722.4	126.1
1,000-1,999	17	13	2,118.0	1,224.9
2,000-	7	5	6,645.8	1,995.5

Note: Size is measured by book value of total assets, in million 1987 Swedish Crowns.

panies. [6] It is of interest, for this study, to partition the data set with respect to publicly traded and private companies. A cross tabulation of mergers with respect to the category of both the target and the acquiror is given in table 5.3.

5.2.1 Types of Mergers

Firms may accumulate excess funds and use these funds to acquire other firms for tax reasons, as discussed above. However, there exist other possible explanations for this behavior. Jensen [52] suggested the "free-cash flow theory." According to this theory, managers of firms with cash-flows from existing activities in excess of what are required for consolidation and expansion in their main line of business, will not distribute these funds. Instead they will invest them in low return, size increasing, acquisitions. It is primarily firms with high profits from existing activities, but low internal expansion possibilities in these activities, which undertake such acquisitions. The main point is that the motivation behind such acquisitions is contrary to shareholders interest, and is pursued by independent managers who seek to maximize their own self-interest. If this motivation is the principal force behind most mergers, the acquirors should primarily be large firms in oligopolistic industries.

Some initial insights into this question may be gained by categorizing mergers into types, such as: *horizontal, vertical* and *conglomerate*. The percentage distribution of total numbers

across these three categories was for our sample: 55,2%, 11.2% and 33.6%, respectively. A merger was considered as horizontal if both firms had the same 4-digit *ISIC* code; as vertical if they had the same 3-digit *ISIC* code, and conglomerate otherwise. The "State Price- and Competition Agency" (SPK), performed a similar classification over the period 1970-1988 for all large scale mergers. They used a different definition of horizontal mergers, and found that

[6] Privately owned companies are compelled to disclose information to the state company-registration bureau, e.g., annual reports and information about owners and board composition. This information is then publicly available.

Table 5.3: Crosstabulation of mergers according to ownership category of acquiring and targets firms.

		Targets			
		Public		Private	
		Numbers	*Size*	*Numbers*	*Size*
Acquirors	Public:	25 (18.7%)	69.372 (64.7%)	57 (16.6%)	17.737 (14.0%)
	Private:	6 (4.5%)	9.770 (9.1%	46 (34.3%)	10.268 (9.6%)

Note: *Size* is total book value of targets in each category, measured in million Swedish Crowns, 1987 prices.

66% of the number of mergers were horizontal, 9% vertical and 25% were conglomerate [96]. Although the classifications used were different, the distribution of types is similar. The higher proportion of conglomerate mergers in our sample suggest that some of the driving forces behind mergers during the 1983-1987 period, were of a different nature than previous motivations for mergers. However, one should bear in mind that horizontal mergers still dominated. One may also look at the total size of the target companies in each category and find the following distribution: 52.2%, 3.4% and 44.2% (horizontal, vertical and conglomerate mergers respectively). Therefore, conglomerate mergers seem to be larger than average.

5.2.2 Tax Attributes: NOL's, Other Deductions and Average Tax Rates

Net Operating Loss Deductions. NOLs can be transferred between companies only after a legal merger has been conducted. In most cases in the sample the target company has only become a subsidiary within a group and thus "keeps" its own NOLs intact. However, several ways in which taxable income can be transferred between companies within a group was discussed in section 4.2, and we will not make a distinction between types of mergers, with respect to the potential tax motives of NOLs.

A NOL can be carried forward for ten years; it is not indexed, and thus declines in real value in inflationary times. It is thus clear that companies would want to use them as soon as possible. Companies are not mandated to report NOLs in their annual reports, so we cannot get an exact input on this variable. Instead we tried to estimate the addition to the stock of NOLs, starting from 1980. If a company had a loss in one year and reported a profit the next, we calculated the actual tax rate paid the second year (taxes and pretax profits were available). If this percentage rate was below the statutory tax rate, we assumed that the difference was due to the use of the NOL from the year before. The remaining stock of NOLs was calculated in this way for each company and year.[7]

The relative importance of NOLs can be measured in different ways. One way is to relate the stock of NOLs to the size of the target and/or the acquiror. In our sample the average NOL/target ratio was 2.03% and the average NOL/acquiror ratio was 0.68%. Since the immediate tax savings would be $\tau \cdot NOL$, this number is not very large. If one looks only at those mergers where the target had any NOLs at all, which were in 48 out of 134 cases (36%), we find that the first ratio was 5.57% and the second was 1.87%. In three (five) cases were the NOL/acquiror (NOL/target) ratios bigger than 10%.

Other deductions. The most important non-interest tax deductions, which are done both on the book and on the tax return, have for a long time been: *i)* Accelerated depreciation deductions for tax purposes; *ii)* Inventory write-downs; and *iii)* Deductions for allocations to so called investment funds (IF).

To what extent do companies use their available deductions? Table 5.4 gives some answers for publicly traded and private acquiring companies and for two size classes respectively. This table reveals that only 40-50% of the available deductions were used for the average companies. The difference between public and private companies is not significant, something that is surprising considering the discussion about the dividend constraint in section 4.2. It was argued where that public companies may not be able to use all their deductions because they "had to" pay dividends, out of positive reported profits, due to the information asymmetry between the management and the shareholders. Since this information asymmetry is not present within private firms, and since they often do not pay dividends at all (see below), they ought to not to be constrained and should be able to use more of their tax deductions. This hypothesis is not supported by the evidence.

A more important distinction is due to the size of the companies, or more correctly, the size of the industrial group. The evidence seems to support the notion that larger groups are better placed to use their deductions than smaller groups. The test-statistic has the right sign (the alternative hypothesis is that the difference between large and small companies' relative redundancy of deductions is negative, i.e., that small companies have more redundancies), and is significant at the five-percent level in two cases.

Average Tax Rates. Since larger companies seem to be able to use more of their non-interest tax deductions than smaller companies, in our sample, it is interesting to test whether there is any difference between these two groups with respect to the average rate of tax paid. The tax rate variable we used was taxes

[7] This procedure neglects the presence of deductions for dividends paid, which the companies can do each year up to a maximum of 10% of what has been paid in new equity emissions, during the preceding 20 years. This deduction is only done, like NOL deductions, on the tax return and is not reported in the annual report, but will make actual taxes paid as a percentage of reported pretax profits lower than the statutory rate.

Table 5.4: The average rate of "redundancy" of deductions for acquiring companies.

	Public	Private	Test-Stat.	Large	Small	Test-Stat.
1984	0.516 (0.257)	0.496 (0.312)	0.319	0.474 (0.242)	0.562 (0.309)	-1.461
1985	0.552 (0.273)	0.568 (0.298)	-0.259	0.479 (0.227)	0.671 (0.308)	-3.253*
1986	0.628 (0.239)	0.622 (0.273)	0.107	0.577 (0.230)	0.686 (0.281)	-1.964*
1987	0.655 (0.233)	0.618 (0.242)	0.714	0.621 (0.228)	0.692 (0.241)	-1.421

Note: The entries are unweighted averages of unused tax deductions relative to the maximum available deductions, 1984-1987. (sum of maximum tax depreciation deductions, inventory deductions and investment fund deductions). 'Large' refers to companies with more than and 'Small' with less than or equal to 1.000 employees. 'Test-Stat.' refers to a test-statistics of a null-hypothesis of no differences in populations means, * refers to the rejection of the null-hypothesis for a two-sided test at the five percent significance level. Numbers in parentheses are standard deviations.

paid divided by earnings after interest deductions. It may be argued that this tax rate depends on the debt/equity ratio used, but we did not have data on interest payments, so we use this measure as a substitute. Furthermore, we tested for a difference in the mean debt/equity ratio, and could not reject the null hypothesis of no difference. This type of tax rate definition is problematic to use when the tax system is nonlinear, or asymmetric, since companies sometimes have to pay positive taxes despite negative or very low earnings, making the (unweighted) tax rate non-sensible. Instead, we calculated the total tax payment for all companies in each category and year, and divided this sum with the total earnings after interest. We then took the average over the five observations years and performed a test on difference of population means, over the observation period. The result was that the average tax rate was 26.1% for the large company sample and 30.4% for small company sample. The null hypothesis of no difference between sample means for a two-tailed test was rejected at the one percent level.[8]

5.2.3 Dividend Behavior

We argue above that acquisitions may be a substitute for paying dividends. Looking at the dividend behavior of the acquirors, we find a substantial difference between publicly traded and private companies. The general pattern is that public companies feel compelled to *always* pay dividends, or, for newly introduced companies, when possible. We divided our sample of public companies into a *large-firm* and a *small-firm* subsample. The large-firm subsample consisted of older and mature companies, while the small-firm subsample had several new and rapidly growing companies. Private firms dividend behavior is entirely different, they pay dividends irregularly and usually not at all. Table 5.5 summarizes the dividend behavior for the subsamples mentioned above.

The mean dividend yield was around 2.8% percent for the large public firms. The smaller companies had a mean dividend yield of 1.6%, this lower number is, however, influenced by a large fraction of new public firms who initially chose a low dividend yield, which they gradually increased over time.

5.3 Econometric Models

5.3.1 Acquirors

The dependent variable used in modeling acquirors merger behavior is a censored variable, which is zero if no merger took place in a certain year and the ratio between the targets' and the acquiror's book assets. The models are estimated by a *Tobit* procedure[9].

[8] The test statistic used was: $z = (\mu_1 - \mu_2)/\sqrt{\sigma_1^2/n_1 + \sigma_2^2/n_2}$, in this case the number of observations, n_i, refers to the number of years over which the averages were taken, i.e. five years.

[9] See Maddala [67] for an explanation of the Tobit model.

Table 5.5: Dividend behavior of sample companies; divided into large and small size publicly traded firms and private firms.

	Public		Private
	Large	*Small*	
Dividend observations, %	99.1	81.3	36.9
Mean dividend yield	0.028 (0.013)	0.016 (0.011)	

Note: Numbers in parentheses are standard deviations.

As for the explanatory variables, we include a variable ($SIZE$) controlling for the size of the acquiror. If smaller concerns tend to grow at a faster rate than bigger ones, something that may be predicted on the basis of increasing monitoring costs of larger companies, this variable will have a negative sign.

In non-perfect capital markets the availability of credit may be a determinant of real investments, as well as acquisitions of shares. As a flow measure of relative internal liquidity constraints, we use $RLIQC$, defined as (one minus) profits after financial items, plus depreciation deductions, plus taxes paid, divided by total (book) assets, in turn divided by (one minus) the industry average of this variable. Higher values of this variable means a higher degree of internal liquidity constraints, and it is thus predicted to have a negative sign.

Redundant non-interest tax deductions as merger incentives were discussed in length above. It was argued where that the tax system provides incentives for joining companies into industrial groups, since income averaging and the possibility to use redundant deductions more effectively, is then possible in various ways. This in turn lowers the effective average tax rate and provide a rationale for corporate insurance, by diversification into unrelated lines of business. Section 5.2 showed that the acquiring companies on average do not use more than about half their available deductions each year. This could potentially be explained by what we called "the dividend constraint;" however we also noted that private companies do not use more of their deductions each year, in spite of not being constrained by the need to pay dividends. For some private companies this behavior can be explained by other legal restrictions. Full use of all deductions may for example result in a large loss that erodes the equity capital base of the company, pushing it close to the legal limit of the equity capital base. It should also be noted that if a company does follow this strategy, and reports a big loss, its attractiveness as a target may actually increase since it will acquire a large NOL, which could be attractive in the future for another company, as was discussed above.[10] Therefore, a high level of redundant deductions in a

[10]This possibility can explain why firms do not use all deductions since the presence of a

particular year may increase the likelihood of the incorporation of this company into a larger industrial group. When it is inside this group it will be ordered to use all it deductions and generate a NOL, which can be transferred later to the acquiring company through a legal merger.

The upshot of this discussion is that we include a variable called RED, which is the sum of all unused non-interest deductions, divided by total available deductions, in each year. The expected sign of this variable is undetermined, since it should depend on the "matching" of the merger pairs. We include the same variable in the model of targets below, and expect to find opposite signs. On the grounds that we have found that most large companies carry a significant stock of unused deductions, we may conjecture that acquirors have positive signs and targets have negative signs on the RED variable.

The free-cash flow theory of Jensen, which was discussed in section 5.2, predicts that managers of companies with high cash-flow from existing activities, but with little expansion opportunities in these activities, use this cash-flow to invest in unrelated industries, instead of paying out money to shareholders in form of dividends. We test this theory by trying both the level of real physical investments, divided by total book assets, (I), and the change in this variable from the last year, (ΔI). The free-cash flow theory predicts that, at least for cash-acquisitions, these variables should have a negative sign.

The trapped equity model suggests that acquiring companies may be cash-rich. But due to the higher taxes on dividends than capital gains, they are reluctant to pay higher dividends, despite lack of profitable internal investment opportunities. We include a measure of average Q to test whether lower Q values implies higher propensity to engage in acquisitions.

The tax hypothesis predicts that acquisitions and dividends are negatively related, since an acquisition is an alternative mean of distributing cash to the market. One could conceivably include the rate of dividends, e.g., the dividend yield, as an explanatory variable and check whether dividends are lowered when acquisitions are made etc. However, it was argued above that companies very grudgingly deviate from an established dividend pattern. It therefore seems à priori unlikely that one can associate yearly variations in dividend with variations in M&As.

In a cross section study we may try to classify companies into dividend groups; i.e., high-dividend yield companies and low-dividend yield companies. According to the tax-clientèle theory [10], companies may choose a certain dividend policy to attract investors with preferences for dividends to capital gains and vice versa. However, companies may choose a low dividend if they have many profitable internal projects, and furthermore horizontal and vertical mergers may be a part of their long-term growth strategy (buying up competitors, securing raw material supplies etc.). Consequently, we would like to be able to distinguish companies that engage in such growth mergers from those that want to find a use for their free-cash flow according to Jensen. It is often claimed that

large NOL may attract unwanted, from the current managements perspective, predators.

the price-earnings ratio, (P/E), is an indicator of expected future high growth. We use P/E as a proxy for growth prospects within the acquiror's core industry, and suggest that high P/E firms should engage in mostly horizontal and vertical mergers. Low P/E firms, on the other hand, mostly in conglomerate mergers that are expected to have a low present value discounted with the owners discount rate. If this hypothesis is correct it is favorable to the free-cash flow theory.

Estimation Results: Acquirors. The acquirors included in the sample can be divided into two main groups, publicly traded and private companies. For publicly traded companies it is possible to include stock price related variables, such as Q, therefore we analyze those companies separately.

The Tobit estimation results are summarized in table 5.6. The most important factor for the acquisition decision seems to be the relative liquidity constraint, which has the predicted sign and is significant at the five percent level or lower. The coefficient is higher (and more significant) for the complete sample compared to the stockmarket sample, this lends support to the notion that stockmarket firms are less constrained by the availability of internal liquidity than are private firms. The $SIZE$ variable is not significant in any specification, and it does not have the negative sign predicted above.

Redundant deductions (RED) by the acquiror do seem to have some positive explanatory power in the complete sample as was discussed above (albeit with a a low level of significance); for stockmarket firm the role is insignificant.

The coefficients of I and ΔI are consistently positive, which belies the "free-cash flow" theory. It appears that investments in new capital and acquisitions are complements instead of substitutes, this fact can be explained by the dependence of both investments and acquisitions on liquidity factors. A higher Q-value is negatively related to the probability of engaging in an acquisition, as was predicted, but the coefficients are insignificant.

To test the theory that companies with high expected future growth are more likely to engage in horizontal and vertical mergers, and low expected growth companies in conglomerate mergers, we calculated the price-earnings ratios for the public companies, for each year. These P/E-ratios were normalized by dividing with each years sample-mean P/E-ratio. Three "acquisition-type" dummy variables were defined as, D_h (D_v, D_c) equals one if an acquisition is of the horizontal (vertical, conglomerate) type, and zero otherwise.

The following regression was run:

$$P/E = D_h + D_v + D_c$$

With the following results: $D_h = 0.871$, $D_v = 0.823$, and $D_c = 1.016$. None of these are significantly different from one (the sample mean), and since the signs are the reverse from those expected, this theory does not receive any support in this test.

Table 5.6: Results of Tobit estimation of acquiring companies.

	Constant	SIZE	RLIQC	RED	I	ΔI	Q	LR-t
Complete Sample: (N=335)	-1.046	0.024	-3.698	0.584	1.234			21.
	(−3.607)**	(0.565)	(−3.473)**	(1.646)*	(1.489)			(0.0
	-0.973	0.019	-3.582	0.631		0.401		20.
	(−3.427)**	(0.465)	(−3.374)**	(1.787)*		(0.899)		(0.0
Stockmarket Sample: (N=197)	-0.163	0.008	-1.278	0.105	0.201		-0.019	14.
	(−1.646)*	(0.795)	(−2.371)**	(0.969)	(1.803)*		(−0.444)	(0.0
	-0.101	0.006	-1.277	0.087		0.647	-0.029	19.
	(−1.083)	(0.556)	(−2.426)**	(0.833)		(2.874)**	(−0.700)	(0.0

Note: Variable names are explained in the text. The "LR-test" column gives the value of the likelihood-ratio test statistics and numbers in parentheses below these values are significance levels for the Chi-square distribution. The complete sample consists of yearly observations of large companies that engaged in mergers during the period 1983-87, and a control sample of stock market firms that did not engage in mergers during the same period. The stock market sample consists of the same companies and observation periods but without the private companies included in the complete sample. Numbers in parentheses are t-values.

5.3.2 Model of Targets

By modeling target companies we want to test whether any of the tax related attributes discussed above influence the probability of a company being an acquisition target in a particular year.[11]

The original sample of acquired public companies, was complemented by a random sample of public companies. This supplementary sample was drawn from the subset of such companies that had not been subject to takeover bids or acquisition offers, within twelve months after each year. The following independent variables were included:

SIZE : market value of assets,
RHO : 5 year exponential growth rate of assets,
E/P : earnings price ratio,
RED : the proportion of maximally allowed deductions left unused,

The $SIZE$ variable is included to control for the possibility that larger companies are less vulnerable for takeovers due to liquidity constraints in the capital market, it's regression coefficient is hypothesized to be negative. RHO is included to see whether the data supports the notion that high growth companies are more palatable acquisition targets than sluggish ones. The earnings-price ratio (E/P) is supposed to be a proxy for expectations of future high growth, which may also be positively related to the probability of being acquired. RED, finally, is a tax related variable, the sign of this variable cannot be predicted in advance since, as was discussed, above what matters is the tax situation of the

[11] We only have information on completed acquisitions.

combined firm after the merger, and thus the "matching" of the merger pair. We want to find out however, if this variable has any, positive or negative, influence on the probability of being acquired and we therefore perform a two-sided test of the null-hypothesis that it has none. From the discussion of acquiring companies we can observe that most acquirors have a lot of unused tax deductions of their own. Therefore, one may à priori assume that if the tax hypothesis has some truth in it, we would observe a negative coefficient of this variable. A low value of RED implies that a small fraction of the available deductions were left unused by the target, and it may be expected that a combination with a parent with much deduction slack may increase the future use of deductions within the group, and therefore lower the group taxes.

Estimation results: Targets. The Probit formulation (see [67]) of the econometric model for predicting targets was used. The dependent variable was coded as 1 if the company had been acquired by another the year after the (end of) observation year for the independent variables and 0 otherwise.

The sampling procedure was not random sampling; instead all the target companies during the period were included and a supplementary sample was added with companies that were not acquisition target within a year after the observation period. This procedure is called *choice-based* sampling, and is used if the phenomenon of interest (in this case an acquisition) is infrequent in the population. The supplementary sample was stratified so that the same proportion of companies from different size groups were included in both sub-samples. A stratification over industries and size groups was tried but was deemed infeasible due to small numbers of companies in some industries and size groups. The estimation procedure of a choice-based sample and the asymptotic properties of various estimators has been studied by for example Manski & McFadden [69]. They recommend a weighting procedure for the parameter vector and variance-covariance matrix, which corrects for an upward bias of the estimates, due to the conscious overrepresentation of 1's in the vector of the endogenous variable. The weights used depends on the true population proportion of the 1 outcomes relative to the designed sample proportion. In our case, around 7.5% of the stock-market companies disappeared from the stock market due to an acquisition, on average, per year. The sample proportion was 30%, and the 1's were weighted by $0.075/0.30 = 0.25$.

The results for the unweighted and the weighted versions of this models is given in table 5.3.2. The signs are consistently in line with expectations, but the level of significance is low, especially after the correction for the oversampling. We may note that the sign of RED is negative, and the opposite to the sign in the model of acquirors, it is significant at the 10%-level in the weighted sample.

5.4 Event Studies

To measure the gains (or losses) incurred by the shareholders in case of an acquisition or takeover, so called "event studies" are used. These are studies of

Table 5.7: Results of estimation of the target model.

Coefficient	*Constant*	*RHO*	*SIZE*	*EP*	*RED*
Weighted:	-0.791	0.400	-0.055	0.564	-1.677
	(−1.655)	(0.222)	(−0.618)	(1.119)	(−1.845)
Unweighted:	0.211	0.565	-0.056	0.465	-1.905
	(0.640)	(0.472)	(−0.907)	(1.418)	(−3.104)

the price changes of the concerned companies' shares around the time when the planned transactions became publicly known. To get a correct measure of the price changes due to these events, in isolation, one has to adjust the observed price changes by the general movement of prices in the market at the same point in time. Prices change due to general, or systematic effects such as lower interest rates or better than expected GDP growth etc.

The general methodology is to compute a so called "control return" for each company for a period during which the company was not the target of, or involved in, any acquisition or takeover proposal. The control return is compared to the actual return around the time of the acquisition announcement, and the difference between these return measures is called an "abnormal" return. The cumulated abnormal return is a measure of the gains the shareholders sustain due to the acquisition. Formally, the abnormal return of company j at period t is

$$ar_{jt} = r_{jt} - c_{jt} \tag{5.1}$$

where r_{jt} is the actual return and c_{jt} is the control return. The cumulated abnormal return is defined as:

$$car_{jt} = \sum_{i=t_0}^{t} ar_{ji} \tag{5.2}$$

where t_0 is the first observation date.

To calculate the control return one needs a model capable of explaining the return process. In this study we use the so called "market model" (see, e.g., [29]); which defines the control return as

$$c_{jt} = \alpha_j + \beta_j(r_t^m - r_t^0) \tag{5.3}$$

where

r_t^0 = the yield of a T-bill over the period t;
r_t^m = return of the stock market index;
β_j = the covariance of stock $j's$ return with that of the stock market; divided by the variance of the stock market index.

Given the estimates of α_j and β_j, an estimate of the control return, $\hat{c}_{jt}$, can be obtained.

We performed a study of 25 tender offers over the period April 1983 to January 1988; 17 acquiring companies were involved and all tender offers succeeded in acquiring at least 90% of the targets voting stock.

We call the announcement date, $t_0 = 0$[12], the target companies' abnormal return between day -1 and $+1$, was on average 16.3%, the cumulated abnormal return, car_t, was, from $t = -16$ to $t = +1$, on average 18.5%. car_{-1} was on average 2%, which suggests a small rate of "information leakage," before the announcement date.

The acquiring companies' shareholders enjoyed on average 4% abnormal return at $t = +1$, however, this return is not significantly different from zero (at the 5% level of significance). car_t is negative before $t = +1$ and does not reach positive values before $t = +10$; car_t is not significant at the 5% level for any t.

These results are in accordance with the results presented in [16], for a bigger sample over the period 1980-1987. The target companies' abnormal return around $t = 0$ was 15% and the acquiring companies' 3%. In both studies the variation around these means is considerable, suggesting that the abnormal return may differ for different categories of companies.

5.4.1 Choice of Medium of Exchange in Tender Offers

The choice of medium of exchange may be related to the observed magnitude of the abnormal return, or the bid premium. Differences in tax treatment of different media of exchange, is one such possible source of variation in bid premia.

If the individual shareholder has the right to postpone the payment of capital gains taxes on a share-for-share offer, but not on a cash-for-share offer; cash transactions must give the shareholder a higher pretax capital gain than a share transaction. However, while it is the case, in for example the U.S. and the U.K., that capital gains taxes can be postponed when new shares are received as consideration, this is not so in Sweden.

The choice of medium of exchange, if not tax motivated, may nevertheless have an impact on observed bid premia. A popular explanation is that of information signaling[13]. Issuing new shares may give a signal that the acquiring firm's management believes its own shares to be overvalued and the abnormal return for the acquiror may be less than if other media of exchange were used.

Using cash may also be associated with a low abnormal return. Such a reaction would be in line with Jensen's "free cash flow theory," where it is assumed that independent managers use excess cash to invest in low return acquisitions, instead of distributing them to the stock market. An alternative explanation for using cash would be the "trapped equity" model, discussed in section 4.1, where mature (low-q) companies engage in acquisitions to distribute money to the stock

[12] The announcements date were easily recognized in the prospect later distributed to the stock holders.

[13] See Harris & Raviv [42] for a survey.

market in a low taxed way (i.e., instead of paying dividends). One would expect to see a negative relationship between the use of cash and average-q.

A problem in testing these theories is that many tender offers are mixed, offering the shareholder a choice between, e.g., cash and new shares in the acquiror. A crude classification into three main groups was done: 1) *pure cash offers*; 2) *cash and shares*; and 3) combinations of *cash, shares, regular/convertibles debentures*, and *warrants*. These groups included 6, 10 and 9 tender offers, respectively.

The average abnormal return, at $t = +1$, was for targets in group 1), 12.1%. car_{+16} was only 5.6% (not significant at the five percent level). Targets in groups 2) and 3) obtained an abnormal return of 17.4% and 17.8%, at $t = +1$, respectively; car_{+16} was 20% and 20.8%, respectively.

Acquiring companies in group 1) had an $ar_{+1} = 6.3\%$, but a $car_{+16} = -30.5\%$, which is significant at the 5% level. For the over groups ar_{+1} and car_{+16} were 6.1 (2.6%) and 10% (2%), respectively. The difference between car_{+16} of group 1) and either of the two other groups was significant at the 5% level (but not between group 2) and 3)).

To test if the abnormal return differed among the three groups for the target firms we estimated the following model:

$$ar_{+1} = \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \epsilon \tag{5.4}$$

where $D_1 = 1$ if the tender offer belongs to group 1, 0 otherwise;
$D_2 = 1$ if group 2, 0 otherwise;
$D_3 = 1$ of group 3, 0 otherwise.

The result of the estimation was:

$$ar_{+1} = \underset{\substack{(1.795)\\(0.086)}}{0.121D_1} \; \underset{\substack{(3.329)\\(0.003)}}{+0.183D_2} \; \underset{\substack{(3.248)\\(0.004)}}{+0.17D_3} \tag{5.5}$$

Number in parentheses are t-values and levels of significance, respectively.

These results are in line with those for the target companies and suggest that cash acquisitions are connected with significantly lower abnormal returns for the acquiring company than other types of acquisitions. The acquiring companies in this group show a significantly negative cumulated abnormal return over a period of three to four weeks after $t = 0$. However, this result must be interpreted with great caution in this study since only four acquiring companies are included, two cash offers were done by non-stockmarket companies.

Due to the small number of involved companies these results are only suggestive, but one may note that they seem to support the free cash flow hypothesis. Cash acquisitions are, according to this hypothesis, done by cash rich companies, whose managements pursue their own agendas, on shareholders' expense.

The trapped-equity model was also tested by running a Probit estimation of a model where $y = 1$ if the acquisition was for cash and $y = 0$ otherwise; the independent variable was the average-q of the acquirors. The estimate was positive (and insignificant) which does not support the "trapped-equity" model.

5.4.2 Estimation of the Model of Growth and Acquisitions

Mervyn King's model of stock market valuation of companies and growth through acquisitions was discussed in section 3.3; here we will discuss how to test this theory.

The following equation, describing an equilibrium position where the marginal adjustment cost equals the marginal value of an additional dollar of acquisitions, was derived:

$$c_A = \frac{q}{1-\tau}\left(\frac{1-q^*}{q^*}\right) \tag{5.6}$$

An estimable counterpart to this equation can be derived by assuming that adjustment costs are linear in the value of assets acquired divided by the firm's market value qK:

$$c_A = \alpha_0 + \alpha_1(\frac{A}{qK}) \tag{5.7}$$

Combining 5.7 and 5.6 and solving for $\frac{A}{K}$ yields:

$$\frac{A}{K} = \frac{-\alpha_0}{\alpha_1}\cdot q + \frac{q^2}{\alpha_1(1-\tau)}\left(\frac{1}{q^*} - 1\right) \tag{5.8}$$

We rewrite this more compactly as:

$$\frac{A}{K} = \alpha_0^* \cdot q + \alpha_1^* Q_A^* \tag{5.9}$$

where $\alpha_0^* = \frac{-\alpha_0}{\alpha_1}$ and $Q_A^* = \frac{q^2}{\alpha_1(1-\tau)}\left(\frac{1}{q^*} - 1\right)$.

Equation (5.9) is an estimable equation, a variation is to use $\frac{A}{qK}$ as the independent variable; we will use both these variants that will be discussed more below.

To construct Q_A^* we need estimates of q and the tax variables θ, γ and τ (the dividend tax rate, the capital gains tax rate and the corporate income tax rate, respecitvely). The q-variable is the ratio of stock-market valuation to net worth. Net worth is calculated from the firms' balance-sheets by assuming that all liquid items (inventories, receivables, cash, bonds and stocks) are correctly valued. The problematic part is the real capital stock, i.e., machines and structures. The crux of the matter is to estimate real economic depreciation rates. Calculations by Södersten and Lindberg [103]) puts the rate of depreciation on machinery to 7.7% and on structures to 2.6%[14]. We proceeded by estimating for each firm the share of machinery and structures, respectively, in the capital stock and after that used the "perpetual inventory method" to calculate the replacement cost.

[14] These rates are lower than what is calculated for the U.S., 13.7% and 3.3% respectively, see Auerbach and Hines [12]

The starting point is the book value of the capital stocks at the end of 1966, the first year of available data. The evolution of the capital stock, year from year, is given by:

$$K_t = \frac{P_{t+1}}{P_t} K_t \Gamma + I_{t+1} \tag{5.10}$$

where $\Gamma = (1-\lambda)(1-\delta_M) + \lambda(1-\delta_S)$, and δ_M, δ_S and λ, are, respectively, the depreciation rate of machinery, the depreciation rate of structures and the proportion of structures of the book value of the real capital stock. P_t is a machine price index, an index of industrial structures was not available, so we assume that the structures have followed the same price path as machinery.

The estimated q values for the period 1970-1988 are given in table Appendix I.A in the appendix. These are value-weighted average-q values for 42 companies, for which we had data over the period 1966-1985, for the three last years this group had shrunk to 27. The very low values of q at the end of the seventies and values above one for peak acquisition years, 1986 and 1988, are especially noteworthy from this table.

Estimates of tax variables, θ, γ and τ, is taken from Södersten & Lindberg [103] and Södersten [102]; only values for certain years are given, see table I.A.2. The estimate for the capital gains rate is the statutory rate, assuming a minimum two years holding period. A correct rate would be to use an equivalent accrual rate, i.e., the a tax on capital gains as they accrue instead of on realization, which declines with the holding period and the rate of inflation rate.

If we now turn to the investment function we can go through a similar derivation as we did for the rate of acquisition, starting from the equilibrium condition:

$$c_I = \frac{1}{1-\tau}\left(\frac{q-q^*}{q^*}\right) \tag{5.11}$$

and assuming an adjustment cost function of the form:

$$c_I = \beta_0 + \beta_1\left(\frac{I}{qK}\right) \tag{5.12}$$

where I refers to *net*-investment. Combining with 5.11 and solving for $\frac{I}{K}$ yields an equation analogous to 5.9:

$$\frac{I}{K} = \beta_0^* \cdot q + \beta_1^* Q_I^* \tag{5.13}$$

where $\beta_0^* = \frac{-\beta_0}{\beta_1}$, $\beta_1^* = \frac{1}{\beta_1}$ and $Q_I^* = \frac{q}{1-\tau}\left(\frac{q}{q^*} - 1\right)$.

Equations (5.9) and (5.13) are the two main models to be estimated; referred to as *Model A* and *Model B* respectively. *Model A* comes in two variants, as was discussed above: *Model A(1)* is estimated by OLS methods from a sample of "surviving" firms, i.e., firms which existed over the period 1966-1988; *Model A(2)* is estimated from aggregate data covering all acquisition of stock market

Table 5.8: Results of OLS and Tobit estimations for the growth model.

	Constant	α_0^*	α_1^*	β_0^*	β_1^*	R^2	DW
Model A(1):		-0.0129	0.0284			0.58	1.69
		(−1.061)	(3.053)				
Model A(2):	-0.0127		0.0277			0.49	1.39
(OLS)	(−1.534)		(4.040)				
Model A(2):	-0.0093		0.0212				
(Tobit)	(−0.448)		(1.309)				
Model B:				0.1322	-0.0433	0.15	1.14
				(12.5)	(−5.18)		

Note: Numbers in parentheses are t-values.

firms; A is here the value of all acquired firms at the end of the last year before the acquisition and the denominator is the average stock market value for each year. *Model A(2)* is also estimated by the "Tobit" method (see [67]). The reason for this is that for some early years no acquisitions were undertaken by the sample firms, OLS may in such circumstances yield biased estimates. *Model B* (5.13) is estimated by OLS using the "survival" sample.

Results. The estimation results are shown in 5.8. The acquisition model on the aggregate data has the right sign on both coefficients, α_1^* is significant while α_0^* is not. This would indicate that adjustment cost goes to zero when there are no acquisitions, which seems reasonable. The model explains 58% of the variation in the aggregate merger series and autocorrelation does not appear a serious problem. *Model 1b*, the 'survival' sample, gives very similar coefficient estimates as the aggregate model, with less goodness of fit though. The 'Tobit' specification of the model also gives the correct signs but in this case both estimates are insignificant. Since both models have the same number of parameters one can judge the models based on the log-likelihood function, the lowest value being the best. This comparison comes out in favor of the 'Tobit' specification in this case. *Model 2*, the investment model, yields significant estimates but, alas, of the wrong sign, and has also a low goodness of fit.

These result should be interpreted with caution, since a danger of simultaneity bias of the estimates is apparent. A wider model should be tested which also tries to explain q. It is also clear that a structural break occurred at the beginning of the eighties, then the stock market started to take off. This coincided with changes in the tax law that increased the incentives for shareownership, but since booming stock markets was a worldwide phenomenon, especially after 1984, this is not the sole explanation. The results here do suggest, however, a role for the taxsystem in influencing the acquisition activity, in line with King's theory, but more detailed taxdata, and a more developed model are needed to establish this link with greater confidence.

5.5 Conclusions

This study's aim has been to describe how the tax system and other legal constraints may influence industrial firms' behavior, with respect to the incentives to merge, or acquire other firms.

The trend in the development of the tax system was, for quite some time, toward keeping high statutory tax rates, but simultaneously provide generous tax incentives that reduced the tax base. This has resulted in quite low effective average tax rates, a tendency common to several western countries (see section 13). While low effective average and marginal tax rates, may be considered as "good" from a static allocative efficiency viewpoint, since the marginal product of capital is (nearly) equal to the marginal user cost of capital, there may be other detrimental effects. For example, the basic asymmetry of the tax system may favor large concerns, which may be in a better position to take advantage of the provisions in the tax code in certain states of nature. The result may be lower expected average and marginal tax rates, and a lower cost of capital, compared to newer and smaller companies. The results presented in section 5.2 give some support to this point of view.

Larger companies, due to their expansive organizational structure, may be relatively slow to adapt to changing supply- and demand situations compared to smaller and more flexible companies. If this is true the rate of structural change and the rate of growth of the macro economy, may be hampered. On the other hand, it is probably the case that larger companies face a less severe information problem vis-à-vis external sources of finance, and are less financially constrained and will therefore always face lower capital costs. However, it is hard make a case that the state should exacerbate this asymmetry through the tax system.

During the later parts of the eighties, several countries undertook ambitious tax reforms, like for example the U.S. (1986) and Sweden (1990-91). A common trait of these tax reforms was a movement away from the high statutory tax rates – low tax base mold, toward lower rates and wider bases. Tenuous though the conclusions from this study are, this may be seen as a step toward reducing the inherent merger-bias in the former tax system as it has been discussed in this study.

In the next part of this thesis, international aspects the corporate taxtion are discussed, and the focus is on incentives for Swedish companies to undertake direct investments abroad. These incentives are furnished by the Swedish tax system, and the tax systems of the prospective host countries.

Appendix I.A Figures and Tables

Table I.A.1: Average q-value for 42 major companies, 1970-1988.

Year	Average q-values
1970	0.596
1971	0.622
1972	0.623
1973	0.484
1974	0.371
1975	0.406
1976	0.407
1977	0.344
1978	0.357
1979	0.305
1980	0.329
1981	0.491
1982	0.805
1983	0.841
1984	0.647
1985	0.790
1986	1.222
1987	1.002
1988	1.318

Source: FINDATA and own calculations.

Table I.A.2: Average marginal tax rates on dividends (θ), statutory tax rates on capital gains (γ), and effective corporate tax rates (τ).

Year	θ	γ	τ
1970	0.58	0.15	0.41
1980	0.64	0.258	0.349
1981	0.53	0.212	
1985	0.59	0.236	0.373

Source: Södersten & Lindberg, [103].

Figure I.A.1: Employment in acquired companies as a proportion of total industrial employment and aggregate value of acquired companies in proportion of total market value.

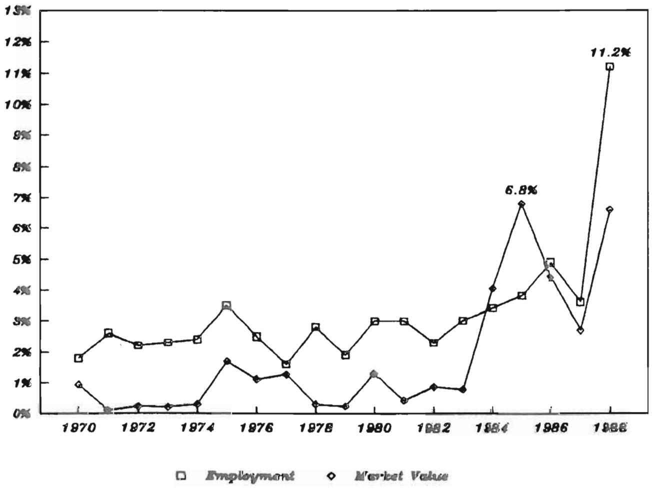


Figure I.A.2: Total number of mergers and acquisitions in Swedish Industry, 1946-88.

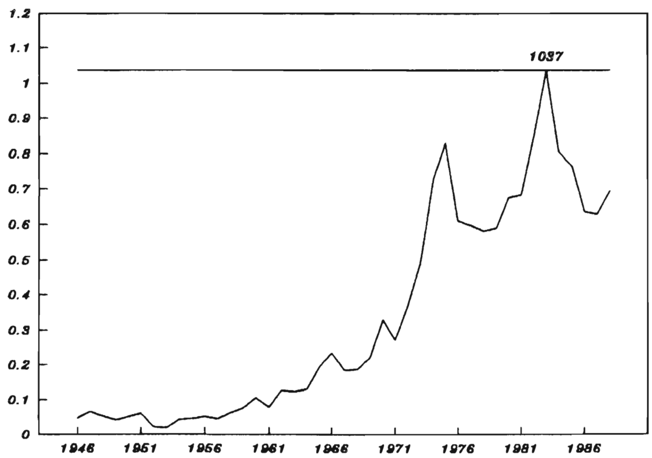
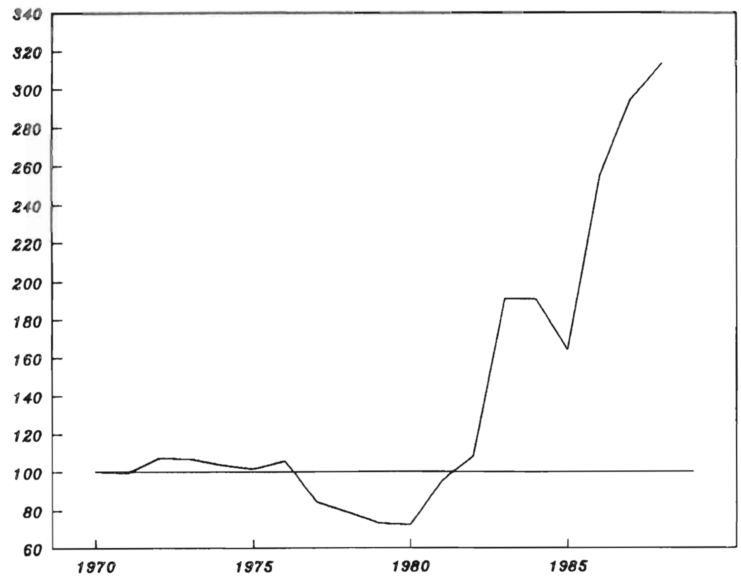


Figure I.A.3: Real stockmarket index, 1970=100.



Part II

The Effect of Capital Income Taxation on the Localization of Foreign Direct Investments

Chapter 6

Introduction: Part II

6.1 Background

During the last ten to fifteen years there has been a rapid expansion of capital markets in Sweden and throughout the world. There has also been a strong trend toward increased international integration and financial deregulation. These developments have raised questions of theoretical and practical concern about the proper design of national systems of capital taxation. The government's problem of designing an "optimal" tax system may have changed, i.e., the proper mix of different sources of tax revenue may be different from what it used to be. National governments may also become more dependent on each other, which in turn may force a convergence between the sizes of the public sectors in the main industrial countries. These considerations suggest that tax coordination, or tax harmonization, will become important issues on governments' agendas in the future.

The effect of taxation of capital that is used in productive activities, depends on the statutory rate of taxation and the tax base to which this rate is applied. It is the effective tax rate on the last invested dollar, or the effective marginal tax rate, which determines firms' cost of capital and the efficiency feature of the system of capital taxation. This means that one has to consider the effects of tax incentives, such as accelerated depreciation allowances, as well as statutory tax rates when one compares tax systems in various countries.

This study discusses tax-rules toward foreign source income and the spillover effects of one country's tax policy on other countries. Examples of interesting questions in this context are: Will tax incentives to private savings increase the national capital stock or will (all or most of) the extra savings flow abroad? Does an increased corporate tax rate result in higher effective taxation on capital or will the tax burden be shifted over to labor and land? How should the rules for taxing foreign source income be designed to achieve an efficient international allocation of capital? Will the scope for an independent tax policy diminish, and will the need for tax coordination increase as financial integration continues?

The question on which this study focuses is: Have the localizations of direct investments by Swedish multinationals been influenced by differences in effective tax rates among various host countries? This question is the object of the empirical study presented in section 13 below. To test whether the localization of direct investments is sensitive to variations in effective tax rates in various host countries, one needs a good theoretical model that can yield testable hypotheses. The modeling problem is quite complex; two countries' tax systems are involved, with different rules for calculating taxable income, investment incentive schemes and tax rates. The tax code's treatment of foreign source income is also quite complex. All these factors have to be considered, since they may influence the profitability of foreign investments and the decision to expand at home or abroad.

The rules concerning foreign source income taxation could ideally be designed so that the tax wedge on an investment abroad is the same as if it was done at home. In this case, the pre tax rates of return abroad and at home will determine the localization of investments. It will be argued below that this is a situation which is consistent with allocative efficiency, and may be seen as an ideal to strive to. The actual situation is far more complex, and a secondary objective of this study is to describe the decision problem facing a government when it is designing its tax policy. Of particular importance is the strategic aspect that a tax rate set by one government may trigger a respons by another government, which is also trying to maximize its national income, or welfare. We will discuss the incentives involved in such a tax-game situation, with some simple examples, and try to explain the actually observed behavior, based on that analysis.

6.2 Outline of the Study

We start the analysis of the connection between capital income taxation and foreign direct investment in subsection 7.1, where welfare aspects of capital income taxation in an open economy are dicussed. The welfare analysis is followed up in section 7 by a discussion of theoretical principle for taxing foreign source income.

In section 8 we extend the analysis to consider the question of how governments, acting in their own national advantage, will set tax rates, when each country is large and thus is able to influence the world interest rate. This analysis is developed further in section 9, where we assume that governments compete, not only with tax rates, but also by granting tax incentives to firms based in their own country.

In section 10, the focus is shifted from the issue of tax policy to an analysis of how taxes affect the individual firm's, or subsidiary's, cost of capital and financing behavior; how this behavior influence the condition for the attainment of neutrality with respect to the localization of foreign direct investments is also discussed. Section 11 discusses the effect of specific tax incentives, such as accelerated depreciation deductions, on the subsidiaries' cost of capital, and the effective tax rates they face on direct investments in different jurisdictions.

In section 13 the theoretical aspects are confronted with empirical facts to test whether the Swedish tax policy has the beneficial feature of "export neutrality". This concept implies that the localization decision of foreign operations is influenced solely by real factors and not by tax consideration. The legal approach to these problems does not always conform to economists preferred solutions; section 12 contains a discussion of the considerations that have shaped the tax law concerning foreign income taxation.

The study concludes, in section 14, by a study of the dividend payout behavior of Swedish multinationals.

Chapter 7

Capital Income Taxation in an Open Economy

7.1 Welfare Aspects of Taxing Interest Income

In this section we will consider some basic welfare aspects of capital income taxation, with free international capital mobility. The analysis is purely expositional and intended to highlight the most important issues in taxation of internationally mobile capital. To keep things simple we will assume that there is no uncertainty and that all foreign investments are performed by one representative household which buy foreign bonds. All capital flows are in the nature of portfolio investments and the income generated is interest income that will be subject to a tax.

To set the stage, we start from a simplified version of the canonical model used by most analysts in this field, see e.g., [85]. A single representative household starts out in the first period with an endowment of a consumption good (y) which may be consumed directly (C) or saved (S) to old age, i.e., the second period. Saving can take the form of domestic bonds or foreign bonds (Z). It is assumed that no capital import takes place and, consequently, the aggregate saving in domestic bonds equals the domestic capital stock (K). Furthermore, we abstract from labor supply decisions.

The representative firm produces a consumption good (X) subject to a technological constraint represented by a, neoclassical, constant-returns-to scale production function

$$X = F(K) \tag{7.1}$$

The firm is assumed to be a price taker in output- input-markets, and it therefore takes the output price, p, and the cost of capital, r, as given. The cost of capital is equal to the firm's discount rate, and its maximization problem is

$$\max[pF(K_t) - rK_t](1+r)^{-1} \tag{7.2}$$

i.e., the firm maximizes the present value of second period profits. Capital does not depreciate and is returned to the household after it is used in the production process.

The government is assumed to operate in the second period only when it taxes interest income, both from domestic and foreign bonds, and uses the proceeds to buy G units of a public good. A common assumption is that the utility is strongly separable in G; in this case the household's optimization problem is:

$$\max U(C_1, C_2, G) = u(C_1, C_2) + \nu(G) \tag{7.3}$$

The household's first and second period budget constraints are:

$$\begin{aligned} C_1 + K + Z &= y \\ C_2 &= K(1 + r(1-t)) + Z(1 + r^*(1-t)) \end{aligned}$$

where r^* is the rate of interest on foreign bonds, we neglect foreign taxes on interest income for now. Free capital mobility and arbitrage possibilities will ensure that: $r = r^*$. We can therefore define $S = K + Z$, which is aggregate savings, and write the following present value budget constraint for the household:

$$C_1 + P_2^t C_2 = y \tag{7.4}$$

where $P_2^t = (1 + (1-t)r)^{-1}$. The household takes both G and t as given and maximizes (7.3) subject to (7.4). The maximization process yields demand functions for first and second period consumption

$$C_1^* = C_1(P_2^t, y) \tag{7.5}$$

$$C_2^* = C_2(P_2^t, y) \tag{7.6}$$

and also a saving supply function

$$S^* = S(P_2^t, y) \tag{7.7}$$

defined as $S^* = y - C^*$.
Substituting the demand functions into the direct utility function yields an indirect utility function of the household:

$$V(P_2^t, y; G) = V(P_2^t, y) + \nu(G) \tag{7.8}$$

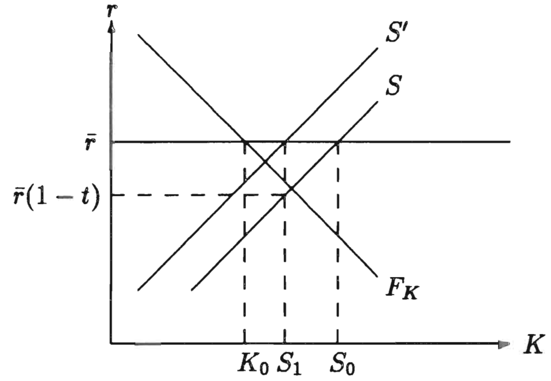
The resource constraints for the whole economy, in each period, are:

$$y = C_1 + K + Z \tag{7.9}$$

and, using 7.1 for period 2:

$$F(K) + (1 + r)Z + K = C_2 + G \tag{7.10}$$

Figure 7.1: The effect of a tax on interest income on domestic residents.



The optimal tax policy is achieved by choosing the tax rate to maximize (7.8) subject to (7.10). The government controls aggregate capital exports, Z, indirectly by affecting total savings, S, and domestic investments, K, through its choice of interest tax rate. Z is determined as a residual between total savings and domestic investment.

Figure 7.1 illustrates the above point, where it is assumed that the country is a capital exporter. An interest tax is introduced which shifts the savings curve upwards. Total savings decline, but the domestic firm can still finance its capital stock at the interest rate, $\bar{r}$. Total exports, which is the distance $Z = (S - K_0)$, must therefore fall.

Taxation of capital income has in general two sides. On the one hand, to the extent that it is applied to income from existing capital, it its non-distortionary and it is efficient to tax all the rent away. On the other hand, taxation of the returns to current and future investment will lower savings, and will work as a disincentive and entail deadweight losses. In the present example only the latter effect is at hand and the tax considered is thus distortionary. A tax on initial endowments would have been non-distortionary, but is usually non-feasible. Because a distortionary tax is used, the resulting equilibrium cannot be Pareto-efficient and the optimal taxation analysis has to be pursued in a second-best context. Given the second-best context one may analyze the effects of different rules for taking into account that, at least, two countries tax jurisdictions tax the same income. We call these rules "principles of international taxation."

7.2 Principles of International Taxation

Two main principles of taxing foreign source income exist: the ***residence*** or ***worldwide*** principle and the ***source*** or ***territorial*** principle. According to the residence principle the home country taxes its residents on their worldwide income, i.e., irrespective of where it is earned. If the source principle is followed the government only taxes income inside its own borders, but irrespective of the nationality of the income recipient. In reality governments use a mixture of both principles, for example they may tax interest income accrued inside its own borders on a territorial basis, but also tax its own residents on their worldwide income.

1. To analyze the consequences of these different taxation principles we start by assuming that there exist two countries who are integrated via a common capital market[1]. r is interest income and t the tax rate applied to that income, stars denote foreign country variables. Both countries apply the resident principle to their own residents but the territorial principle vis-à-vis foreigners. Tax rates are chosen to solve maximization problems like the one outlined in the last section. However, the setting of tax rates in each country is interdependent through the following equilibrium conditions in the capital market (observe that corner solutions are ruled out in the discussion below):

$$\begin{aligned}(1-t)(1-t^*)r^* &= (1-t)r \qquad \text{home country taxation}\\ \Longrightarrow \quad (1-t^*)r^* &= r\\[1em] (1-t^*)(1-t)r &= (1-t^*)r^* \qquad \text{host country taxation}\\ \Longrightarrow \quad (1-t)r &= r^*\end{aligned}$$

The first and third line says that investors resident in either country demand the same net return on a home as on a foreign investment. Combining these equations, one gets the following condition:

$$(1-t)(1-t^*) = 1$$

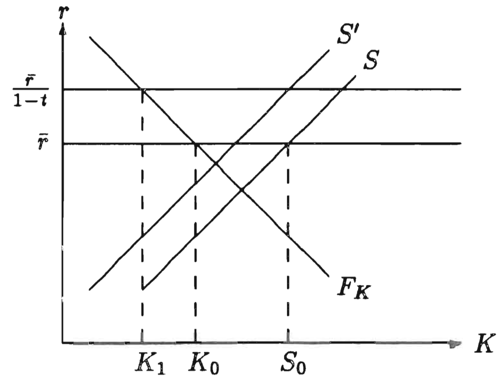
If tax rates are assumed to be nonnegative, this condition will only hold if, $t = t^* = 0$. Thus, with perfect capital mobility, and the assumed taxation methods, the only equilibrium is no capital income taxes.

2. We now assume that each country adheres strictly to the residence principle, and thus do not tax foreigners' income within their borders:

$$\begin{aligned}(1-t)r^* &= (1-t)r\\ r^* &= r\end{aligned}$$

[1] The presentation here follows Razin & Sadka [86] closely.

Figure 7.2: The effect of a tax on all interest income within a single territory.



Pre-tax interest-rates are equalized between countries, which means that investors are indifferent about which country to invest in. This means that the marginal products of capital in each country are equalized and therefore production efficiency is assured. It should be noted that this case is consistent with positive tax rates in each country. This is the case illustrated in 7.1, where $t^* = 0$.

3. The third case is if both countries stick to the territorial principle:

$$(1 - t^*)r^* = (1 - t)r$$

With the territorial principle post-tax interest rates are equalized which means that intertemporal marginal rates of substitution are equated across countries and the allocation of savings is therefore efficient. However, unless $t^* = t$, marginal products of capital will not be equal and the allocation of the capital stock is not efficient. This principle is also consistent with positive tax rate in equilibrium. The effect on the domestic capital stock is negative in this case, while aggregate savings are unaffected. This is illustrated in figure 7.2.

These examples show that the two main principles of international taxation, if strictly enforced, are both consistent with positive tax rates. However, mixtures of these methods will generally not be consistent in that respect. Given that we have to use either method the question boils down to a choice between achieving an optimal allocation of investment or savings, or put another way: Will it matter whether it is production or consumption decisions that are distorted in a single country?

Diamond–Mirrlees [30] provided an answer, namely that it will never be optimal to distort production decisions.[2] With their help we may thus conclude that

[2] This proposition is called the "Aggregate efficiency theorem".

the only taxation method consonant with production efficiency is the residence principle.

Chapter 8

A Non-Cooperative Tax-setting Game

8.1 Optimal Tax Rules in the Large Country Case

In this section we will discuss the issue of strategic tax-rate setting on income from international capital flows. Following a tradition in this literature (e.g. Gordon [37] and Bond & Samuelsson [20]), we consider two countries, one being a capital exporter and the other capital importer.[1] The capital flow is in this, one period, model thus uni-directional. Both countries may, however, try to tax this income flow. We will assume that it is possible for each country to distinguish precisely this income flow, from other, domestic, sources of income. The question we will try to answer is how each country's government is likely to act, when they recognize that the tax revenue they can obtain depends on the tax rate set by the other country. We will assume that this "tax-game" is played non-cooperatively. We also, in this section, assume that the maximands are the respective country's national income, not a social welfare function. The issue of public good financing through distortionary taxation is thus not explicitly analyzed. The rationale for taxing capital income is to use monopoly power to influence the interest rate in a favorable direction. It is thus assumed that both countries are "large".

8.1.1 The Exporting Country's Tax Incentives

Denoting the exporting country's production function, total savings, capital export and tax rate as: $F(K)$, $\bar{K}$, Z and t; the counterparts for the importing country are identified by a star. It is assumed that both production functions

[1] The presentation in this section follows [20] closely.

exhibits positive but decreasing marginal products. With no taxes, but free capital mobility, the condition for capital market equilibrium is:

$$F_z(\bar{K} - Z) = F_z^*(\bar{K}^* + Z) \tag{8.1}$$

i.e., the marginal products of capital are equalized between countries through capital flows. This condition implies, of course, an efficient world allocation of capital. We now assume that the exporting country imposes a tax on the return on foreign investments, while the importing country abstains from taxing the same income. The equilibrium condition is now

$$F_z(\bar{K} - Z) = F_z^*(\bar{K}^* + Z)(1 - t) \tag{8.2}$$

The gross marginal products are no longer equal and the allocation of capital is no longer efficient. In the terminology of trade theory, what has happened is that the exporting country has managed to restrict trade in capital and, consequently, improved its term-of-trade. That is, the price of capital goods has gone up and the rate of return to capital (the world interest rate) has decreased. At some t the condition (8.2) is only fulfilled as a corner solution, i.e., where $Z = 0$ and the capital export tax is then referred to as *prohibitive*, no capital outflow and no tax revenue to the government results at his point. The existence of a positive tax rate with $Z > 0$ depends on the shapes of the two production functions. If such an interior solution does exist, the exporting country will choose the tax rate that maximize national income. The maximization problem it faces is

$$\max_{\{t\}} Y = F(\bar{K} - Z(t)) + F_z^*(\bar{K}^* + Z(t)) \cdot Z(t) \tag{8.3}$$

National income is the sum of factor payments (from home and abroad) and tax revenue. Differentiating (8.3) totally and rearranging gives:

$$dY = [(1 - 1/\epsilon^*)F_z^* - F_z]\, dZ \tag{8.4}$$

where $\epsilon^* = -\frac{F_Z^*}{F_{ZZ}^* \cdot Z}$, the elasticity of capital import demand.
Substituting from (8.2) yields:

$$dY = [(t - 1/\epsilon^*)F_z^*] dZ \tag{8.5}$$

From (8.5) we can see that the optimal tax rate for the capital exporting country is $t_{opt} = 1/\epsilon^*$, which is a familiar result from optimal tariff theory. If the capital import demand curve facing the exporting country is perfectly elastic the optimal tax rate is zero, (i.e. $\lim_{\epsilon \to \infty} t_{opt} = 0$).

8.1.2 The Importing Country's Tax Incentives

Turning to the importing country, we assume that it is alone in taxing the income from international capital flows. It maximizes its national income plus tax revenue:

$$Y^* = F^*(\bar{K}^* + Z) - (1 - t^*)F_z^*[\bar{K}^* + Z] \cdot Z \tag{8.6}$$

We first differentiate equation (8.2) totally, which yields:

$$-F_{zz} d\,Z = F_{zz}^*(1 - t^*)\,d\,Z + F_z^*\,d\,(1 - t^*) \tag{8.7}$$

Now, differentiate (8.6) totally and substitute from (8.7) and (8.2):

$$dY^* = \left[\left(\frac{1}{\epsilon} - \frac{t^*}{1 - t^*}\right) F_z\right] d\,Z \tag{8.8}$$

If $t^* = 0$ initially a small increase in t^*, will increase Y^*. The optimal tax rate: $t^*_{opt} = \frac{1}{\epsilon+1}$. If the capital export supply is completely inelastic it is optimal to tax all income away, while the optimal tax rate approaches zero as the elasticity increases.

8.2 Double taxation: Deduction method

In this section we assume that both countries tax the same income. The exporting country grants a deduction for foreign taxes paid, which means that the home and host country tax revenue will be, respectively:

$$T = F^*(1 - t^*)t, \qquad T^* = F^*t^*$$

Worldwide private sector income is

$$\Pi = F(K - Z) + F^*(K^* + Z) - T - T^* \tag{8.9}$$

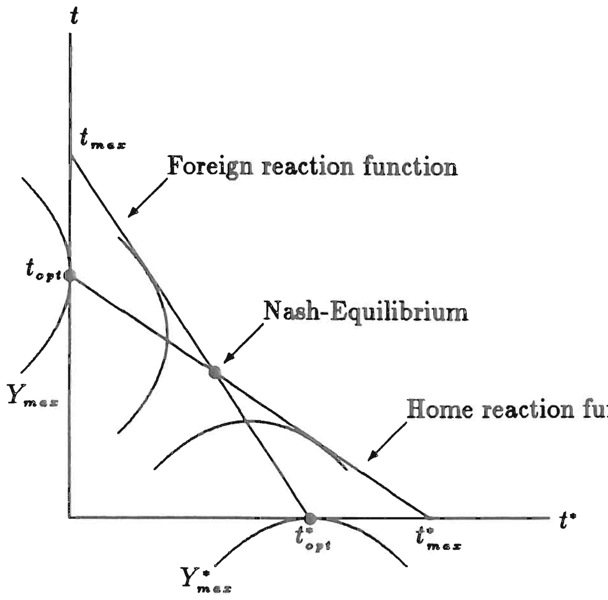
the capital market equilibrium condition is:

$$F_Z(\bar{K} - Z) = F_z^*(\bar{K} + Z)(1 - t)(1 - t^*) \tag{8.10}$$

The respective government objective functions are:

$$\begin{aligned} Y &= F(K - \bar{Z}(t, t^*) + (1 - t^*)F_z^*(\bar{K}^* + Z(t, t^*) \cdot Z(t, t^*) && (8.11) \\ Y^* &= F^*(\bar{K} + Z(t, t^*)) - (1 - t^*)F_z^*(\bar{K}^* + Z(t, t^*)) \cdot Z(t, t^*) && (8.12) \end{aligned}$$

Figure 8.1: Nash equilibrium with tax deductions.



The derivation of the formulas for the total differentials of (8.11) and (8.12) is given by Bond & Samuelson [20] and they establish the same optimal tax rate as we have done above, but in the current case they are conditional on the choice of tax rate by the other country. The Nash-equilibrium is illustrated graphically figure 8.1. The exporting country's welfare, i.e., national income, increases as t^* decreases and reaches an optimum at t_{opt}, (the point labeled Y_{max}). The importing country's welfare optimum is at t^*_{opt}, where Y^* is maximized. A pair of reaction functions is traced out by connecting the maximum points on each iso-welfare curve; the intersection of the reaction functions gives the Nash equilibrium.

8.3 A Numerical Example

To illustrate the above analysis we will give a numerical example. The production functions are assumed to be:

$$F = K^{0.25} \qquad \text{and} \qquad F^* = K^{*\,0.25} \tag{8.13}$$

At the initial equilibrium we assume that: $\bar{K} = 2, \bar{K}^* = 1, t = t^* = 0$ and $Z = 0$. When trade in capital starts we get the values for Y, Y^* and Z reported in table 8.3. The numbers show that the optimal tax rates (columns 3 and 4) for each country, conditional on the other abstaining from taxation, improves national incomes compared with the free capital mobility (zero-tax)

Table 8.1: Numerical example for different tax rates.

	$t = t^* = 0$	prohibitive tax rates	$t = t_{opt}$, $t^* = 0$	$t^* = t^*_{opt}$ $t = 0$	$t = 0.145$, $t^* = 0.095$
Y	1.1989	1.1892	1.2035	1.1935	1.1980
Y^*	1.1045	1	1.0063	1.0178	1.0093
Z	0.5	0	0.3027	0.3497	0.2469

case. The free mobility case (first column) implies a capital flow that equalizes the capital stocks located in each country, which follows from the fact that we assumed the same technology in both countries. No capital flow (second column) is clearly inferior to all other alternatives, but the Nash-equilibrium (fifth column) is Pareto-dominated by free-mobility.

8.3.1 Tax Credit Method

A tax credit method with an upper limit equal to the home country taxes, implies that the effective tax rate is: (t, t^*). The equilibrium condition in this case becomes:

$$F_z(K - Z) = F_z^*(K^* + Z)(1 - \max(t, t^*)) \tag{8.14}$$

To study the incentives under this system, we start with the importing country and assume initially that it is alone in taxing the income flow in question. It is obvious that it will choose the t^*_{opt}-rate derived above, since $t = 0$. If the exporting country now starts to increase its tax rate from zero, we may observe from (8.14) that the equilibrium condition is unchanged, as long as $0 \leq t \leq t^*$. Since Z is unchanged when the exporting country increases t, the importing country has no incentive to change its tax rate as long as $t \leq t^*_{opt}$. However, if $t > t^*_{opt}$ the importing country will always have an incentive to match every increase by the exporting country so that $t^* = t$, whenever $t > t^*_{opt}$.

In the case of the exporting country, we may start by observing that when $t \leq t^*$, the exporting country receives no tax revenue since the exporter receives a credit of the full amount of the domestic tax. To raise some revenue it must apply a higher tax rate than the importing country. Now, since the importing country will match any tax increase by the exporting country the process will continue until $t = t$, this is the Nash-equilibrium in the tax credit system.

We may now compare the Nash-equilibria of both systems. We have already concluded that the no trade equilibrium, as would result under the credit system, is inferior to the Nash-equilibrium under the deduction system. It follows that in this non-cooperative framework, both countries would prefer the deduction system.

8.4 The Small Country Case

The foregoing analysis pertained to two large countries or regions, between which capital could move freely. This could, for example, be the case of the U.S. vs. Europe in the future (neglecting other areas of the world). Since tax coordination is not explicit, even within Europe, it is natural to assume that most countries are small, i.e., facing a given rate of return. This case is explored by Gordon [38], and the discussion below rests on his analysis.

It is assumed that the home country is a capital exporter, and uses a resident system with a foreign tax credit. This means that capital is exported until, in capital market equilibrium, $F_K(1-t) = F_K^*(1-\max(t,t^*))$. The world interest rate is, r, which is the domestic residents opportunity rate of return (we assume no personal tax on savings). Domestic firms must therefore promise a return before home tax of $F_K(1-t) = r$; the net receipts from capital exports are, per unit of exports, $F_z(1-t^*)$. Capital exports are small compared with the home capital stock, K, and the home country's total income may therefore be written as

$$Y = F(K-Z) + F_z^*(1-t^*)\cdot Z \tag{8.15}$$

The government is assumed to maximize a social welfare function of the type given by equation (7.8).

If we assume that $t < t^*$ initially, and consider the consequences of an increase in t. r is in this case fixed at $F_K^*(1-t^*)$, F_K must therefore increase, i.e., K drops or capital exports increase. The change in income due to the increase in capital exports is

$$dY = [F_z^*(1-t^*) - F_z]dZ < 0 \tag{8.16}$$

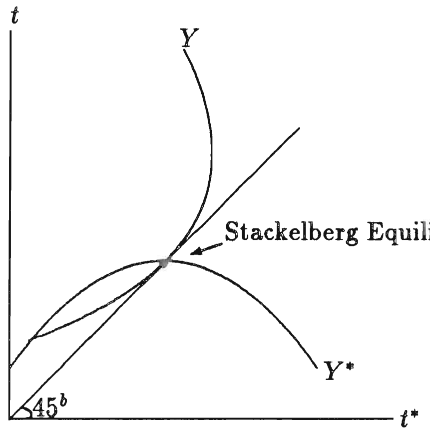
this follows from the definition of capital market equilibrium given above. The conclusion is that welfare falls as t rises as long as $t < t^*$.

The other possibility is that $t > t^*$, initially. If t is increased, the after-tax rate of return to savers will decline, reducing total savings and capital exports, but the domestic capital stock will be unchanged. The change in welfare may be positive initially if the deadweight losses from the increased taxation of savings are outweighed by the utility of the increased public good provision.

The capital importing country faces a similar problem. Capital is imported until $F_K^*(1-\max(t,t^*)) = r$. If $t > t^*$, initially, a small increase in t^* will not change the equilibrium, i.e., no capital flows result. An increase in the tax rate will therefore increase tax revenue and the welfare of the importing country. Consequently, it will keep on raising the tax rate at least until $t^* = t$. Raising t^* above t will, however, start an incipient outflow that must cause a decrease in welfare since $F_K > r$. The capital importing country will therefore set $t^* = t$.

Comparing the strategies for both countries, Gordon concludes that no Nash-equilibrium exist, since the capital exporting country will try to avoid setting the same tax rate as the importing country.

Figure 8.2: Stackelberg equilibrium; capital exporter is leader.



Stackelberg Equilibrium. The historical development of capital income taxes[2] reveals that changes in tax rates often take place at the same time in most of the major countries. This coordination is not explicit, but suggests instead that one or a few countries are leaders in deciding the level of capital taxation. During times with capital controls on portfolio investments, this will probably be most noticeable for corporate income taxation. A relevant model to consider in this context is therefore the Stackelberg leader-follower model.

In the Stackelberg model the leader has the first move and he chooses a tax rate, taking into account how the follower will react. If the capital exporter is the leader, he knows that the capital importer will match the tax rate he sets. He will therefore choose a point in $\{t, t^*\}$-space, such that the tax rates are equal and he reaches his highest welfare indifference curve. This is illustrated in figure 8.2, where the leader's indifference curve is tangent to the 45° line. It is clear from this figure that points in the "lens", to the southwest of the Stackelberg equilibrium, Pareto-dominates the equilibrium point. Therefore, there will be gains to tax coordination.

If the capital importer is the leader the analysis becomes more complicated. The followers will not match the leader in this case, as was described above. One may see no response at all, over some large interval of change in the leaders tax rate, and sudden discrete jumps from one equilibrium to another (see [38]). Empirically, continuous change, not discrete jumps seems to have been the most common occurrences. Before concluding that a capital exporting country, e.g., the U.S., has been the leader, one should be reminded that the above analysis is for a residence system with foreign tax credits.

[2] See section 13 for details.

Chapter 9

Taxation of Income from Direct Investment

In this section we will assume that portfolio investments are prohibited, but domestic citizens can invest abroad through direct investments by companies, i.e., multinational companies (MNCs). The reason for moving to this scenario from the framework of portfolio investments in foreign bonds, as in section 7, is that it may be a reasonable approximation to the actual situation during periods with substantial restrictions on portfolio investments flows. The rationale for capital controls on individuals' investments, is that it is quite easy, and safe, for individuals to avoid paying taxes on foreign source income. Large corporations may be easier to monitor, and made to pay tax, with the possible cooperation of the host countries' governments. Therefore, individuals may be forced to invest abroad through MNCs.

In this case the personal tax rates on capital income affect capital flows only indirectly, while the corporate taxation will have a direct effect on capital flows between countries. The main purpose of this section is to investigate how changes in tax parameters affect capital movements under different taxation principles. The focus will mainly be on the resident principle, but the source principle is briefly discussed first. Another purpose of this section is to investigate the optimal tax policies of both countries involved and to address the positive question of which tax principle a particular country is most likely to adopt.

The theoretical literature (e.g.[20]) has focused on the effects of tax rate setting; which was anlysed in section 8.1. The issue of tax incentives which reduces the effective tax rates has not been incorporated within the type of models analyzed above. The current section tries to extend these models in that direction.

9.1 Territorial Taxation

As a starting point, consider the decision of a ***single*** MNC that has decided its total investment budget (K) and in a second step should decide how to allocate this budget across tax jurisdictions. Without taxation the MNC will invest in two separate geographical markets until the marginal products net of depreciation are equal:

$$F_K - \delta = F_K^* - \delta^* \tag{9.1}$$

where $\delta (= \delta^*)$ is the true, geometric, rate of depreciation. Taxes are paid on profits after deduction for depreciation. With capital taxation the MNC will maximize:

$$(1-\tau)(F(K) - \delta K) \tag{9.2}$$

where τ is the corporate tax rate. Investments in different tax jurisdictions are adjusted so that:

$$(1-\tau)(F_K - \delta) = (1-\tau^*)(F_K^* - \delta) \tag{9.3}$$

However, deductions for true economic depreciation are never accomplished in reality, although reasonable rules of thumb are used in some circumstances. More important, though, is the habit of governments of granting depreciation deductions for tax purposes in excess of true economic depreciation. It may, for example, take the form of more than 100% deductions over the usable life of the equipment, or accelerated write-off, e.g., 5 years instead of a (true) lifetime of 10 years. In all these cases the discounted present value of the tax deductions exceeds that of true depreciation deductions. We will model tax depreciation by multiplying, δ, by a parameter, $\alpha \geq 0$, which shows the degree of acceleration of the tax deductions. The equilibrium condition now becomes:

$$(1-\tau)(F_K - \alpha\delta) = (1-\tau^*)(F_K^* - \alpha^*\delta) \tag{9.4}$$

This is the basic equilibrium condition that would hold true if both countries applied a territorial system of taxation, i.e., taxing only income earned within its own borders and exempting foreign source income. The gross marginal products are not equal unless both $\alpha = \alpha^*$ and $\tau = \tau^*$.

9.2 Worldwide Taxation

9.2.1 Deduction Method

We assume that companies pay tax at home on their worldwide income, i.e., the home country uses the residence principle, but may *deduct* taxes paid abroad on the foreign part of their income. Home taxes due are:

$$T = \tau \cdot [F(K - Z) + F^*(Z) - \alpha\delta K - T^*] \tag{9.5}$$

where T^* are foreign taxes, defined as:

$$T^* = \tau^* \cdot [F^*(Z) - \alpha^*\delta Z] \tag{9.6}$$

The MNC maximizes worldwide net profits:

$$\Pi = F(K - Z) + F^*(Z) - \delta K - (T + T^*) \tag{9.7}$$

Differentiating (9.7) with respect to Z, (holding K constant), yields the following first-order condition:

$$\begin{aligned}\Pi_z &= -(1-\tau)F_z + (1-\tau)F_z^* + \tau^*\alpha^*\delta - \\ &\quad \tau[(1-\tau^*)F_z^* + \tau^*\alpha^*\delta] = 0\end{aligned} \tag{9.8}$$

(9.8) may be rearranged to show the MNC:s equilibrium condition:

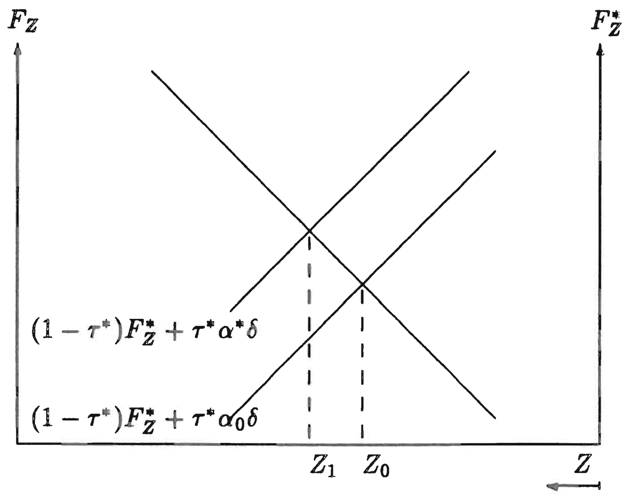
$$F_z = (1 - \tau^*)F_z^* + \tau^*\alpha^*\delta \tag{9.9}$$

From (9.9) the optimal capital export, Z^* can be solved for. One may also observe that no home tax parameters influence the localization decision, we have "capital-export neutrality." However, the host country's tax rate and tax incentives do influence this decision and we do not have "capital-import neutrality."

The analysis above may also be given a graphic illustration, as in figure 9.1. The length of the "box" is the fixed capital stock and the intersection of the two demand curves for capital, the marginal product of capital curves, determines its division between the two markets. Capital export, Z, is measured from right to left and the home demand curve slopes downward from left to right (the host country counterpart thus in the opposite direction). An increase in α^* will shift the host country curve upwards, raising the equilibrium marginal product and shifting more capital toward the host country.

We would like to get a measure of how sensitive Z is to changes in the tax parameters. The equilibrium condition (9.9) must be satisfied for each parameter

Figure 9.1: The effect on capital exports, Z, of an increase in the host country's depreciation allowances, α^*, ($\alpha^* > \alpha_0$).



constellation; if Z can be viewed as an implicit function of these parameters we can solve for the derivatives $\frac{dZ}{d\tau^*}$ and $\frac{dZ}{d\alpha^*}$. This can be done if the conditions for the implicit function theorem are fulfilled (see [23]). We define the following function:

$$\phi(Z) = F_z - (1-\tau^*)F_z^* - \tau\alpha\delta = 0 \tag{9.10}$$

Differenting $\phi(Z)$ yields the first order condition: $F_{zz} - (1-\tau^*)F_{zz}^* = 0$. If this condition holds at some point in the domain of $\phi(Z)$ the implicit function theorem is not valid in the neighborhood of this point. To go on we must therefore assume that the interval of interest is not in such a neighborhood. In the numerical example we assume that $F(\cdot) = F^*(\cdot)$, and at the laissez-faire optimum the capital stock will be divided equally between the two countries. It follows that the above condition is satisfied exactly at that point. However, it will be shown that the tax incentives will work to restrict capital flows and the relevant domain will be below the laissez-faire point. Over the relevant domain $\phi(Z)$ is a one-to-one function.

Under the above assumptions we proceed by differentiating (9.9) totally. Holding τ^* and δ^* constant, dividing the differential by $d\alpha^*$ and solving for $\frac{dZ}{d\alpha^*}$, yields:

$$\frac{dZ}{d\alpha^*} = \frac{\tau^*\delta}{\Gamma} \tag{9.11}$$

where $\Gamma = F_{zz} - (1-\tau^*)F^*_{zz}$. Similarly, we get:

$$\frac{dZ}{d\tau^*} = \frac{-(F^*_z - \alpha^*\delta)}{\Gamma} \tag{9.12}$$

With the assumptions on $F(\cdot)$ and $F^*(\cdot)$, it can be shown that Γ is positive for $Z \in [0, 0.5)$. Therefore, equation (9.11) will be positive and, as long as the term in parentheses in the numerator is positive, equation (9.12) is negative.

9.2.2 Credit Method

In the case of the credit method it is important to specify carefully the sources of tax revenue in both countries. The home country taxes income earned by capital located at home and in the host country, but the latter are also taxed by the host country. To avoid double taxation, the home country grants a credit for the host country taxes paid, up to the amount paid at home on the same income. Notice that we don't assume that the credit can be extended to the taxes paid on income from home-capital, and thus that it is possible for the tax authorities to distinguish tax flows originating from different sources.

We have the following tax definitions:

$T(h)$	$= \tau(F(K-Z) - \alpha\delta(K-Z))$	(home taxes on home income)
T^*	$= \tau^*(F^*(Z) - \alpha^*\delta Z)$	(host taxes on host income)
$T^*(h)$	$= \tau(F^*(Z) - \alpha\delta Z)$	(home taxes on host income)
$\Delta T^*(h)$	$= \max[T^*(h) - T^*, 0]$	(additional home taxes on host income)
$\bar{T}(h)$	$= T(h) + \Delta T^*(h)$	(total home taxes collected)
$\bar{T}$	$= \bar{T}(h) + T^*$	(total taxes paid by MNC)

One can distinguish between two "regimes": (1) $T^* < T^*(h)$, which implies that $\bar{T} = T(h) + T^*(h)$, and (2) $T^* > T^*(h)$, with total taxes paid by the MNC equal to: $T(h) + T^*$. Observe here that in regime (1) only home taxes are relevant while in the second regime both home and host country tax parameters will influence the localization of capital. To derive the equilibrium allocation of capital we first define total profits for the MNC in both regimes:

Regime (1):

$$\Pi = F(K-Z) + F^*(Z) - \delta K - (T(h) + T^*(h)) \tag{9.13}$$

Regime (2):

$$\Pi = F(K-Z) + F^*(Z) - \delta K - (T(h) + T^*) \tag{9.14}$$

The equilibrium conditions are, respectively: (1) $F_z(K-Z) = F^*_z(Z)$, and (2) $(1-\tau^*)F^*_z + \tau^*\alpha^*\delta = (1-\tau)F_z + \tau\alpha\delta$.

In regime (1) the foreign countries tax parameters do not influence Z at all, and neither do the home country counterparts, since no discrimination between home and foreign capital takes place. Regime (2) is more complicated, though; differentiating equation (9.9) totally and solving for the effects of changes in tax instruments, yields:

$$\frac{dZ}{d\tau} = \frac{-(F_z - \alpha\delta)}{\Delta}$$
$$\frac{dZ}{d\alpha} = \frac{\tau\delta}{\Delta}$$
$$\frac{dZ}{d\tau^*} = \frac{(F_z^* - \alpha^*\delta)}{\Delta}$$
$$\frac{dZ}{d\alpha^*} = \frac{-\tau^*\delta}{\Delta}$$

where $\Delta = (1-\tau^*)F_{zz}^* - (1-\tau)F_{zz}$.

If we consider an initial situation where $\tau = \tau^*$, and make the following additional assumptions: $|F_{zz}^*| > |F_{zz}|$, $(F_z - \alpha\delta) > 0$ and $(F_z^* - \alpha^*\delta) > 0$, we can derive the following signs on these derivatives:

$$\frac{dZ}{d\tau} > 0, \quad \frac{dZ}{d\alpha} < 0, \quad \frac{dZ}{d\tau^*} < 0, \quad \frac{dZ}{d\alpha^*} > 0$$

These derivatives maybe called the "normal" case, since they agree with the intuition that raising home taxes should increase capital exports, while more generous tax incentives should work the other way around (and similarly for the host country's variables). However, we can see that no general restrictions can be put on these derivatives.

9.3 National Tax Policies

In this section we will look at each governments optimal tax policies toward foreign source income. The importing (host) country's objective vis-à-vis capital imports is to maximize its tax revenue from the income it generates, i.e., its objective function is, T^*. The exporting (home) country's national income is defined as:

$$Y = F(K - Z(\cdot)) - \delta K + (1-\tau^*)F^*(Z(\cdot)) + \tau^*\alpha^*\delta Z(\cdot) \tag{9.15}$$

where $Z(\cdot)$ stands for: $Z(\tau, \tau^*, \alpha, \alpha^*)$.

It should be noted that the importing country's capital stock does not appear as an argument of $F^*(\cdot)$; the host country could be thought of as only providing land and basic services of a public good character, but does not pursue any own production. Alternatively, one may think of the two production sectors as separable so that the addition of capital from abroad does not influence the marginal product of capital in the domestic sector. In either case it is reasonable to assume that the host country is solely interested in the tax revenue it derives from foreign capital.

The national tax policy is dependent on: (1) whether the territorial or residence system is used; (2) given the residence system, which of the two methods for avoiding double taxation is used (deduction or credit); and, (3) in the case of the credit method, the relationship between taxation of the foreign income in the host and home countries, as explained above. We will focus solely on the incentives under a residence system, and start with the deduction method.

9.3.1 Deduction Method

Beginning with the home country, its national income will increase by policies that increase Z as long as the marginal product of foreign capital, net of all tax effects, exceeds the marginal product of home capital. However, we saw in section (9.2.1) that the home country's tax parameters do not influence Z, and since no such parameters are included in the definition of home national income, (9.15), there is no role for tax policy in this case.

The host country's tax policy will, however, influence Z and therefore the home national income, as well as it own tax revenue. These effects are given below:

$$\frac{dY}{d\tau^*} = ((1-\tau^*)F_z^* + \tau^*\alpha^*\delta - F_z)\frac{dZ}{d\tau^*} - (F^* - \alpha^*\delta Z) \tag{9.16}$$

$$\frac{dY}{d\alpha^*} = ((1-\tau^*)F_z^* + \tau^*\alpha^*\delta - F_z)\frac{dZ}{d\alpha^*} + \tau^*\delta Z \tag{9.17}$$

$$\frac{dT^*}{d\tau^*} = \tau^*(F_z^* - \alpha^*\delta)\frac{dZ}{d\tau^*} + (F^* - \alpha^*\delta Z) \tag{9.18}$$

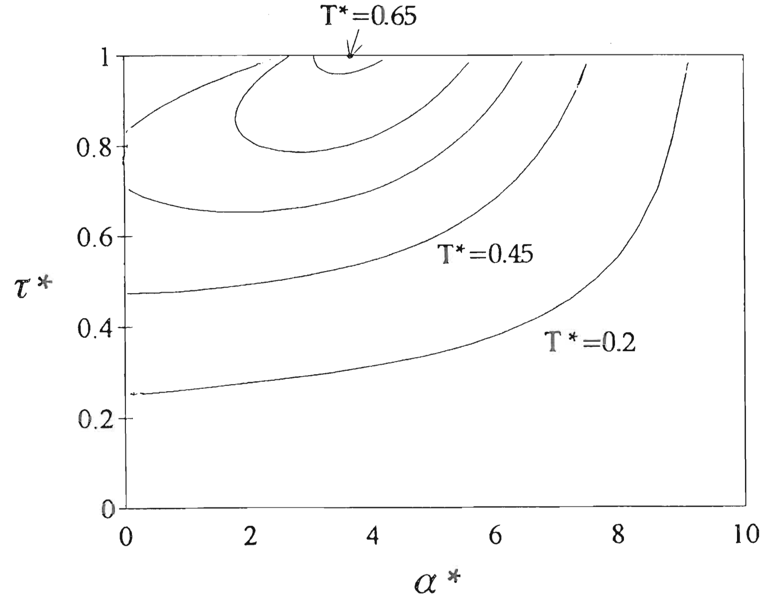
$$\frac{dT^*}{d\alpha^*} = \tau^*(F_z^* - \alpha^*\delta)\frac{dZ}{d\alpha^*} - \tau^*\delta Z \tag{9.19}$$

The signs of these derivatives depend on the parameters of the production functions and how Z changes with the tax parameters, (which is also undetermined in general as we've seen above).

To illustrate how the equilibrium solution may turn out, we consider a numerical example. In figure 9.2 a set of iso-revenue curves for the host country is drawn in $\{\tau^*, \alpha^*\}$-space. These curves are drawn conditional on some specific values of the home country's tax parameters; the whole map will change as these parameters change.

The host country will choose a combination of τ^* and α^* that allows them to reach the highest iso-revenue curve, subject to the constraints that: $0 \leq \tau^* \leq 1$ and $\alpha^* \geq 0$. In the example this happens at the border where $\tau^* = 1$ and $\alpha^* = 3.57$.

Figure 9.2: Iso-revenue curves for the host country under the deduction method.



9.3.2 Credit Method

As was described in section 9.2.2 there are two basic regimes to consider when the credit method is used. The first regime, where the home tax rate on foreign income exceeds the host country's tax rate on the same income, implies that neither home nor host country tax parameters affect the localization of capital. We thus have complete neutrality with respect to the tax systems and the laissez-faire allocation is attained.

In the second regime, where foreign taxes exceed home taxes on the foreign income, both countries' tax parameters influence the equilibrium condition and therefore the capital flow. The choice of parameter configurations will thus be taken in a strategic, non-cooperative, game setting.

A basic question is whether the choice of regime is endogenous, i.e., if we always will end up in one and never in the other in equilibrium. A graphical illustration is not feasible due to the multidimensional character of the problem, however, a verbal discussion might be sufficient to grasp the intuition behind the mechanisms at play.

We start by assuming a laissez-faire solution. The capital-stock is then optimally allocated from a world efficiency viewpoint, but not necessarily from the point of view of the individual countries. It is natural to assume that it is the host country that starts the tax game. We thus immediately jump into the second regime. Starting from $\tau^* = 0$ it is obvious that a small increase in the tax rate must increase tax revenue.

The host country increases its tax rate as long as the increased revenue due to the higher tax rate is not dominated by the loss of revenue due to the induced reduction in Z. The home country loses of course income and the question is now whether it will retaliate by increasing its own tax rate. However, at $\tau = \alpha = 0$, the equilibrium condition is the same as the term in parentheses in equation (9.16), and therefore $\frac{dY}{d\tau} = 0$. Consequently, the home country will not be able to increase its national income by changing its tax rate.

Before analyzing the optimal policy of the host country again, we shall consider the host country's incentives to attract capital by granting depreciation allowances, i.e., by raising α^* above zero. As α^* is raised, it will be more attractive to invest in the host country, ceteris paribus, and the capacity to tax the return on that investment increases. Since the home country's tax parameters are set to zero the equilibrium condition is the same as with the deduction system, and therefore the analysis given above applies; in most cases it will be optimal to raise τ^* and α^* simultaneously.

9.3.3 Public Goods

We saw above that the home country would not respond in kind to an increase in the host country's taxes. This is because it will lose as much by additional reduction in foreign net income as its own home income increases (again starting from zero tax rates). However, if tax revenue is used to finance public good provisions and not just returned lump-sum to the representative household, the maximand will not be national income but a social welfare function.

If we apply the assumption of separability between private and public goods in the utility function, as in (9.20), and that the public good sub-utility function $(m(G))$ is such that $m'(0) = \infty$, we can guarantee that it will always be optimal to choose a positive tax rate. The social welfare function can be written as:

$$W(y, G) = U(y) + \nu(G) \tag{9.20}$$

where $y = Y - T$ is private disposable income. Furthermore, we have the restriction $T = G$.

We could now define a transformation function between $U(y)$ and G, which is customary (see [8]). However, we will assume that $\frac{dU}{dy} = 1$ and define a transformation function between y and G, as: $\Psi(y(Z(\cdot)); G(Z(\cdot))) = 0$.

The same production function applies to both private and public good production, so the production possibility frontier is linear with a slope equal to minus one. However, the need to finance public goods by taxes on internationally mobile capital implies that the tax base decreases as G is increased, increasingly so as more capital moves out. The transformation function will therefore be concave, or it will take successively larger reductions in y to obtain an extra unit of G.

It should be noted that if the host country does not tax foreign income at all, and the residence principle is used, home taxes do not influence Z and the

Table 9.1: Results of numerical example for the resident principle.

	τ	α	τ^*	α^*	W	Y^*	Z
Deduction Method:							
$\{\tau_{opt}, \alpha_{opt} \mid \tau^* = 0\}$	0.166	0			1.77	0	0.5
$\{\tau^*_{opt}, \alpha^*_{opt} \mid \tau = 0\}$			1	3.57	0.92	0.65	0.5
Nash-equilibrium	0.314	0	1	3.57	1.11	0.65	0.378
Credit Method:							
Regime 1:							
$\{\tau_{opt}, \alpha_{opt} \mid \tau^* = 0\}$	0.166	0			1.77	0	0.5
Regime 2:							
$\{\tau^*_{opt}, \alpha^*_{opt} \mid \tau = 0\}$			1	3.72	0.93	0.65	0.41
Nash-equlibrium	0.420	3.72	1	3.72	1.12	0.65	0.41
Laissez-faire					1.58	0	0.5

transformation function will have the same shape as the production possibilities frontier. In general, though, the shape of Ψ will depend on the sensitivity of Z to changes in tax parameters of both countries.

The maximization problem facing the home government is to maximize (9.20) subject to the constraint, $\Psi = 0$. Forming the Lagrangean:

$$\mathcal{L}(\tau, \alpha) = W(y, G) - \lambda\Psi(y, G) \tag{9.21}$$

where λ is a Lagrange multiplier. Maximizing $\mathcal{L}$ w.r.t. τ yields the following first-order conditions:

$$\mathcal{L}_y = U_y - \lambda\Psi_y = 0 \tag{9.22}$$

$$\mathcal{L}_G = m_G - \lambda\Psi_G = 0 \tag{9.23}$$

This yields the familiar optimality condition that $MRS = MRT$, or:

$$\frac{U_y}{m_G} = \frac{\Psi_y}{\Psi_G} \tag{9.24}$$

The difference between this and the standard public good analysis is that the shape of the transformation function depends on the specific tax rules as described above. The optimal level of public goods can be determined from (9.24).

9.4 Numerical Example

To give some flavor to the rather arcane analysis above, we will consider a numerical example. It is assumed that both countries have the same production technology available; the production functions are: $F(K - Z) = (K - Z)^{0.25}$ and

$F^*(Z) = Z^{0.25}$, respectively, and K is fixed and normalized to one. The welfare function, W, consists of the MNCs profits after all taxes, $\Pi - \bar{T}$, plus the utility of public good production, $m(G)$, where $m(G) = G^{0.6}$. The welfare optima in each country is dependent on the choice of tax parameters by the other country, we use the Nash-Cournot behavioral assumption, so the resulting equilibria are called Nash-equilibria.

The results of the numerical example are given in table 9.3.3. The numbers show that under the deduction method there exists a Nash-equilibrium, where the host country attracts capital by generous incentives, but at the same time taxes away all the taxable profits. With the credit method we will inevitably end up in regime 2 and at a new Nash-equilibrium. The biggest difference between these Nash-equilibria is that the home country matches the host country's tax incentives; otherwise, the difference in welfare in the home country is small. It should also be pointed out that the total capital flow is higher with the credit method in this example. This result can be compared to the results by Bond & Samuelson [20] who derived this as a rule in a model without tax incentives.

Chapter 10

Cost of Capital and Sources of Funds

In this section we consider the optimization problem of a subsidiary to a domestic firm, located in ROW ("rest of the world"). It is assumed that it strives to maximize its market value, i.e., the discounted present value of all future net distributions to the parent company. The discount rate that it should use is assumed to be exogenously given by the parent company's required rate of return on equity investments. This discount rate is in turn determined by the ultimate owners' required return. This second-tier problem is neglected and the parent is, from the subsidiary's viewpoint, the ultimate principal, whose net wealth it tries to make as big as possible.

10.1 The Domestic Firm's Optimization Problem

To explain the subsidiary's investment and finance problem, we will start by reviewing the general problem of investment project evaluation in a closed economy, or more generally a single jurisdiction economy.

Consider an investment project that cost one dollar in initial outlays and gives net cash flows of x_t, accruing at the end of each period, for T periods. If the interest rate, r, which is the cost of funds, is known and constant, the project's value at the beginning of period $t \leq T$ is:

$$V_t = \frac{x_t}{1+r} + \cdots + \frac{x_T}{(1+r)^{T-t+1}} + \frac{V_T}{(1+r)^{T-t+1}} \tag{10.1}$$

This may also be written as:

$$V_t = \frac{x_t + V_{t+1}}{(1+r)} \tag{10.2}$$

which in turn may be written as:

$$\Delta V_t + x_t = rV_{t-1} \tag{10.3}$$

where $\Delta V_t = V_{t+1} - V_t$. Equation (10.3) expresses the equilibrium condition that an asset's total return, i.e., cash-flow plus capital-gains, should equal the investors opportunity cost. Alternatively, this may be expressed as what could have been earned if V_t had been invested at the interest rate. For a marginal project (zero profitability) the interest rate equals the project's internal rate of return that is also the cost of capital for the investor undertaking the project. An income tax, at rate τ, on cash-flow plus accrued capital gains, yields the equilibrium condition:

$$(\Delta V_t + x_t)(1-\tau) = rV_t \tag{10.4}$$

The cost of capital in this case is $r/(1-\tau)$.

A firm is ultimately valued by the net distributions that reach the investors. If we introduce a personal tax on dividends at rate t_p and one on capital gains at the accrual equivalent rate of c, and assume that the owner can provide new equity, E, we get the following arbitrage equation:

$$(1-c)(\Delta V_t - E_t) + (1-t_p)Div_t = rV_t \tag{10.5}$$

where r is assumed to be the owners' opportunity rate of return after personal tax.

Equation (10.5) can be solved forward from $t = 0$ to a terminal time period, which we set to infinity, to yield the following value of the firm:

$$V_0 = \int_0^\infty \left[\left(\frac{1-t_p}{1-c}\right)Div_s - E_s\right] e^{-\frac{r}{1-c}s}\, ds \tag{10.6}$$

where it is assumed that the transversality condition $\lim_{t\to\infty} V_t e^{-\frac{r}{1-c}t} = 0$ is satisfied.

Equation (10.6) shows that taxes influence the value of the firm and the marginal source of finance. If $c < t_p$, for example, an equal reduction of Div_t and E_t will increase the firm's value, from which it follows that the firm should never pay dividends and issue new equity simultaneously.

The domestic firm's investment behavior can be analyzed by optimal control techniques. The optimization problem is to maximize equation (10.6) subject to the constraint on the evolution over time of the state variable, i.e., the capital stock: $\dot{K} = I$, where I is investment, which is the control variable. In this simple example it is assumed that the capital stock does not depreciate. The next constraint facing the firm, called the cash-flow constraint, shows the equality of sources and uses of funds:

$$(1-\tau)F(K_t) + E_t = I_t + Div_t \tag{10.7}$$

where $F(K)$, which is assumed to be concave, is the firm's net operating profit and τ is the corporate tax rate. The third constraint is a non-negativity constraint on equity injection, $E \geq 0$. To proceed we substitute for Div from the cash-flow constraint into equation (10.6) and append a costate-variable (q) to the capital stock constraint and Lagrange multipliers to the cash-flow and equity constraints. We write the following Hamiltonian:

$$\begin{aligned}\mathcal{H}_t &= \left[\left(\frac{1-t_p}{1-c} + \lambda_D\right)((1-\tau)F(K_t) - I_t + E_t) - (1-\lambda_E)E_t + \right. \\ &\quad \left. qI_t\right] e^{-\frac{r}{1-c}t} \end{aligned} \tag{10.8}$$

Differentiating with respect to I and E yields:

$$\mathcal{H}_I = \left(\frac{1-t_p}{1-c}\right) + q_t = 0 \tag{10.9}$$

$$\mathcal{H}_E = \left(\frac{1-\xi}{1-c} + \lambda_D\right) - (1-\lambda_E) = 0 \tag{10.10}$$

Solving for λ_D in equation (10.9) and substituting into equation (10.10) yields the following relationships:

$$\begin{aligned}\lambda_D + \lambda_E &= \frac{t_p - c}{1-c} \qquad \text{and,} \\ \lambda_E &= 1-q\end{aligned}$$

It is shown in appendix Appendix II.A, for the equivalent problem of an optimizing subsidiary, that if $c < t_p$ then λ_D and λ_E cannot be zero simultaneously. This, in turn, due to the Kuhn-Tucker conditions, implies that a firm shall never issue new equity and pay dividends simultaneously.

If one assumes that the firm is initially financed by equity capital, the optimal initial size of the firm is such that $q = 1$, this is not the long-run equilibrium value, however, since equity gets "trapped" inside the firm, due to the assumed unfavorable dividend tax rate (see 3.2, in part I). It pays to retain earnings until q has declined so much that an additional dollar retained yields as much after tax as a dollar paid out in dividends. This implies that q_t must decline overtime until it reaches a value of $q = (1-t_p)/(1-c)$. Furthermore, to get an expression for the change over time of q we can differentiate the Hamiltonian with respect to the state variable and we get the so-called co-state equation:

$$-\mathcal{H}_K = \dot{q} = \frac{r}{1-c}q - \left(\frac{1-t_p}{1-c} + \lambda_D\right) F_K(1-\tau) \tag{10.11}$$

Substituting for λ_D from above this can be rewritten as:

$$\dot{q} = \{\frac{r}{1-c} - F_K(1-\tau)\}q \tag{10.12}$$

In equilibrium the change in q must be zero so we may solve for the equilibrium cost of capital by solving for F_K:

$$F_K = \frac{r}{(1-\tau)(1-c)} \tag{10.13}$$

10.2 International Taxation Methods and Definitions

The foreign subsidiary's optimization problem is very similar to the domestic firm's problem. Especially if one considers the required rate of return as given by the parent and disregard the second-tier problem that the parent's required rate is determined by its ultimate owners. The most important difference is due to the different tax rates that apply to the subsidiary's income and the specific rules that commonly exist to reduce the adverse effects of international double taxation.

The two polar principles (*residence* and *source*) of taxing foreign source income are rarely applied to their full extent. A more common situation is that each country taxes all income originating within its own borders and also some of what its own residents earn outside. It has been recognized for long that if each country pursued its own taxation strategy the outcome could be very high taxes (double taxation) on FDIs. The need for coordination has been widely recognized and has manifested itself in an extensive web of bilateral double taxation treaties. In these treaties each country agrees to which country has the priority to tax which kind of income, and, if both have the right to tax, how the double taxation should be ameliorated. Even without an explicit double taxation agreement, an individual country may find it to its advantage to reduce the double taxation burden on foreign income unilaterally. In either case there exist several basic methods to accomplish this.

The tax base of foreign source income can either be the underlying income, and/or the distributions paid out from the host country to the home country. Distributions can be of different sorts: dividends, interest, royalty and equity

Table 10.1: Definitions of taxes payable at home and tax rate on dividends under different taxation methods.

Taxation Method	*Credit w. deferral*	*Credit w.o. deferral*	*Deduction w. deferral*	*Exemptio*
ΔT	$\max\left[\left(\frac{\tau-\tau^*}{1-\tau^*}\right) Div, 0\right]$	$\max[(\tau-\tau^*)F(K), 0]$	$\tau \cdot Div$	
$\gamma = \frac{\Delta T}{Div}$	$\max\left[\left(\frac{\tau-\tau^*}{1-\tau^*}\right), 0\right]$		τ	
ξ	$\gamma + \omega$	ω	$\tau + \omega$	ω
$\bar{T}$	$\tau^* \cdot F(K)$	$\max[\tau^*, \tau]F(K)$	$\tau^* \cdot F(K)$	$\tau^* \cdot F(K$
$\zeta = \frac{\bar{T}}{F}$	τ^*	$\max[\tau^*, \tau]$	τ^*	τ^*

redemptions. If income is taxed only when it is distributed, one says that taxation has been deferred, or the tax system is characterized by *deferral*; if income is always taxed as it accrues, we have as system of *no-deferral*.

The methods of ameliorating double taxation can be divided into three main types: With a *deduction system* the host country tax is deductible from the home country tax; if the home country runs a *credit system* the foreign tax paid is credited against the home tax liability; the foreign tax may also simply be *exempted* from home country tax that would mean that the home country, in effect, would use a territorial system.

To analyze the effects of all possible combinations of methods, we need a formal apparatus to sort out the complexities that arise. The following definitions should prove helpful:

$\bar{T} = T^* + \Delta T + T_w$, total taxes paid on foreign income,
$T^* = \tau^* \cdot F(K)$, host country taxes,
$T_w = \omega \cdot Div$, withholding taxes on dividend repatriations,

where ΔT is additional taxes paid at home on foreign income and $F(K)$ is the foreign income tax base.

Taxes payable in the host country on ordinary income, T^*, and on dividend repatriations, T_w, are straightforward. They are assumed to be levied at a constant rate on a well-defined tax-base, $F(K)$. ΔT, the extra taxes that may be payable at home are the focus of our attention here. We shall see that we need to distinguish between the cases of deferral and no-deferral, and whether the credit or the deduction method is used.

To simplify the analysis, we will introduce some additional tax-rate definitions: *i)* An effective (average) tax rate on dividend repatriations, ξ; which in turn is made up of two components: *ii)* a tax rate conferring to the extra taxes payable at home (γ), if deferral is used, and the withholding tax rate, ω; and finally: *iii)* the effective tax rate on foreign income as it accrues, ζ. Table 10.1 summarizes these tax rate definitions.

Some comments are in order at this place. It should be observed that the type of credit described in table 10.1 is called a *partial credit* since it is limited to the taxes actually paid (or deemed as paid) abroad, no tax refund is granted if the foreign taxes paid exceed the home country taxes due. If the parent cannot use all of its credits from one subsidiary it is in an "excess credit" position; in some countries such credits can be used to offset "deficit credits" from other subsidiaries or against the parents home tax liability on its home income. We will abstract from these possibilities and assume that excess credit will expire unused. One should also observe the factor $Div/(1-\tau^*)$, which reflects the "grossing up" of dividends since they are paid out of after foreign tax profits. The extent to which such grossing up can be made is not necessarily equal to τ^*, but we will assume that this is the case. To avoid complications we will also assume that the definition of taxable income is the same in both countries.

10.3 The Subsidiary's Optimization Problem

The formal treatment of the subsidiaries investment problem is relegated to the Appendix II.A. A verbal description of the results is as follows: The subsidiary maximizes its value, using the parents after home-corporate tax required rate of return of the parent as its discount rate. After the initial transfer the evolution of the capital stock is governed by the differential equation: $\dot{K} = I = F^*(K)(1-\zeta)-Div+Z$. In addition the parent and the subsidiary face two flow constraints, on cashflow: $Div = (1-\zeta)F(K) - I + Z$, and on transfers: $Z \geq 0$.

The arbitrage equation for the subsidiary becomes:

$$Div_t(1-\xi) + (\Delta V_t - Z_t)(1-c) = r(1-\tau)V_{t-1} \tag{10.14}$$

where we have assumed that capital gains are taxed at an accrual equivalent rate of, c, in the home country.

It is shown in Appendix II.A that the subsidiary will never receive transfers and pay dividends simultaneously if the condition $c < \xi$ holds, and furthermore, that it will not receive any more transfers after the initial one, and it will not pay dividends until it has reached its steady state.

The shadow value of capital, or q_t, starts out with a value of one, and changes monotonically according to the differential equation:

$$\dot{q} = r\left(\frac{1-\tau}{1-c}\right) - F'(K)(1-\zeta)\left(\frac{1-\xi}{1-c} + \lambda_D\right) \tag{10.15}$$

At the steady state, when the subsidiary starts paying dividends, the Lagrange multiplier, λ_D is zero.

The evolution of the capital stock is governed by:

$$\dot{K} = I = g\left[q\left(\frac{1-c}{1-\xi} - \lambda_D\right)\right] \tag{10.16}$$

At the steady state the change of the capital stock is zero and $q_t = (1-\xi)/(1-c)$, which is below one, by assumption. q_t must therefore decline over the intervening period, generating anticipated capital losses to the parent.

10.3.1 Example

As a concrete example[1], consider the following parameterization of the production function:

$$F(K) = K^\alpha, \qquad 0 < \alpha < 1 \tag{10.17}$$

the output price and the exchange rate are both assumed to be constant and are normalized to one. This specification of the production function is a common one in the literature (see, e.g., Ruffin [88] and Hines [47]), and features decreasing returns to scale, which implies positive pure profits. It is further assumed (implicitly) that there does not exist any dependency between production in the home country and in the host country. This is a simplifying assumption, but a critical one, and it may be rationalized by assuming that all national markets are strictly segmented.

The parent's initial transfer problem is an ordinary capital budgeting problem of deciding whether a particular project has a positive net present value or not. Given that a particular investment project is worthwhile, its scale can be decided as the level of transfer that maximizes the net present value, or

$$\max_{\{K_0\}}(V_0 - K_0) \tag{10.18}$$

The first order condition is:

$$\frac{\partial V_0}{\partial K_0} = \int_0^\infty \left[\left(\frac{1-\xi}{1-c}\right)\alpha K_s^{\alpha-1}(1-\zeta)\right] e^{-r\frac{1-\tau}{1-c}s}\, ds - 1 = 0 \tag{10.19}$$

If the transversality condition: $\lim_{s\to\infty}(-1/r(\cdot)exp(-r(\cdot))) = 0$ is satisfied the solution to the integral is:

[1] This example follows closely, but extends, the analysis of Hines [47].

$$\frac{1}{r(\cdot)}\left(\frac{1-\xi}{1-c}\right)(1-\zeta)K_0^{\alpha} = 1 \qquad (10.20)$$

where $r(\cdot)$ stands for $r((1-\tau)/(1-c))$. Equation can be solved for K_0:

$$K_0 = \left[r\left(\frac{1-\tau}{(1-\xi)(1-\zeta)}\right)\right]^{\frac{1}{\alpha}} \qquad (10.21)$$

From equation 10.21 we can observe that both the home and the foreign tax on corporate income influence the size of the initial transfer, as does the tax on dividend repatriations, ξ.

The next question we want to address is the size of the steady state capital stock, K_{SS}. This can be found from the solution of equation 10.15, setting $\dot{q} = 0$, substituting for the steady state value of q and solving for K_{SS}:

$$K_{SS} = \left[\frac{\alpha(1-c)(1-\zeta)}{r(1-\tau)}\right]^{\frac{1}{1-\alpha}} \qquad (10.22)$$

The subsidiary reaches K_{SS} as rapidly as possible by retaining all earnings during the period between the initial transfer and the period in which the steady state is reached. However, if an unanticipated change in one of the tax parameters in equation (10.22) takes place, the retention period and the expansion path will change. A noticeable feature of equation (10.22) is that, ξ is not included and will thus not change the repatriation (or dividend) behavior of the subsidiary. The dividend tax is a lump-sum tax in this framework.

The effects of tax changes on the volume of foreign direct investments depend on how the initial transfer and the steady state capital stock are affected. In Appendix II.A a set of derivatives is given and a graphical illustration is provided below.

In figures 10.1 and 10.2 the difference between the credit and the deductions systems is illustrated, for the case of deferral and no-deferral respectively. The deduction system with deferral implies a higher value of ξ, which, in turn, implies that the optimal initial transfer is higher and that the steady state capital stock is attained earlier than under credit with deferral. The steady state capital stocks are identical with deferral, which, however, is not the case without deferral. Taxes cannot be reduced in present value by postponing them, and the credit system implies lower effective taxation each period compared to the deduction system hence the the optimal capital stock must be lower with the latter system.

To describe the effects of tax changes we will focus on the credit system with deferral; the illustrations are given in figures 10.3-10.5. Figure 10.3 shows the effect of an increase in τ^*; both the size of the initial transfer and the steady state capital stock is affected by such a change, the latter increases and the

Figure 10.1: Expansion path of the subsidiary's capital stock under the deduction and credit systems, with deferral.

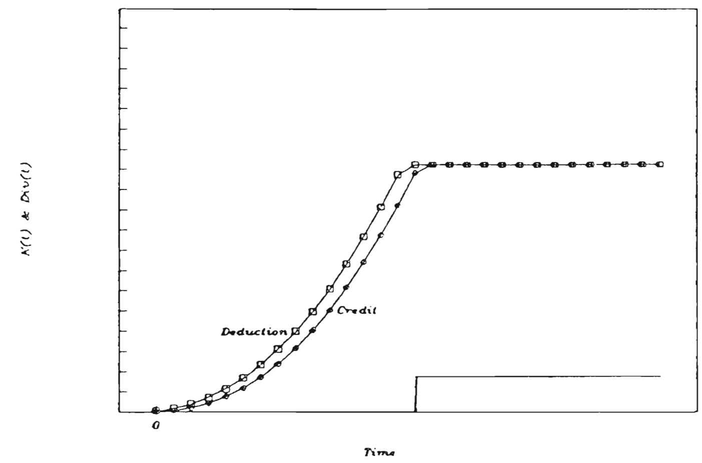


Figure 10.2: Expansion path of the subsidiary's capital stock under the deduction and credit systems, without deferral.

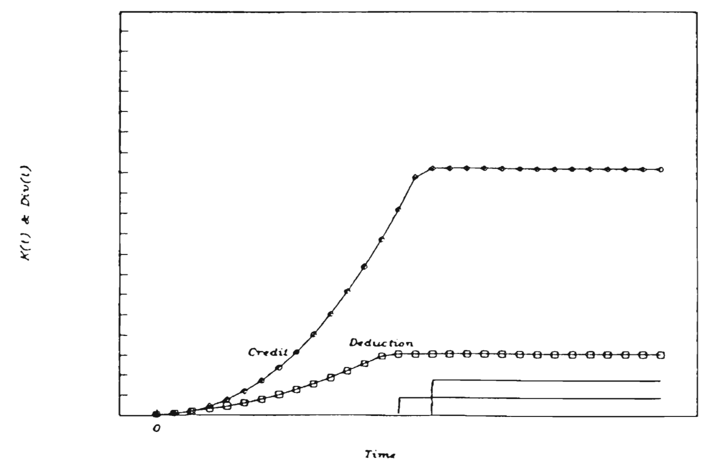
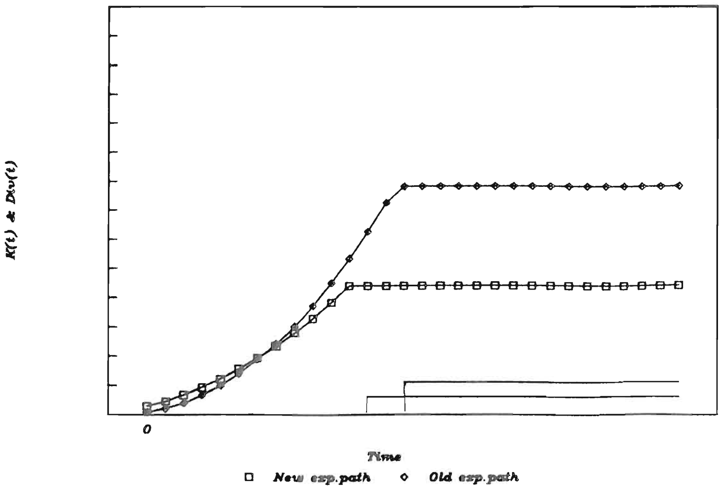


Figure 10.3: Effect of an increase in τ^* on the expansion path of the subsidiary under the credit system with deferral



former decrease. An increase in τ also affects both capital stocks but this time it increases the steady state capital stock. Increasing c will not change the size of the initial transfer, but since capital gains are taxed higher, the benefit of accumulation is reduced and therefore the size of the steady state capital stock.

10.4 The Global Optimization Problem

We may consider the parent's problem of investing in home operations and/or foreign operations, through a subsidiary, as a problem of investing in separate markets. The separation is due to the differential rate of taxation on the resulting income stream.

The formal optimization problem is described in Appendix II.A, section II.A.2. The main results are the formulas for the cost of capital for investing home and abroad, respectively, which are:

$$\begin{aligned} F_K &= r \cdot \frac{1-t_p}{(1-c)(1-\tau)} \\ F^*_{K^*} &= r \cdot \frac{1-t_p}{(1-c)(1-\zeta)} \end{aligned}$$

We may note that if $\zeta = \tau$, the cost-of-capital (the gross marginal products) will be the same and capital export neutrality is satisfied. From table 10.1 we may also note that this is only guaranteed to be satisfied by the credit system without deferral and only if $\tau > \tau^*$. Otherwise it is only satisfied if the tax rates happen to be equal.

Figure 10.4: Effect of an increase in τ on the expansion path of the subsidiary (credit with deferral)

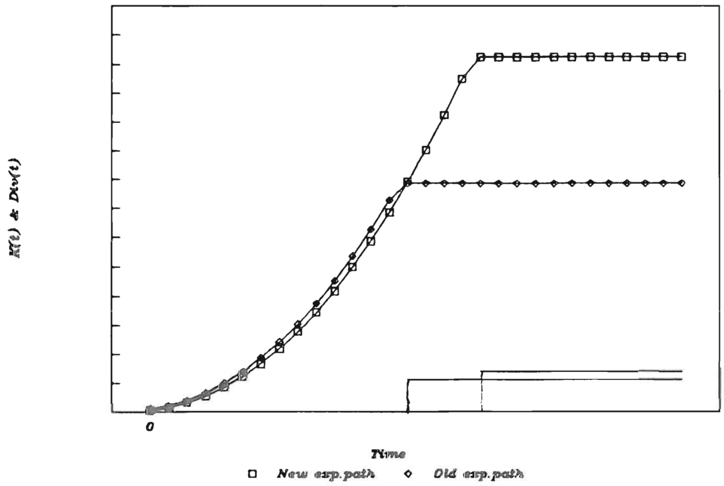
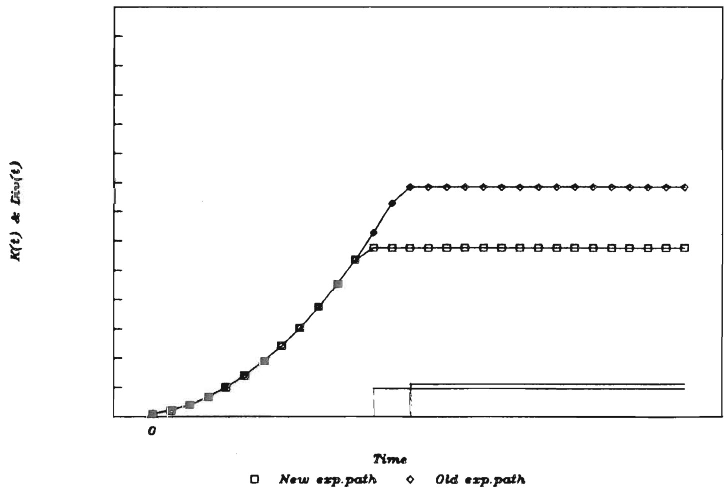


Figure 10.5: Effect of an increase in c on the expansion path of the subsidiary (credit with deferral)



10.5 The Effect of Debt Finance

So far we have only considered parent transfers and retained earnings as the subsidiary's possible sources of funds. However, debt finance is in reality the most important average source of funds in most countries. The only difference between debt and equity in this framework is that financial claims labeled as debt is treated favorably for tax purposes compared to equity. The difference is that interest cost is deductible from the tax base, whereas dividends are not. This implies that the firm's tax base becomes: $F - wL - rD$. An increase in debt thus lowers the tax base and the firm's tax payments. A domestic firm, operating under perfect certainty, should finance its investments exclusively by debt, which give a net marginal product of capital of: $F_K = r$ in equilibrium, i.e., the firm pays no tax on a marginal investment. This is different from the case of full-equity finance, where r is the rate of return on alternative capital investments, which is not deductible. This difference between equity and debt finance implies that debt finance is favored at the margin since the firm's cost of capital with debt finance is the interest rate, r, while it is $r/(1-\tau)$ $(> r)$ with equity finance.

The "Miller equilibrium", which was discussed in section 3.2 of part I, implies that prices of bonds and equities adjust so that, in equilibrium, the cost of capital of these two sources will be the same. Firms will choose either source of finance to attract a "clientèle" of investors, an internal debt-equity ratio is determined only in the aggregate. An international extension of the original, closed economy, idea is developed by Gordon [37].

If interest rates differ between the home- and host country the subsidiary could choose to raise funds in the market with the lowest cost of funds. If the national credit markets are segmented each company can tap only its own local market directly. If $r^* < r$, the subsidiary will raise local debt, but if $r^* > r$ the parent can raise home-debt and make transfers to the subsidiary. Transfers could be either in the form of equity contributions or in form of intercompany loans.

Capital controls on portfolio investments may produce segmented credit markets, without such controls, credit markets in different countries are linked through the currency markets. The covered and uncovered interest parity relations tie these markets together, and arbitrage results in the same expected cost of debt. Different rates of taxation on interest income and exchange rate gains, may produce some adverse affects on capital flows; this issue is discussed further in section 11.4.

Chapter 11

Tax Incentives and Direct Investments

The corporate profit-tax should ideally be an "income tax"; the correct tax base for an income tax is: $x_t + \Delta V_t$, i.e., cash-flow plus change in value. However, individual assets used within firms are not priced in secondhand markets, which makes it hard to determine the correct economic depreciation during a specific period, and in practice some approximations have to be done. Another aspect of tax depreciation is that allowances are often granted in excess of "true" depreciation. These "accelerated" depreciation allowances are granted to lower the firms' cost of capital, and thus give incentives for firms to increase their investments.

Tax incentives toward domestic investments may also influence the multinational firm's choice of location. To analyze these issues in the same framework as presented above, we start by consider the firm's cost of capital with an income tax and depreciation allowances. In section 11.2 we will consider the more extensive framework presented in [63], which has become known as the King & Fullerton approach to modeling investment incentives. The two modeling approaches presented below should be seen as complementary.

11.1 Depreciation and the Cost of Capital

Assume that depreciation deductions are allowed at a rate equal to true depreciation: $-\Delta V_t$. To derive an expression for the cost of capital with depreciation, we start from the arbitrage equation, which in this case may be written:

$$(x_t + \Delta V_t)(1 - \tau) = rV_{t-1} \tag{11.1}$$

Assuming that $V_T = 0$ and that cashflow is constant at, $\bar{x}$, the cost of capital becomes, $r/(1 - \tau)$.

The case of constant cashflow is a special case that gives a simple expression for the cost of capital, however, a more realistic case is when the cashflow declines over time. An often used assumption is that of exponentially declining cashflow, which implies that cashflow at time t is: $x_0 e^{\delta t}$. The true economic depreciation in this case declines with age at a rate of $\delta e^{-\delta t}$; the cost of capital without taxation equals $\delta + r$ (see [10]).

The situation with exponentially declining cashflow and accelerated depreciation allowances, may be modeled as consisting of two parts. The first part is an immediate subsidy equal to the present value of the accelerated portion of the depreciation deduction, and the second part is the succeeding, economic, depreciation deductions in each year (see [93]).

The net acquisition cost in this case equals: $(1 - \tau\alpha)q$, and the succeeding depreciation allowances are: $(1 - \alpha)\delta e^{-\delta t} q, \quad (t > 0)$, where q is the gross acquisition cost of the capital good. The sum of the depreciation allowances should equal the gross acquisition cost of the capital good, or if we assume that $q = 1$:

$$\alpha + \int_0^\infty (1 - \alpha)\delta e^{-\delta t}\, dt = 1 \tag{11.2}$$

The tax base at time t is:

$$(x_0 - (1 - \alpha)\delta)e^{-\delta t} \tag{11.3}$$

and total, discounted, profits over the project's life-cycle are:

$$\Pi = \int_0^\infty \Big\{x_0 - \tau(x_0 - (1 - \alpha)\delta)\Big\} e^{-(\delta + r)t}\, dt - (1 - \tau\alpha) \tag{11.4}$$

Solving this and rearranging yields:

$$\Pi = (1 - \tau)\left\{\frac{x_0}{r + \delta} - \left(1 + \frac{\tau(1 - \alpha)}{1 - \tau} \cdot \frac{r}{r + \delta}\right)\right\} \tag{11.5}$$

Setting $\Pi = 0$ and solving for x_0 yields the cost of capital

$$x_0 = \delta + \frac{1 - \tau\alpha}{1 - \tau} \cdot r \tag{11.6}$$

i.e., the cost of capital is the starting period cash-flow that is just high enough for the project to achieve an internal rate of return equal to the required rate of return, when account is taken of depreciation.

If $\alpha = 1$, which is called expensing, the cost of capital is $\delta + r$, which in turn is equal to the cost of capital without taxation. If $0 \leq \alpha < 1$, the cost of capital is increased compared to the no taxation case. However, if $\alpha > 0$ the cost of capital is lowered compared to the situation when no immediate investment subsidy is granted.

11.1.1 The Effective Marginal Tax Rate

The effective marginal tax rate is defined as the percentage tax wedge between the pre- and post-tax rate of return on an asset. As an introduction to the next section we define this as:

$$\tau^* = \frac{p - s}{p} \tag{11.7}$$

where p is the real pretax rate of return and s the after-tax return.

We now define s as equal to the equity owners' opportunity cost, r, and p is found from equation 11.6 as: $r \cdot (1 - \tau\alpha)/((1 - \tau)$. The effective marginal tax rate can be solved to:

$$\hat{\tau} = \frac{(1 - \alpha)\tau}{1 - \tau\alpha} \tag{11.8}$$

If $\tau = 0.5$, we get the following values for $\hat{\tau}$, for three different values of α:

$$\begin{aligned} \alpha = 1 \quad &\longrightarrow \quad \hat{\tau} = 0 \\ \alpha = 0.5 \quad &\longrightarrow \quad \hat{\tau} = 0.33 \\ \alpha = 0 \quad &\longrightarrow \quad \hat{\tau} = \tau \quad (= 0.5) \end{aligned}$$

We can thus conclude that the more accelerated depreciation allowances are, as measured by α, the lower will the effective marginal tax rate be.

11.2 The King & Fullerton Approach

The last section illustrated the point that with accelerated depreciation allowances and other tax incentives the effective marginal tax rate will usually not be equal to the statutory tax rate. A basic problem with empirical studies of tax effects on investments is that the effective marginal tax rate is unobservable. However, studies that calculate analytical measures of effective tax rates have proliferated in the tax literature since the study by King & Fullerton [63]. Their study described methods for computing such tax rates for different kind of assets, sources of finance and ownership categories. The great virtue of their model is the flexibility in modeling specific institutional details of different tax systems.

Looking first at depreciation rules, K & F define α_1 as the fraction of the acquisition cost of an asset that could be deducted over the assets lifetime; ($\alpha_1 = 1$ means that all of the cost, but not more, may be written off).

An *investment deduction* implies that a fraction, α_2, of the investment cost may be deducted from the tax base, giving rise to an immediate tax saving of, $\tau\alpha_2$.

An *investment tax credit* implies that a refund equal to, α_3 per dollar of investment outlay is received each period. This is equivalent to a direct subsidy to the price of the investment good.

Putting these definitions together the effective, or net, acquisition cost of an asset with a gross price of \$1, may now be written:

$$Q = 1 - D \tag{11.9}$$

where $D = \tau(Z + \alpha_2) + \alpha_3$; where Z is the present value of the depreciation deductions.

The typical firm invests in projects until the net present value of the last project is zero, or until the value of that project equals Q. The value of a project is the present discounted value of the future net-cash flow, which in the case of exponentially declining cash-flow may be written:

$$V_0 = \int_0^{\infty} (1-\tau)x_0 e^{-(\delta+r)t} dt \tag{11.10}$$

to determine the cost-of-capital we set $V_0 = Q$, and solve the integral:

$$Q = \frac{(1-\tau)x_0}{\delta + r} \tag{11.11}$$

Solving for x_0:

$$x_0 = \frac{Q(\delta + r)}{(1-\tau)} \tag{11.12}$$

that is the cost-of-capital expression we are looking for.

11.2.1 Introducing Personal Taxation

The owner's opportunity cost, or required rate of return, r, was not determined above, but in the K&F approach it is assumed to be the after personal tax interest rate on a typical industrial or government bond, or: $s = i(1 - t_p)$; there t_p is the personal tax on interest income and i the interest rate on bonds.

The effective marginal tax (equation 11.7) can be solved in terms of tax parameters and the interest rate as:

$$\tau^* = 1 - \frac{i(1-t_p)(1-\tau)}{Q(r+\delta) - \delta(1-\tau)} \tag{11.13}$$

One may observe the rich opportunities for variation in τ^*, between projects if the components of D differ, as well as the dependence on variation in t_p across ownership groups. Furthermore the source of finance will also introduce variation if projects are financed from different sources. In fact, K & F, considered investments in three different types of capital assets, financed by three different sources of finance, by three different ownership categories and across three different industries. This produced $3^4 = 81$ possible tax rate combinations.

Since we have much more limited information, we will consider investment projects in equipment, for the manufacturing sector, with one owner, but three different sources of finance.

11.2.2 Closing the Model

The F & K model is partial in the sense that the saving and labor supply behavior is not modeled, but instead are assumed to be fixed. Two polar approaches are used to close the model:

i) the fixed-p case; where it is assumed that the pretax return is equalized across all classifications, and

ii) the fixed-r case, where the real rate of interest, r, is assumed to be constant, and p thus variable across projects.[1]

Below we will focus on how i and τ^* are determined under the fixed-p case with different sources of finance.

EQUITY FINANCE. The owner is taxed at rate t_e on equity income.[2] r_e, the required rate of return on equity before personal tax, should be compared with the owners opportunity cost: $i(1-t_p)$, and we can thus write: $r_e = i(1-t_p)/(1-t_e)$; which in turn equals the after tax required rate of return, s.

With p fixed (exogenously given), we first set p equal to the cost of capital, after substituting for r_e, and then we can solve for the unknown interest rate:

$$i = \left[(p+\delta)\left(\frac{1-\tau}{Q}\right) - \delta\right]\left(\frac{1-t_e}{1-t_p}\right) \tag{11.14}$$

Since $s = i(1-t_p)$ one may now calculate τ^*.

DEBT FINANCE. If the project was entirely debt financed, the firm's discount rate would be $r = i(1-\tau)$ and we have the following expression for p:

$$p = iQ + \frac{\tau - D}{1-\tau}\cdot\delta \tag{11.15}$$

[1] We have used r for the firm's discount rate and will continue that practice. No distinction is made between real and nominal interest rates since inflation is disregard, hence $r = i$, and we will use i instead of r in the continuation.

[2] Methods for integrating the corporate and personal taxation of equity income by granting dividend relief is not considered here. Implicitly we assume that the "classical" system is used, with full double taxation of dividends.

A particular case of interest is the case when we have expensing, or immediate write-off of the investment cost; if no subsidies and/or credits are given (α_2 and α_3 equals zero) this means that $D = \tau$ and thus that $p = (1-\tau)i$. In this case we have

$$\tau^* = \frac{t_p - \tau}{1 - \tau} \tag{11.16}$$

The tax wedge is therefore positive iff $t_p > \tau$.

RETAINED EARNINGS. When retained earnings is the marginal source of funds the owners receive their return as capital gains, taxed at an accrual equivalent rate of c. The after personal tax return to equity ownership is therefore $r(1-c)$. Comparing this with the opportunity cost gives: $r = i(1-t_p)/(1-c)$, and:

$$i = \left[(p+\delta)\left(\frac{1-\tau}{1-D}\right) - \delta\right]\left(\frac{1-c}{1-t_p}\right) \tag{11.17}$$

Since p is predetermined i and τ^* can be calculated.

11.3 Effective Tax Rates in Host Countries for Model Projects

In this subsection we will illustrate the analysis presented by calculating effective tax rates for two hypothetical investment projects. In the first example, which corresponds to the analysis in section 11.1, implicit subsidy rates for the model project in the different host countries are calculated, as well as the effective marginal tax rates. The second example, follow the King& Fullerton methodology of calculating effective marginal tax rates.

Assume that we have a project with out-of-pocket cost of $1 and constant cashflow for 10 years, and no scrap-value after that. The post-tax internal rate of return is equal to 10%, when depreciation allowances follow true economic depreciation, which is assumed to be 10% of the initial investment cost. The post-tax required rate of return is also equal to 10% and we therefore have a zero net present value project.

The implicit subsidy rate due to accelerated depreciation allowances is calculated as the net present value of a project granted such allowances then calculated at the internal rate of return, i^*, of an equivalent project without the subsidy. In general we may write the net present value of the project as:

$$NPV_0 = \{x_0(1-\tau) + \tau \cdot dep\}\left[\frac{1-(1+i^*)^{-T}}{i^*}\right] - 1 > 0 \tag{11.18}$$

Table 11.1: Statutory corporate tax rates, depreciation deduction methods, as of 1986, and calculated effective tax rates for a marginal equity financed investment project in different host countries.

Host Country	τ	Depreciation* deduction method (%)	Subsidy rate (%)	τ^*
France	0.50	10-20 SL; 30 DB	8.08	0.333
Italy	0.36	10-33 SL	8.08	0.180
Netherlands	0.43	10-20SL	6.18	0.291
West-Germany	0.36	20 SL; 30 DB	9.05	0.222
Denmark	0.50	30 DB	8.08	0.333
Finland	0.59	30 DB	9.54	0.414
Norway	0.508	30-35 DB	9.11	0.322
United Kingdom	0.35	25 DB	4.97	0.229
United States	0.46	ACRS†	6.22	0.317
Canada	0.44	20 SL	6.32	0.300
Sweden	0.52	20 SL, 30 DB	8.40	0.360

Comments: * SL = Straight Line deduction, DB = Declining Balance deduction.

† The ACRS system classifies different types of equipment and structures in so called "recovery classes". The most common class is the five-year class which grants cost recovery of 15% in the first year, 22% in the second year and 21% in the remaining three years.

Source: Price-Waterhouse [83] and own calculations.

Where *dep* is the actual depreciation allowances and T is the predetermined length of the project.

The actual depreciation allowances, may be split up in two parts, one that corresponds to true economic depreciation, dep^* and one subsidy part $\widehat{dep}$. Now, if $dep = dep^*$, i.e., no accelerated depreciation allowances, the net present value is zero, or $NPV^* = 0$. The subsidy may now be defined as:

$$\alpha = NPV_0 - NPV^* = \tau Z > 0 \qquad (11.19)$$

where $Z = \widehat{dep}\{1 - (1+i)\}^{-T}/i$.

In table 11.1 actual tax-parameters from the host countries included in the empirical section are presented, along with calculations of implicit subsidy rates and effective tax rates for the stylized project described in this section. The effective tax rates are calculated by comparing the pretax internal rate of return for the zero-NPV project with the internal rate of return for the subsidized project.

Although accelerated depreciation may be the most important investment incentive in most of the host countries, other incentives exist and are sometimes more important. However, direct investment subsidies are often granted on regional basis, making them difficult to incorporate in general return and tax measures like the ones presented in table 11.1.

Table 11.2: Effective marginal tax rates for debt, new equity, and retained earnings finance; **fixed-p case**, $p = 0.1$; personal tax rate on interest and dividends is 50% in each country, the capital gains tax rate is 20%. Investment incentives as of 1986.

Source of Finance:	Debt	New Equity	Retained Earnings
France	0.310	0.484	0.393
Italy	0.451	0.692	0.385
Netherlands	0.193	0.632	0.264
West-Germany	0.378	0.781	0.562
Denmark	0.259	0.703	0.407
Norway	0.289	0.718	0.436
Finland	0.202	0.674	0.349
United Kingdom	0.611	0.705	0.411
United States	0.320	0.712	0.424
Canada	0.165	0.674	0.349
Sweden	0.171	0.682	0.363

Source: Price-Waterhouse [83] and own calculations.

If the pretax rate of return is equalized internationally, and fixed, we may use the K&F framework to calculate how the effective marginal tax rate will differ between countries for different sources of finance. We will assume that investor's marginal tax on interest income is 50% in all countries. The results are given in table 11.2.

In 11.3 the effective marginal tax rates in each country in the fixed-r case are presented, with the same assumptions as for the fixed-p case.

11.4 Effective Tax Rates in an Open Economy

Extending the K & F framework to an international setting requires some modifications. In an integrated world capital market with free mobility for financial capital flows, interest arbitrage will guarantee that the yield to two identical securities (bonds) are equalized, when expressed in a common currency. I.e., covered interest parity obtains:

$$i_t = i_t^* + (f_{t+1} - x_t) \tag{11.20}$$

where i_t is the domestic, nominal, one-period interest rate, i_t^* is the corresponding foreign interest rate, f_{t+1} is the forward one-period exchange rate and x_t the spot exchange rate.

Table 11.3: Effective marginal tax rates for debt, new equity, and retained earnings finance; **fixed-r case**, $p = 0.1$; personal tax rate on interest and dividends is 50% in each country, the capital gains tax rate is 20%. Investment incentives as of 1986.

Source of Finance:	Debt	New Equity	Retained Earnings
France	0.719	0.732	0.439
Italy	0.738	0.797	0.380
Netherlands	0.668	0.663	0.142
West-Germany	0.721	0.798	0.567
Denmark	0.636	0.767	0.117
Norway	0.708	0.728	0.425
Finland	0.498	0.682	0.343
United Kingdom	0.723	0.714	0.406
United States	0.711	0.725	0.418
Canada	0.694	0.311	0.697
Sweden	0.508	0.687	0.352

Source: Price-Waterhouse [83] and own calculations.

When investing in foreign currency assets on a long term basis, it is not possible to cover all the repatriations of income. The forward markets do not extend very far into the future and the income stream is not certain, and one would thus not know how much foreign exchange one would have to sell in advance to obtain a covered position. Consequently, investors will have to take uncovered positions and expose themselves to exchange risk. The open, or uncovered, interest parity theorem states that the *expected* depreciation of the home currency vis-à-vis the foreign currency, equals the difference between the nominal interest rates:

$$E_t(x_{t+1}) - x_t = i_t - i_t^* \tag{11.21}$$

According to the market efficiency hypothesis the forward exchange rate will be an unbiased predictor of the expected future exchange rate, i.e., $E(x_{t+1}) = f_{t+1}$. This implies that all the information relevant in predicting future exchange rate changes is already impounded in the forward rates, and on average it is not possible to earn money by betting against the forward market rates. However, even in a world of efficient markets and where investors have rational expectations, it is not necessary that the strict equivalence between forward and expected future exchange rates holds exactly. If investors are risk averse they will demand a risk premium (RP), and the forward rate would be connected with the expected future spot rate as: $f_{t+1} = E(x_{t+1}) + RP_{t,1}$.

Exchange risk would not arise if purchasing power parity (PPP) between two currencies always holds. The strong, or absolute version of PPP, implies that goods markets are perfectly integrated and thus that the "law of one price" always holds. The weaker version, relative PPP, implies that the nominal exchange rate will change to reflect differences in inflation rates in the two countries. Relative PPP implies that purely monetary disturbances cannot, over time, affect the *real exchange rate* between two currencies, only real factors, such as differential productivity shocks will have real consequences.

If there are deviations from relative PPP, exchange risk will arise since the cashflows that reach the investor is not perfectly correlated if expressed in different currencies.

The extent of deviations from PPP and the existence of risk premiums, is an empirical question. The evidence points toward persistent deviations from PPP and that investors demand significant risk premiums.

11.4.1 The Role of Taxes

Taxes on interest will, as usual, drive a wedge between the interest rates at home and abroad, and in addition exchange rate gains and losses may also be taxed. These factors imply that the parity conditions discussed above ought to be amended.

Assume that t_j^h is the personal tax on nominal interest income earned in country j by a personal investor in country h (the home country), and c_j^h is the corresponding tax on an exchange rate gain: $\hat{x}_{jh}$, where x is units of country $j's$ currency per unit of country $h's$. We get the following equilibrium condition (dropping time-subscripts)

$$i_h(1 - t_h^h) = i_j(1 - t_h^j) - \hat{x}_{jh}(1 - c_j^h) \tag{11.22}$$

Note that a positive $\hat{x}_{jh}$ implies that an h-investor expected return is reduced, since a given sum of j-currency buys less h-currency than before, if the expected depreciation has taken place.

It may be observed from (11.22), that open interest parity will only be obtained if the same marginal tax rate applies to interest income from all sources, as well as to exchange gains and losses. This outcome cannot be expected in general, and the relationship between tax rates and capital market equilibrium will be quite complicated. If we assume that: $t_h^h = t_h^j \neq c_j^h$ and that country j is a small country taking the world interest rate (i_h) and inflation rate (π_h) as given, then it can be shown[3] that if relative PPP holds, that country $j's$ interest rate will change with its own inflation as:

$$\frac{\partial i_j}{\partial \pi_j} = \frac{1 - c_j}{1 - t_j} \tag{11.23}$$

[3] See Alworth [3].

This is an open economy version of the tax modified version of the Fisher Hypothesis of the relationship between real and nominal interest rates and was suggested by ***inter alia*** Feldstein[33]. If, for example, the effective taxrate on exchange gains is less than that on interest income, the nominal interest rate in country j will increase more than one-to-one with its own inflation rate.

Other cases have been investigated by, e.g., Gordon[37] and Levi[64]; they show that different tax rates and tax treatments may result in abnormal two-way capital flows, where it is optimal for marginal investors to invest in the other country's securities. Under those circumstances interest parity may not hold at all.

How nominal interest rates depend on taxes, and relative inflation rates is an empirical question that is difficult to answer, due to the multidimensionality of the problem as well as the complicated tax rules. Empirical studies of these relationships have been undertaken by for example Tanzi[104].

11.4.2 Effective Tax Rates on FDIs

The K & F framework applies to closed economies and our aim is now to extend it to an open economy and to study effective tax rates on FDIs.

The fixed-p case will, in the closed economy case, imply that the firm's discount rate is independent of financial policy and ownership structure; the problem of determining a capital market equilibrium with different sources of finance and ownership categories is avoided. However, this simplification is bought at the cost of accepting that different market interest rates i prevail for each project considered.

In the international framework we may consider an identical investment in different countries as different country-specific projects. If national capital markets are segmented, the simplification entailed by the fixed-p approach may be more motivated when doing the present kind of country comparison, than it is in the closed economy. For a closed economy the natural assumption is that the market interest rate is constant and not variable between projects. Furthermore, capital- and exchange controls have for a long time impeded short-term financial capital flows. It may therefore not be, completely, unreasonable to assume that the return to real capital through FDIs has been more nearly equated across borders, than have interest rates. Anyway, we will assume that the fixed-p assumption can be carried over to the international setting in the examples that follow.

DEBT FINANCE. It is assumed that the parent company finance its investment by an intercompany loan. The firm's discount rate is $i(1-\tau_j)$, where τ_j is the corporate tax rate of host country j. The after-tax required rate of return at home, s, is in this case: $i(1-\xi)$, where ξ depends on the corporate tax rates in both countries, the withholding tax rate on interest income and the method used to account for international double taxation. Observe that s is the pre personal tax required rate of return of the parent company's owners. We follow Jun [57] in neglecting the second-tier problem.

Following the same reasoning as in section 11.2, we can express p as:

$$p = \frac{(1 - D_j)(i(1 - \xi_j) + \delta)}{1 - \tau_j} - \delta \qquad (11.24)$$

where the subscript j stands for country j, and D_j is the present value of investment incentives in country j.

NEW EQUITY. If parent transfer equity to fund the subsidiary's investment project, its opportunity cost is the rate of return it earns at home, $i(1-\tau_h)$, which in equilibrium equals the rate of return it gets from the subsidiary: $r_j(1 - \xi_j))$, where ξ_j equals the effective tax rate of a dollar earned by the subsidiary and repatriated home as dividends. The discount rate is:

$$r_j = i\left(\frac{1 - \tau_h}{1 - \xi_j}\right) \qquad (11.25)$$

RETENTIONS. With retentions as the marginal source of funds the discount will be described by the same formula as in equation (11.25), with the only difference that ξ now depends on the rate of capital gains taxation, as well as the rules for accounting for double taxation of such gains.

The results of the simulations for the fixed-p case is given in table 11.4 The values for ξ are calculated with the actual rules in existing double taxation treaties by the end of 1986, as well as the tax rates current at that date.

Table 11.4: Effective marginal tax rates for debt, new equity, and retained earnings finance; fixed-p case, $p = 0.1$. Investment in equipment by a Swedish company in a foreign subsidiary. Tax rates and investment incentives as of 1986.

Source of Finance:	Debt	New Equity	Retained Earnings
Canada	0.357	0.453	0.485
Denmark	0.315	0.349	0.452
Finland	0.278	0.314	0.422
France	0.241	0.241	0.393
West-Germany	0.453	0.480	0.563
Italy	0.391	0.482	0.513
Netherlands	0.168	0.293	0.335
Norway	0.551	0.573	0.640
United Kingdom	0.179	0.179	0.343
United States	0.280	0.316	0.424
Sweden	0.171	0.682	0.363

Source: Price-Waterhouse [83] and own calculations.

Chapter 12

Legal Aspects on Foreign Income Taxation

Existing tax codes are often the result of long processes of revisions and alterations of previous rules. This state of affairs is the product of a process of actions and reactions. For example, individuals or businesses find ways to carry out their economic activities that reduce tax revenue and the law must be changed to stop the revenue decline. The results are that new forms of tax evasion are invented, which trigger new legislative responses, and so on. A result of this process may be that the actual outcome is far from a stated ideal or principle. These problems are especially pertinent in the area of taxation of income from capital in general and of foreign source capital income in particular. In this section we will consider which principles may underlie the tax rules and to assess in what way the actual outcomes deviate from stated norms. In so doing it is interesting to compare different legal traditions and we therefore describe both the U.S. and the Swedish tax codes, starting with the U.S.

12.1 Taxation of Foreign Source Income in the U.S.

The philosophy behind the U.S. approach toward taxing foreign source income, is that all taxation should be based on the "ability-to-pay" criterion and that horizontal equity should be accomplished (see [13]). This has led to the following two principles; 1) income accrued to a U.S. citizen should be taxed by the U.S. authorities wherever it is earned; 2) international double-taxation should be alleviated through a credit mechanism.

The first principle, which may be called the "nationality-principle," implies that the place of residence should not make a difference on how high a tax burden a U.S. citizen should bear, but instead the extent of the income earned.

The second principle complements the first in that it guarantees that foreign earned income, which is taxed by a foreign country, is not taxed heavier than an equivalent amount of income earned inside the U.S. The theoretical ideal is that all of foreign tax is creditable against the U.S. tax on the same income, so that the effective tax rate is the U.S. tax rate. A consistent execution of these principles would produce a tax system that is both equitable and efficient. Efficiency is guaranteed by the credit-system that means that investment in different countries are made on the basis of pretax returns, or that capital export neutrality is achieved.
The current[1] practice of the U.S. corporate tax system is that ([13]):

(i) U.S. corporations are taxed on their income wherever earned. "Income" from shareholdings in foreign companies is considered as dividends received, when received, i.e., there is deferral of U.S. tax until repatriation.

(ii) Branches to U.S. corporations are taxed on a consolidated basis, i.e., on accrual (no deferral).

(iii) The foreign tax credit is limited to the amount of U.S. tax that would have been collected on the foreign income. If this was not the case foreign governments would be able to assess infinitely high tax-rates at the expense of the U.S. Treasury.

(iv) Foreign income is categorized into different "baskets". Corporations are allowed to pool taxes paid in different foreign countries but only within each basket. The overall foreign taxes on each type of basket-income are compared to the U.S. taxes due on the underlying basket-income and the foreign tax credit is limited to this overall foreign taxes.

(v) In spite of the right to deferral of income received from subsidiaries, U.S. tax authorities may tax subsidiary income as earned if it is categorized as "passive income"; usually retained earnings that have been put into financial assets.

In addition to these rules there are of course many more detailed regulations, but of less interest for a discussion of principles.

How well do these legal rules fulfill the proposed objective of the tax system? Ault and Bradford [13] give a far ranging critique of the current system and point out several inconsistencies. They argue, for example, that place of residence and citizenship are choices, and thus may be expected to be influenced by the tax law. The importance of this observation is that for the concept of horizontal equity to apply, the income has to be exogenous to the person. This is however not the case when the location and tax liability is under the influence of the person. One

[1] These rules were instigated as part of the Tax Reform Act of 1986.

may object to this reasoning that ordinary people have very scant opportunities to choose between different locations and location specific taxes are therefore fully borne by them. This is not the case with corporations however.

Corporations are considered as separate "persons" under legal doctrine. One would therefore assume that corporations also should be taxed independently of location. This is the case with branch income, but income from controlled foreign corporations is treated differently. The reason is that the subsidiary in question, being incorporated in a foreign country, is not legally a U.S. "person". The solution is to tax as income, the dividends the parent receives, as it is received. Hence, the much debated deferral feature. The issue has a practical side, apart from the doctrinal issues, and this is the question of how to tax portfolio income. The integration of corporate and personal accounts may be feasible in the case of domestic corporations and persons, but is less so in the international context. If the concept of "control" therefore would mean a very different tax treatment, one would expect curious threshold effects at the point of ownership there the formal criterion of control applies.

The foreign tax credit is theoretically the ideal mechanism for achieving capital export neutrality. However, as Ault and Bradford [13] point out, it is not clear that this worldwide efficiency criterion should be in the national interest. Theoretical analysis (e.g., [34]) instead point toward deduction of foreign taxes as the best policy from a national point of view. Why, then, does it seem that the stated policy is to achieve capital export neutrality? This may be because governments have to take into account the reactions of other governments, a cooperative game outcome would then be to maximize the size of world income (but it does not say how the cake should be divided).

However consistent the actual practice may be with stated intentions, the actual foreign tax credit does not in general achieve capital export neutrality. This is only true when the U.S. tax rate exceeds the foreign rate, otherwise investment is discouraged. This is due to the (necessary) limitation of the credit to the domestic tax on the same income. Another problem is the possibility to pool taxable income, and average tax rates, from different countries. This implies that a company that has excess credits, due to operations in high tax countries, has an incentive on the margin to undertake new investment in low tax countries. This is contrary to the concept of capital export neutrality.

One may conclude that to some extent legal and economic norms may collide in the international sphere, making it difficult or impossible to design rules that assure neutrality and efficiency. Tax considerations will probably remain one important decision variable for corporations and other persons.

12.2 Taxation of Foreign Source Income in Sweden

The basic principle of taxation of foreign source income in Sweden is that residents are taxed on their worldwide income. Strictly interpreted, this would mean that all persons permanently residing in Sweden would be taxed on all its income, wherever earned, irrespective of their citizenship. However, this is not quite the case since the tax code classifies all persons into two categories 1) those "unconstrainedly" liable to pay tax in Sweden, and 2) those "constrainedly" taxable. The first category, which include Swedish citizens, are liable to tax on foreign income if they could be considered as having been residents of Sweden during the period of tax assessment. The criterion for residency is that the individuals have had their main abode in Sweden for an uninterrupted period of at least six months. This applies to both citizens and non-citizens alike. Swedish citizens, however, are liable to tax even if not residents during the specified period until three years has elapsed since they left the country, unless they can prove that no substantial ties (such as an apartment etc.) remain in Sweden.

Corporations also belong to the first group if they are incorporated in Sweden and if their statutory seat of management (i.e., the place specified in the corporate charter) is in Sweden. Foreign citizens, considered as residing in Sweden according to the criterion mentioned above, fall into the second category and they are in general taxable only on the income they earn inside Sweden. Foreign owned companies fall into the second category if they are registered in Sweden, but also unregistered companies may be considered residents if one or more of the following criteria applies to them: *i)* the actual management of the company is in Sweden; *ii)* shares in the corporation are held directly or indirectly mainly by Swedish individuals; and *iii)* the activities of the corporation mainly consist of the administration of and trading in securites and similar movable property.[2] It should be noted that the last criterion does not imply that subsidiaries of Swedish multinationals are considered as resident firms.

Wholly owned foreign subsidiaries to a Swedish corporation are not taxable in Sweden for income accrued in foreign countries. Branches to Swedish corporations are taxed at the company level and all income, wherever earned, will be included in the Swedish tax base.

12.2.1 Mitigation of International Double Taxation.

The approach toward double taxation of foreign source income was originally to view foreign taxes as a cost of doing business, and they were therefore deductible as an expense. The present system is more complicated since credits are now allowed in addition to deductions, however, if the company claim a deduction the available credit will be reduced. For all practical purposes one may thus considered the present system as a credit system. The tax credit is allowed against national income taxes and the foreign taxes that can be so credited include national provincial and local taxes[3]. The tax credit has an upper limit which is determined as a fraction of the total national income tax; formally it can be written:

[2] "The Municipal Tax Act", (Kommunalskattelagen) KL §64(2).

[3] "Swedish National Income Tax Act," SI §6.1(a)

$$FTC^{max} = \theta \cdot T \tag{12.1}$$

where; FTC^{max} is the maximum foreign tax credit; θ : foreign taxable income/(foreign + national taxable income); and T is national income tax paid. The rate of maximum credit is therefore: $ftc^{max} = \theta$. As an example, assume that a person has income of 100 both at home and abroad. The tax rate abroad is 50% and at home 40%. The individual will thus have paid 50 in taxes abroad and 80 at home before the credit; the credit is: $\theta = 0.5 \cdot 80 = 40$, and total taxes paid on the 200 of income is 90 (50 abroad plus $80 - 40$ at home).

It is a feature of the general tax law that consolidated industrial groups, consisting of legally independent entities, are not taxed on the consolidated group income, but each company is taxed separately. It has been recognized that a negative side-effect of this rule is that intergroup dividends could be taxed several times before it reaches the ultimate owners. The internal tax law therefore specifies that intergroup dividends are tax-free for the receiving company if it possesses at least 25% of the voting power of the distributing company. This rule extends to foreign subsidiaries, and dividend income is therefore exempt from Swedish tax, and no foreign tax credit is therefore necessary. Withholding taxes on dividends instigated by the foreign country are creditable only in the case of less than a 25% share of the voting power. The motive behind this rule is that domestic and foreign shareholdings should be treated similarly. Other types of cash distributions, such as interest on intercompany loans, royalty, management or service fees, are taxable on receipt in Sweden. We may note that this rule makes the system for taxing international corporate income similar to a territorial system, in spite of the general character of the system as a residence system. Portfolio income from abroad for both companies and individuals are taxed on a worldwide basis, with crediting.

12.2.2 Deferral and Tax Avoidance

Deferral, which is a quite important issue in the U.S. policy discussion, is not a pertinent question in Sweden. The reason, as we have seen, is that companies are exempt from intergroup dividends, over the 25% ownership threshold. However, portfolio income of companies and individuals, in the form of dividends, is taxed when received. By definition of portfolio income the recipient will normally not be able to dictate whether dividends should be paid or not, but if they prefer capital gains they may invest in foreign stock with low dividend yields. A related question is whether a realized capital gain in the foreign country will automatically trigger home tax liability, in line with the worldwide principle, or if this income can be further deferred by reinvestment abroad.

In the U.S., reinvestment of income to defer a home tax liability, may be considered as producing "passive income" and, if in the form of cash distributions, will be taxed as it is distributed from the foreign source. In Sweden the tax code[4] grants the tax authorities power to raise the tax-base on the domestic taxpayers if they deem that a specific transaction will lead to a "not unessential" tax benefit. This general legislation against tax avoidance does, however, not cover the accumulation of "passive income". It's main area of use is to impede the use of transfer pricing to transfer income that would be highly taxed at home to a low-taxed country abroad.

Sweden has during a large part of the current century relied on regulations and direct controls on capital flows, to protect the country from what the authorities have considered as maleficent behavior. This would for example mean that a Swedish company would have to get the permission of the Central Bank to transfer capital abroad. The Central Bank would probably be loth to grant permission to invest in a known tax haven, for example. However, since 1989 much of these regulations has been abolished and the trend is toward greater freedom for individuals and companies to invest abroad.[5]

12.2.3 Double Taxation Treaties

The bilateral double taxation treaties determine which country has the prime right to tax a certain type of income, and if both countries are given such rights, if and how the consequent double taxation should be ameliorated. The guideline for most treaties today is the OECD model-treaty from 1963 (revised in 1977), in which different sources of income are defined and criteria for division of taxation rights suggested. Countries are not forced to follow the rules of the model treaty, but this is often the core of the individual treaties around which minor deviations that suit the two countries in the specific cases.

The model treaty suggests four basic sources of capital income: *i*) dividends; *ii*) interest; *iii*) capital gains and *iv*) royalty. We will consider the first three only.

Dividends. According to the model treaty, the resident country has the prime taxation right, but the source country may also tax dividends at restricted rates. These so called *withholding* taxrates are limited to 5% of the gross dividend paid if the recipient is a company controlling at least 25% of the equity of the paying company, and to 15% otherwise.

Interest. The resident country has the prime right, but the source country can impose a withholding tax subject to rate limitations, as with dividends. The limitation specifies that the tax rate does not exceed 10% of the gross interest paid. However, if the interest rate is unusually high, in the sense that it wouldn't have been applied in an arms-length agreement between the borrower and lender, the limitations only apply to the "normal" interest payments. The additional amount may be taxed outside the double taxation treaty's rules, and therefore be subject to full double taxation.

Capital Gains. Capital gains can accrue on different types of assets. The model treaty specifies four categories of which two are important for our pur-

[4] KL §43

[5] See Oxelheim, [80], for details on the deregulation movement.

Table 12.1: Tax rates on capital income under bilateral doubletaxation treaties with Sweden, as of 1986.

Income Source:	*Dividends, %*	*Interest, %*	*Capital Gains*	
			Fixed	*Movable*
France	E	E	E,S	E,S
Italy	10	15	R,S	R,S
Netherlands	E	E	R,S	R,S
West-Germany	5	E	E,S	E,S
Denmark	5	E	R,S	R,S
Norway	5	E	R,S	R,S
Finland	5	E	R,S	R,S
United Kingdom	E	E	R,S	R,S
United States	5	E	E,S	R,E
Canada	15	15	R,S	R,S

Comments: E=exemption system, S=source country and R=resident country. In the capital gains columns the first entry in each subcolumn refers to the resident country and the second entry to the source country; R,S means that both countries tax the capital gain; E,S means that the resident country exempts it and R,E that the source country exempts it, but not the home country.
Source: Price-Waterhouse.

poses: 1) fixed assets and 2) movable assets including financial assets. The source country has the prime taxation right of capital gains, but this does not preclude taxation in the resident countries at their normal rates. In the case of double taxation, it should be dealt with by the exemption or credit methods.

Table 12.1 provides a summary of taxation priorities, withholding tax rates and methods to attenuate double taxation, as specified in bilateral treaties with Sweden and the included countries, as of 1986.

12.3 Capital and Exchange Controls

Before the two World Wars capital movements across national borders were relatively unrestricted. Because of nationalistic, and protectionists sentiments during, between and after the wars, controls on capital movements in different forms, both inward and outward, were introduced in many countries (see, [79]).

Capital controls can take different forms, e.g., regulations on the amount of foreign exchange that could be brought in and out of a country, restrictions on ownership by foreigners of domestic assets and restrictions on the type of investments which domestic citizens can undertake abroad.

12.3.1 Swedish Capital Controls

The main pertinent legislation is the Foreign Exchange Act of 1939, most of which was abolished in 1989 but was in effect during the period covered by the empirical study. The legislation followed the "OECD Code of Liberalization of Capital Movements" in making a distinction between direct- and portfolio investments. The regulations differed substantially between these two categories:

Portfolio Investments. Outward portfolio investments were in principle prohibited (e.g., acquisitions of foreign bonds and shares or bank deposits). Capital inflows in form of Swedish loans in foreign currency were allowed if the maturity of the loan was at least two years. Trade credits and loans associated with regular trade in goods and services were virtually unregulated.

Direct Investments. Outward direct investments were in principle unrestricted subject to three conditions: *i*) they had to pass a test for "genuiness"; *ii*) they had to be financed abroad (between 1969 and 1981), and *iii*) passive investment through earnings retention was prohibited, (the so called "Höganäs" condition). If the last condition was violated, the controlling authority, which was the central bank, could force the company in question to repatriate the excess funds. Foreigners direct investment in Sweden is restricted (still) by other pieces of legislation, exempting certain types of assets and requiring permission each time certain ownership shares are reached in the case of joint-stock companies. Foreigners are also restricted in the type of share of such companies they can own.

The legislation concerning foreigners rights to acquire Swedish assets is currently in a process of considerable change that probably result in almost equal treatment of all citizens.

Chapter 13

Statistical Evidence

The main data set used in the empirical study consists of investment and financial data of subsidiaries and parent companies in the Swedish manufacturing industry. However, we shall first look at the aggregated direct investment data, as it is reported in the national accounts. In figure II.B.1 in Appendix II.B, the Swedish direct investment abroad (DIA) as a fraction of GNP is plotted as well as foreign direct investments (FDI) in Sweden. It is clear from this picture that starting in the late sixties Sweden has become a net exporter of capital in the form of direct investments. Furthermore, the ratio of DIAs to GNP shows a steep increase in the eighties while FDIs to GNP have been steady at 0.3%.

The main data set consists of financial data from Swedish controlled foreign companies, collected in five surveys: 1965, 1970, 1974, 1978 and 1986[1]. "Control" implies, in this context, an ownership share in the subsidiary that exceeds 50 %. Foreign direct investment is usually defined as investment in foreign corporations in which the domestic investor owns more than 10% of the voting stock. However, our data set is built up around information from consolidated industrial groups in which the parent company is a majority owner in each subsidiary, either directly or indirectly. The total number of parent companies included in each survey is from 1965 and onwards: 81, 107, 108, 116 and 108. The numbers of foreign subsidiaries in each survey are: 423, 454, 481, 567 and 643.

13.1 The Investment Series

The main goal of the empirical studies presented in this section is to estimate the sensitivity of foreign direct investments to changes in the effective corporate tax rate on these investments. To do so we would like to have gross investment data for each year over the entire period, and its distribution over host countries.

[1] These surveys have been conducted by 'The Industrial Institute for Economic and Social Research' in Stockholm. A survey for 1990 has also been done, but the time needed to collect and process the data has made it infeasible to include it in this study.

However, the data sets only give stock numbers for each survey year and the intervening rate of investment has to be interpolated. Before describing how this interpolation was done, we shall describe the information the stock data can give.

Various factors may influence how direct investments are distributed across countries. Examples of such factors are access to local resources, closeness to large markets, factor costs and investment incentives granted by the host country's government. The question why foreign direct investment takes place at all, instead of producing from the home base, has been answered by the supposition that companies in that way can take advantage of specific knowledge, which they have acquired at home and is not available to local entrepreneurs. This theory gives an explanation of why direct investments take place at all, but does not really address the question of what factors decide where these investments will be undertaken. We will come back to this question later, but we shall first look at how the distribution of Swedish DIAs has changed over time.

13.1.1 The Distribution of Direct Investments

We selected ten host countries on the basis of their importance, on average over the whole period, as receivers of Swedish direct investments. The distribution of direct investments across these host countries is given in table 13.1.1, which shows how the number of subsidiaries has changed between surveys[2].

Another illustration is given in figures II.B.2 and II.B.3 which show the distribution of the (book) asset value of Swedish foreign controlled firms across a wider set of host countries for the beginning and end of the entire observation period, respectively.

From both type of illustrations one may observe that the change in relative positions over the period has been mostly in favor of the U.S. and Canada, while for example Norway, Denmark and West Germany's relative positions have declined.

13.1.2 Initial Transfers Series

We argued above that initial transfers should be more responsive to host country tax rates than investments in existing subsidiaries. In order to make the best use possible of the information contained in the data set, we would like to have yearly observations on initial transfers. What we have is, however, only information about the (book) values of assets at the first survey date after the initial transfer, as well as the year of that transfer. For example, an investment may have been undertaken in 1983, through an initial transfer of cash, but we will only have information about the capital stock at the end of 1986. To estimate the size of

[2] In a few instances companies has failed to answer the survey for a particular year but rejoins in the next survey, and is recorded as drop outs in one survey year and addition the next in spite of them being existing over the whole period. This introduces some uncertainty into this table, however, the main trend in the localization pattern is captured.

Table 13.1: Number and changes in the stock of Swedish owned subsidiaries in the included host countries, 1965-86.

	1965	1970	1974	1978	1986
United States					
No. of firms	16	21	25	35	73
Additions		9	9	12	60
Drop-outs		4	5	2	22
United Kingdom					
No. of firms	26	27	34	43	49
Additions		6	10	20	27
Drop-outs		5	3	11	21
West Germany					
No. of firms	37	50	56	49	60
Additions		13	17	7	37
Drop-outs		0	11	14	26
France					
No. of firms	23	28	39	45	52
Additions		9	19	11	39
Drop-outs		4	8	5	32
Italy					
No. of firms	17	20	18	19	32
Additions		4	4	8	29
Drop-outs		1	6	7	16
Netherlands					
No. of firms	31	29	28	33	24
Additions		3	12	8	16
Drop-outs		5	13	13	25
Denmark					
No. of firms	31	29	27	25	29
Additions		5	11	8	24
Drop-outs		7	13	10	28
Norway					
No. of firms	28	27	26	17	21
Additions		7	12	9	21
Drop-outs		8	13	18	17
Finland					
No. of firms	23	26	36	39	40
Additions		9	20	22	36
Drop-outs		6	10	19	35
Canada					
No. of firms	9	6	13	16	16
Additions		0	9	6	15
Drop-outs		3	2	3	15

Table 13.2: Investments in new capital (greenfield+acquisitions) by Swedish Multinational corporations in selected host countries, 1966-86.

	France	Italy	Netherl.	Germany	Denmark	Norway	Finland	UK	USA	Ca
1966	88.19	0	0	38.74	6.77	0	35.57	0	0	
1967	120.74	0	38.39	101.20	0	0	0	121.05	0	
1968	131.64	56.20	79.92	37.86	0	73.05	2.42	20.76	0	
1969	172.38	5.26	136.47	78.24	565.84	0	13.19	26.76	64.59	
1970	48.20	0	0	0	48.26	19.86	27.39	0	0	
1971	189.35	56.61	174.09	902.70	63.19	10.39	53.90	30.17	122.92	[illegible]
1972	164.18	17.48	40.84	166.83	7.26	34.57	52.46	44.81	0	
1973	51.29	0	24.18	890.86	23.22	111.73	33.30	245.54	88.22	[illegible]
1974	0	0	81.05	348.58	0	0	15.37	17.21	0	[illegible]
1975	1068.45	0	2540.89	52.69	88.27	31.11	19.17	1144.72	134.93	
1976	121.25	0	306.63	304.68	262.41	0	21.22	175.32	1033.96	[illegible]
1977	72.87	22.21	0	1.91	3.85	0	22.16	426.41	819.11	
1978	172.99	17.75	0	564.80	21.28	64.60	11.45	157.92	64.95	
1979	1071.86	0	494.94	132.96	0	269.12	15.14	63.05	174.10	
1980	1335.12	1112.64	0	358.08	1155.47	148.14	23.49	158.71	4303.24	
1981	50.53	0	370.74	97.65	156.24	0	270.57	483.25	4473.30	[illegible]
1982	135.94	62.32	104.30	250.67	51.26	38.03	107.15	48.28	416.49	[illegible]
1983	238.51	313.49	0	404.42	388.04	115.08	1.50	288.71	814.78	
1984	238.83	0	196.99	496.93	5.34	576.03	40.12	36.86	1057.54	
1985	234.18	232.05	66.16	790.89	93.58	51.88	66.92	66.54	943.36	[illegible]
1986	49.85	4794.42	134.44	137.18	37.08	1.74	47.60	190.49	10459.56	[illegible]

Comments: Measurement units are million SEK, deflated by Swedish GDP-deflator taken from IMF's international financial statistics, 1980 prices.

the initial capital stock (which we call initial transfer here), we must make some assumptions about the rate of investment in the subsidiary in 1984 to 1986.

The procedure we use to estimate the size of the initial transfer is to make the assumption that the average investment ratio, $i = I/K$, over each subperiod and for each country, of the existing firms, also applies to new firms. From this assumption and the data on the asset values, it is possible to go backwards and estimate the size of the initial transfer, using an assumed depreciation rate of ten percent.

To explain this procedure in more detail, we start with the following formula which shows the evolution of the subsidiary's capital stock:

$$K_T = K_{T-S}(1-\delta)^S + I_{T-S+1}(1-\delta)^{S-1} + \cdots + I_T \tag{13.1}$$

where T is the date of the first survey after the initial transfer; S is the number of years before the survey. Using the assumption of the investment ratio, the investment in year T can be calculated from:

$$I_T = i \cdot K_T \tag{13.2}$$

Plugging this into equation (13.1) one may calculate the preceding years' capital stocks and investments. The transfer series calculated in this way is given in table 13.2.

It should be noted that, besides the approximations introduced by the assumptions made, a further problem is that no information is given about the date when a subsidiary was dropped from the data set,

13.2 Sources of Funds

The stock of foreign invested capital depends on the cost of capital that in turn depends on the marginal source of funds. The main data set provides stock estimates of the proportion of debt and equity at the survey dates, at book values. It does not suggest whether any transfer of new equity funds from the parent has taken place, only the aggregate effect of such transfers plus retained earnings is possible to observe. The Central Bank has conducted a survey covering the years 1982-85 (see [40]); the result of which is given in figure II.B.5. It may be observed from this figure that the dominant (average) source of funds is local debt, while retained earnings is an insignificant source during these years. It should be pointed out that from 1969 to 1986 a requirement for undertaking a foreign direct investment was that it was externally financed by debt raised in local capital markets. From 1983 companies were allowed to raise equity funds abroad, which meant a relatively large increase in new equity issues of Swedish companies on foreign stock markets during the first years after that regulation was lifted.

From the main data set we can observe the evolution of the capital structures of the subsidiaries. In table II.B.6, the "gearing ratio," defined as total book value of debt divided by total (book) assets, is given; this ratio crept up from 1965 to 1978 and declined somewhat after that.

It is possible that the above mentioned finance requirement has forced firms to work with higher debt levels than they would have done if completely unconstrained. The jump in equity issues abroad in 1983 seems to support this view. A suboptimal capital structure implies a higher cost-of-capital and therefore a lower capital stock, removal of such constraints could therefore have implied a surge in DIAs during an adjustment period.

To further investigate the issue of the marginal source of funds we now turn to the main dataset to study the dividend repatriation behavior of the included firms. [3] Tables 14.2 to 14.5 summarize the dividend- and dividend-repatriation behavior of subsidiaries from some selected host countries. The number of subsidiaries repatriating dividends have been relatively stable around 25% of the total number of firms, and the dividend ratio (dividends as percentage of profits after tax) is usually below 50%. This seems to suggest that retained earnings remains an important source of funds, in contrast to the Central Bank's survey result discussed above. The dividend repatriation behavior also seems to suggest a lower dividend-repatriation behavior than one would expect given the tax-free status of inter-company dividends. On the other hand, a withholding tax usually has to be paid to the host country, this tax has however been lowered in latter years through bilateral double-taxation treaties.

Comparing the dividend behavior with the theoretical discussion, we may conclude that the assumption of a fixed repatriation ratio seems unwarranted, given the low fraction of firms paying dividends.

[3] The dividend repatriation decision is analyzed separately in section 14

13.3 Rate of Return, Tax Rates and Tax Incentives

13.3.1 Statutory Tax Rates and Tax Incentives

The calculations of effective tax rates, taking into account various tax incentives, was discussed in section 11. Summaries of the actual developments of these tax factors are given in tables II.B.1, II.B.2, II.B.3 and II.B.4 in Appendix II.B.

13.3.2 Rates of Return and Effective Average Tax Rates

The average rate of return in different countries before tax may be seen as a first approximation to each country specific rents which may attract capital.

In table 13.3 a measure of average return is calculated for some host countries for which comparable data was available. The variable, R_0, is defined as earnings after tax plus taxes and interest on debt, divided by the total capital stock in each country.[4] An after tax rate of return, R_T, is calculated as: earnings after tax plus interest on debt minus imputed tax deductions due to interest payments.[5] Subtracting taxes yields a measure of the after tax returns, which is given in table 13.4. From these two return definitions a measure of average effective tax rates in each country can be calculated as:

$$\bar{\tau} = \frac{R_0 - R_T}{R_0} \tag{13.3}$$

There is some evidence of convergence in average effective tax rates. We calculated standard deviations of tax rates across countries from 1967 and onwards, and took a five-year moving average of these standard deviations. The results are that the moving average for the period 1967-71 was 12.2%, which had fallen to 5.3% for 1979-83, and increased slightly to 7.3% for the last five-year period (1982-86). The downward trend was relatively continuous up to 1981, after which it turned up somewhat.

Table 13.6 shows correlation coefficients between effective tax rates for the six countries for which we have data from 1970-1986. Panel A shows the contemporaneous correlations, and panels B and C show the correlations with the U.S. and West-Germany as "leaders", respectively; i.e., all other countries' tax rates are lagged one period. The contemporaneous correlation between the U.S. and West-Germany is quite high, 0.543, (it is 0.696 for the period 1965-1986), and even higher when West-Germany is lagged one period (0.719). Sweden shows a positive correlation with the three "large" countries, but small and negative correlation with the neighbouring countries, Norway and Finland. Finland is the most autonomous of the included countries, something that may be explained

[4] Since we do not have (the correct) market values of financial debt and equity, we use book values of total assets instead.

[5] This definition is taken from [5].

by stricter capital controls, which were in place for a longer time than in Sweden and Norway. The negative correlation in the case of Norway cannot be explained in the same way, at least not if compared to Sweden since those countries deregulated externally at the same time.[6]

These results suggest that the U.S. has been a leader in the tax game, and that most other countries have chosen to follow, especially if they also have moved toward less restricted international capital flows of all types.

For some periods the effective average tax rates calculated from firm data over profits and tax payments change relatively much from year to year, sometimes in spite of any significant change in statutory tax rules, or other tax factors. This could happen, for example during recessions, when aggregated profits are low. Due to minimum tax rate "floors" below which tax payments do not fall, the average tax rate may be artificially high during such periods. Furthermore, most tax systems are asymmetrical, to varying extent, which means that a loss would not entitle the company to an immediate refund. This fact will also increase the measured average tax rate.

13.3.3 Marginal Tax Rates

Marginal tax rates are not observable and must be estimated. The estimation methodology is well known and described in, for instance [63]. The two polar approaches used is: 1. to assume a fixed pretax rate of return for investment in each host country; 2. to assume a fixed posttax rate of return. In this study the first approach is used. The method used was explained in section 11.2. The marginal tax rates given in table 13.7 are calculated from available information about statutory tax rates and investment incentives.

[6] See [80] for details of the Nordic deregulation process.

Table 13.3: Average rate of return on total capital before corporate tax in selected countries 1965-86.

	USA	UK	France	West-Germany	Nether-lands	Norway	Finland	Sweden
1965	0.063			0.084				
1966	0.065			0.079				
1967	0.061			0.079			0.057	0.062
1968	0.059			0.078			0.060	0.078
1969	0.056			0.081		0.050	0.063	0.046
1970	0.048		0.076	0.079		0.047	0.060	0.043
1971	0.045		0.071	0.079		0.043	0.063	0.038
1972	0.047		0.069	0.076		0.041	0.061	0.041
1973	0.053		0.088	0.068		0.049	0.072	0.045
1974	0.049		0.121	0.068		0.059	0.109	0.038
1975	0.049		0.075	0.071		0.051	0.059	0.043
1976	0.048		0.081	0.075		0.057	0.053	0.044
1977	0.051		0.076	0.068		0.051	0.051	0.036
1978	0.057		0.066	0.061	0.064	0.053	0.062	0.057
1979	0.065		0.086	0.064	0.087	0.078	0.092	0.053
1980	0.061	0.057	0.104	0.070	0.062	0.080	0.092	0.056
1981	0.065	0.051	0.106	0.071	0.065	0.114	0.078	0.064
1982	0.052	0.047	0.098	0.065	0.055	0.114	0.064	0.078
1983	0.051	0.042	0.095	0.059	0.058	0.131	0.069	0.071
1984	0.063	0.048	0.100	0.058	0.070	0.146	0.068	0.059
1985	0.059	0.052	0.089	0.058	0.068	0.108	0.066	0.071
1986	0.055	0.051	0.088	0.059	0.064	0.093	0.056	0.081
Average:	0.056	0.050	0.088	0.070	0.066	0.076	0.068	0.055
Std.dev.:	0.006	0.004	0.015	0.008	0.009	0.033	0.014	0.014

Source: OECD Financial Statistics, Part 3, 1989, Non-Financial Enterprises-Financial Statements; Statistics Sweden Enterprise Surveys, and own calculations.

Table 13.4: Average rate of return on total capital after corporate tax in selected countries, 1965-86.

	USA	UK	France	West-Germany	Nether-lands	Norway	Finland	Sweden
1965	0.057			0.072				
1966	0.057			0.066				
1967	0.053			0.065			0.029	0.053
1968	0.049			0.065			0.030	0.063
1969	0.043			0.069		0.050	0.037	0.038
1970	0.036		0.051	0.066		0.047	0.035	0.033
1971	0.036		0.047	0.063		0.043	0.033	0.028
1972	0.038		0.046	0.060		0.041	0.032	0.032
1973	0.041		0.059	0.052		0.049	0.037	0.037
1974	0.033		0.085	0.049		0.059	0.080	0.027
1975	0.038		0.042	0.051		0.051	0.030	0.031
1976	0.038		0.050	0.058		0.057	0.023	0.031
1977	0.040		0.045	0.052		0.051	0.024	0.018
1978	0.043		0.037	0.049	0.042	0.025	0.038	0.039
1979	0.046		0.056	0.050	0.087	0.046	0.065	0.033
1980	0.042	0.057	0.068	0.051	0.062	0.049	0.063	0.033
1981	0.044	0.051	0.063	0.046	0.065	0.078	0.049	0.037
1982	0.036	0.047	0.055	0.042	0.055	0.075	0.036	0.051
1983	0.039	0.042	0.054	0.042	0.058	0.092	0.037	0.048
1984	0.049	0.048	0.061	0.042	0.070	0.109	0.039	0.044
1985	0.046	0.052	0.053	0.043	0.068	0.077	0.036	0.051
1986	0.043	0.051	0.060	0.045	0.064	0.059	0.035	0.063
Average:	0.043	0.036	0.055	0.054	0.048	0.048	0.039	0.039
Std.dev.:	0.007	0.004	0.011	0.009	0.008	0.027	0.014	0.012

Source: OECD Financial Statistics, Part 3, 1989, Non-Financial Enterprises-Financial Statements; Statistics Sweden Enterprise Surveys, and own calculations.

Table 13.5: Effective average corporate tax rate in selected countries, 1965-86.

	USA	UK	France	West-Germany	Nether-lands	Norway	Finland	Sweden
1965	0.097			0.146				
1966	0.119			0.175				
1967	0.132			0.176			0.483	0.154
1968	0.171			0.167			0.505	0.130
1969	0.229			0.155		0.366	0.403	0.186
1970	0.256		0.327	0.167		0.431	0.415	0.223
1971	0.196		0.336	0.203		0.494	0.480	0.265
1972	0.175		0.343	0.209		0.518	0.472	0.233
1973	0.235		0.329	0.236		0.421	0.490	0.215
1974	0.339		0.302	0.271		0.372	0.268	0.278
1975	0.241		0.438	0.277		0.473	0.494	0.284
1976	0.215		0.386	0.217		0.444	0.567	0.308
1977	0.206		0.412	0.231		0.474	0.530	0.485
1978	0.243		0.439	0.200	0.338	0.540	0.394	0.319
1979	0.282		0.343	0.219	0.309	0.413	0.289	0.371
1980	0.323	0.365	0.351	0.269	0.357	0.385	0.314	0.409
1981	0.311	0.334	0.405	0.351	0.358	0.312	0.375	0.420
1982	0.307	0.314	0.444	0.347	0.327	0.345	0.433	0.344
1983	0.231	0.272	0.425	0.281	0.234	0.296	0.462	0.325
1984	0.228	0.232	0.387	0.271	0.178	0.252	0.427	0.261
1985	0.214	0.221	0.403	0.259	0.194	0.287	0.450	0.283
1986	0.212	0.188	0.324	0.236	0.196	0.369	0.383	0.220
Average:	0.226	0.275	0.376	0.230	0.277	0.400	0.432	0.286
Std.dev.:	0.062	0.060	0.046	0.055	0.071	0.080	0.077	0.088

Source: OECD Financial Statistics, Part 3, 1989, Non-Financial Enterprises-Financial Statements; Statistics Sweden Enterprise Surveys, and own calculations.

Table 13.6: Correlation coefficients between effective tax rates in six countries, 1970-1986.

	USA	Germany	France	Norway	Finland	Sweden
A:						
USA	1.000					
Germany	0.543	1.000				
France	-0.052	0.453	1.000			
Norway	-0.332	-0.636	-0.097	1.000		
Finland	-0.738	-0.176	0.386	0.261	1.000	
Sweden	0.367	0.389	0.447	-0.053	-0.112	1.000
B:						
USA	1.000					
Germany	0.719	1.000				
France	0.504	0.387	1.000			
Norway	-0.306	-0.665	-0.076	1.000		
Finland	-0.080	-0.212	0.392	0.265	1.000	
Sweden	0.380	0.307	0.401	-0.029	-0.127	1.000
C:						
USA	1.000					
Germany	0.193	1.000				
France	-0.042	0.622	1.000			
Norway	-0.338	-0.618	-0.076	1.000		
Finland	-0.738	0.138	0.392	0.265	1.000	
Sweden	0.397	0.053	0.401	-0.029	-0.127	1.000

Comments: Table A shows contemporaneous correlations; Table B shows correlations with all countries lagged one period against the U.S.; Table C shows correlations with all countries lagged one period against West-Germany.

13.4 Econometric Models

We will start by considering the driving forces behind the aggregate outflow of direct investment from Sweden. This is called the aggregated model below. The dependent variable in this model is gross investment abroad divided by the aggregate capital stock of the parent companies. The ratio form is used to correct for the growth of the Swedish economy and the manufacturing sector.

The independent variables used are:

$INDP$:	an index of industrial production in each country, weighted by the relative country sizes;
$REXCH$:	a trade-weighted multilateral real exchange rate relative to the Swedish krona;
CF:	cashflow of large manufacturing companies in Sweden;
R:	rate of return on total investment in Sweden;
$AVGTAX$:	average effective tax rate in Sweden.

The index of industrial production is included as a proxy for expectations of higher future growth, and profitability, abroad. The exchange variable is included to capture effects of relative price changes on capital goods. The remaining variables are intended to capture effects which tend to keep, or push-out investment, in/from Sweden. The availability of internally generated investment funds may promote both inward and outward investments. This growth related issue has not been discussed above, at least not the question of growth on the macro level. What was discussed in sections 8 to 10, was a static scenario where only tax factors influenced the relative attractiveness of each location. The cashflow variable is intended to capture expected growth aspects, and we include the rate of return variable as a measure of static, pre-tax, factors which change the relative attractiveness of Sweden as an investment location.

The predicted signs of $INDP$, CF and $AVGTAX$ are positive, while the coefficents of $REXCH$ and R are expected to be negative. Table 13.8 shows the results of OLS regressions, with four different models. The observation for 1986 contains one transaction (an acquisition of an existing U.S. firm), which dominates the whole series and can be considered as an outlier. We dealt with that by excluding 1986 from the regressions which improved the explanatory power of the model significantly. The results for the whole sample period is given in table II.B.5 in Appendix II.B.

The other category of econometric models to be tested is investment into the various host countries. The dependent variable is the investment volume of initial transfers, the series is deflated by the Swedish GDP-deflator, and the unit of measurement is 100 million SEK, at 1980 prices. We use both the common OLS specification and the Tobit model specification. The Tobit specification is used when the dependent value is censored, i.e., only nonnegative values are recorded. We use the same set of control variables as for the aggregated model (except for CF), but instead of weighted indices of industrial production we

Table 13.7: Calculated marginal tax rates for hypothetical projects yielding 10% real rate of return before corporate tax. Fixed-p case (see text for explanation).

	France	Italy	Netherl.	Germany	Denmark	Norway	Finland	UK	USA	Canada
1965	0.349	0.203	0.418	0.470	0.409	0.446	0.364	0.293	0.431	0.349
1966	0.351	0.203	0.427	0.470	0.311	0.466	0.364	0.279	0.431	0.349
1967	0.349	0.203	0.330	0.470	0.311	0.466	0.502	0.234	0.441	0.349
1968	0.351	0.203	0.322	0.495	0.260	0.455	0.603	0.234	0.488	0.362
1969	0.351	0.203	0.342	0.495	0.260	0.455	0.501	0.234	0.485	0.362
1970	0.351	0.203	0.342	0.495	0.260	0.419	0.491	0.234	0.453	0.288
1971	0.349	0.203	0.342	0.495	0.260	0.420	0.462	0.278	0.441	0.252
1972	0.349	0.203	0.342	0.495	0.260	0.422	0.462	0.287	0.403	0.316
1973	0.349	0.203	0.380	0.510	0.260	0.422	0.462	0.287	0.403	0.335
1974	0.349	0.262	0.380	0.510	0.268	0.422	0.462	0.367	0.403	0.349
1975	0.351	0.308	0.380	0.495	0.268	0.422	0.474	0.367	0.403	0.328
1976	0.351	0.308	0.380	0.495	0.255	0.422	0.474	0.367	0.403	0.310
1977	0.351	0.308	0.380	0.520	0.260	0.422	0.474	0.367	0.403	0.310
1978	0.351	0.355	0.380	0.520	0.260	0.422	0.474	0.367	0.403	0.310
1979	0.351	0.355	0.380	0.520	0.260	0.422	0.498	0.367	0.384	0.310
1980	0.351	0.355	0.380	0.520	0.260	0.422	0.472	0.367	0.384	0.333
1981	0.351	0.355	0.380	0.520	0.289	0.422	0.472	0.367	0.324	0.329
1982	0.349	0.355	0.380	0.520	0.289	0.390	0.472	0.367	0.324	0.329
1983	0.349	0.262	0.380	0.520	0.293	0.390	0.472	0.367	0.324	0.231
1984	0.349	0.262	0.287	0.520	0.293	0.247	0.472	0.367	0.324	0.231
1985	0.349	0.262	0.287	0.520	0.293	0.247	0.472	0.339	0.324	0.382
1986	0.307	0.262	0.287	0.520	0.382	0.247	0.373	0.314	0.304	0.382

use the indices of industrial production and real exchange rates, respectively, for each individual host country. The different models are distinguished on the basis of the tax variable used. In addition to the host countries' average tax rates, $AVGTAX$, we relate this variable to the corresponding tax variable, and define the relative tax rate, $RELTAX$ as: $(1-\tau_j)/(1-\tau_{Sw})$; where τ_j is the average effective tax rate of host country j and τ_{Sw} is the same tax rate for Sweden. This variable show the degree to which taxation reduces the rate of return in country j, relative to how it reduces it in Sweden. A high value implies a favorable tax situation in country j compared to investing in Sweden, and vice versa for a low value. One would thus expect a positive coefficient of this variable. $MARGTAX$ is an estimated marginal tax rate, as described above, with a negative predicted coefficient.

13.4.1 Results for Outward Investments

The results indicate that the explanatory power of the sample excluding 1986, is higher than the larger sample, for most of the models. The contemporaneous *rate of return*, in Sweden does not seem to have much effect on outward investment decisions. The *cashflow* variable does have significant effects in most model variants, a result that is supportive of the Keynesian theory that predicts that investment volume should be highly correlated with contemporaneous cashflow. This could be considered as a push factor, the availability of internal funds makes it possible to undertake investments, both at home and abroad. The level of *industrial production* abroad can be considered as pull factor; the expansion of industry abroad attracts investment through increased demand of investment goods etc. It also has the predicted positive sign in all models, and is often

Table 13.8: Results of regressions of direct investment abroad by Swedish multinationals, 1965-86.

Model No.	Constant	CF	INDP	REXCH	*R*	AVGTAX	R^2	F-value
1	0.272	0.155	0.101	-0.405			0.49	5.17**
	(1.689)	(2.464)**	(3.236)**	(-2.164)**				
2	0.244	0.162	0.098	-0.366	-0.281		0.46	3.02
	(1.311)	(2.336)**	(2.635)**	(-1.628)	(-0.366)			
3	0.157	0.187	0.037	-0.244	-0.123	0.127	0.53	3.25**
	(0.826)	(2.702)**	(0.663)	(-1.045)	(-0.270)	(1.414)		
4	0.174	0.183	0.037	-0.268		0.129	0.53	3.98**
	(1.009)	(2.804)**	(0.695)	(-1.279)		(1.488)		

Comments: Timeseries estimation from 1965-85. The dependent variable is total direct investment divided by total assets of parent companies. Numbers in parentheses are t-values. ** and * show significance at the 5 and 10% level, respectively.

significant. A more correct indicator than the same year rate of return or industrial production would be the expectation of the future values of these variables. These are of course unobservable, but it one assumes rational expectations one could use the next year values as instruments for the expected values of these variables. We tried this approach by replacing the current level of industrial production with the next period value of this variable, the results are given in table II.B.6. The conclusions are not considerably different from those given in table 13.8.

The *real exchange rate* ought to be negatively related to the volume of DIAs, since the higher it is the more expensive foreign assets are measured in Swedish kronor. This is also the case for most models, although it is only significant at the five-percent level in three cases. The *tax variables* enter insignificantly, albeit with the right sign.

13.4.2 Results for the Five Country Estimations

The estimation results for a subsample of countries for which we were able to calculate average effective tax rates are shown in tables 13.9-13.12. Model 1, which includes $INDP$, $REXCH$ and $AVGTAX$ as explanatory variables, yields poor results for France, West-Germany and Norway but better results for Finland and the U.S. For the U.S. the results differ greatly between the a- and b-variants; the level of industrial production has for example a negative sign in the a-variant while it is positive in the b-variant. The real exchange rate shows mixed signs between countries and is often insignificant; the same conclusion goes for $AVGTAX$. The Tobit estimates do not change considerably in either signs or levels of significance compared with their OLS counterparts.

In table 13.10, $AVGTAX$ is replaced by $RELTAX$. This model gives somewhat better results for the U.S., but the tax variable is still insignificant in most cases, otherwise the conclusions from table 13.9 do not change greatly when using $RELTAX$ instead of $AVGTAX$. The results are again not considerably changed in the Tobit estimations.

Tables 13.11 and 13.12 show the results of adding a rate of return variable, R, to the two models discussed above. The results are even less conclusive when this variable is added. The conclusions from the earlier models do not change in this case either.

In tables II.B.7 and II.B.8 the models discussed above are re-estimated by the method of "seemingly unrelated regression". This method generally improves the efficiency of the estimates, by taking account of any existing correlation among the residuals of all the included equations.[7] It is thus a method of system estimation although no jointly determined variables appear in any equation. The results still do not yield any conclusive results, the tax variables change in sign between countries and are insignificant.

13.4.3 Estimation Results for the Ten Country Sample.

Tables 13.13 and 13.14 show the results for OLS and Tobit estimation on the whole set of host countries for a model where the tax variable is the analytically calculated marginal tax rates. This variable, $MARGTAX$, does not vary unless an explicit change has taken place is the tax rules. The variation for some countries, such as West-Germany, is therefore very slight, which in turn implies that it becomes difficult to detect any significant effects. The results do however, usually yield correct (negative) signs, but always with insignificant coefficients.

Table II.B.9 shows the results of seemingly unrelated regressions; the tax variable is negative and significant for three countries and positive and significant in two cases. The results for the U.S. are particularly interesting, due to the comparably frequent and well recognized tax changes that have taken place where. We may conclude that, for the U.S., the model with marginal tax rates does seem to be at least as good as the model with average effective tax rates discussed in the preceding section.

One may also contemplate using both the average and the marginal tax rates. The average tax rate may be important in deciding the localization of a new company, while the marginal tax rate is the correct rate to use for investment by retained earnings, or additional equity infusions in already established companies. This formulation of the model was also tried, but the results did not alter the previous conclusions and is not reported. It was, furthermore, not possible to estimate foreign direct investment through retained earnings, separetely, since we cannot estimate any year by year changes in a way similar to what we have

[7] A problem with this method is that the estimated standard errors of the coefficients are sensitive to the normalization chosen for the dependent variable, something that is not so for the OLS method; this problem implies that the results have to be interpreted with some caution.

done for initial transfers. It will simply be to few observations to correlate with changes in marginal tax rate to obtain any useful results.

Table 13.9: Results of regressions of initial transfers for individual host countries, Model 1: OLS and Tobit estimation

	Constant	INDP	REXCH	AVGTAX	R^2	F-value	N
OLS							
France	13.45	4.723	-18.58	7.333	0.037	0.166	17
	(0.097)	(0.176)	(-0.163)	(0.230)			
W-Germany	-6.493	8.577	-0.896	-4.790	0.154	1.04	21
	(-1.171)	(1.452)	(-0.315)	(-0.307)			
Norway	0.435	0.822	2.094	-7.799	0.27	1.74	18
	(0.019)	(0.567)	(0.090)	(-1.057)			
Finland	-3.331	1.029	2.008	0.189	0.27	2.00*	20
	(-0.816)	(1.741)*	(0.614)	(0.093)			
USA(a)	-141.99	-33.49	149.25	130.04	0.41	3.97**	21
	(-2.811)	(-0.586)	(1.792)*	(0.984)			
USA(b)	-3.267	52.70	-62.82	27.60	0.35	2.89*	20
	(-0.088)	(1.474)	(-1.058)	(0.356)			
TOBIT						LR	
France	17.93	3.498	-22.63	10.16		0.704	17
	(0.142)	(0.143)	(-0.218)	(0.348)			
W-Germany	-6.636	8.193	-0.753	-3.051		3.316	21
	(-1.280)	(1.480)	(-0.283)	(-0.208)			
Norway	-5.081	1.598	4.350	-4.231		4.682	18
	(-0.193)	(0.895)	(0.159)	(-0.493)			
Finland	-3.171	1.088	1.690	0.114		7.448*	20
	(-0.851)	(2.011)**	(0.565)	(0.062)			
USA(a)	-216.86	-8.149	155.12	22.93		14.97***	21
	(-3.360)	(-0.130)	(1.712)*	(1.364)			
USA(b)	-47.60	68.45	-59.79	83.75		13.47***	20
	(-1.044)	(1.715)*	(-0.913)	(0.851)			

Comments: Explanatory variables are: INDP, REXCH and AVGTAX; ***, **, * show significance at the 1, 5 and 10% level, respectively; N is the number of observations and LR is the value of the likelihood ratio statistic; t-values in parentheses.

Table 13.10: Results of regressions of initial transfers for individual host countries, Model 2: OLS and Tobit estimation.

	Constant	INDP	REXCH	RELTAX	R^2	F-value	N
OLS							
France	102.78	-17.19	-91.12	19.58	0.11	0.65	17
	(0.652)	(-0.530)	(-0.710)	(1.077)			
W-Germany	-1.348	12.46	-2.603	-8.588	0.26	2.01	21
	(-0.221)	(2.094)**	(-0.967)	(-1.605)			
Norway	-8.132	1.100	4.064	3.470	0.27	1.68	18
	(-0.407)	(0.790)	(0.178)	(0.989)			
Finland	-3.129	1.010	1.930	-0.024	0.27	1.99	20
	(-0.809)	(1.820)*	(0.589)	(-0.026)			
USA(a)	-91.12	16.81	86.11	-19.63	0.39	3.57**	21
	(-1.675)	(0.407)	(1.348)	(-0.477)			
USA(b)	1.361	60.90	-76.13	4.795	0.35	2.85*	20
	(0.040)	(2.510)**	(-1.709)*	(0.204)			
TOBIT						LR	
France	98.29	-15.25	-88.44	17.93		1.68	17
	(0.681)	(-0.512)	(-0.752)	(0.414)			
W-Germany	-1.520	12.25	-2.373	-8.503		5.96	21
	(-0.266)	(2.198)**	(-0.939)	(-1.699)*			
Norway	-8.918	1.889	4.807	1.325		4.54	18
	(-0.364)	(1.123)	(0.170)	(0.315)			
Finland	-3.195	1.075	1.717	0.093		7.45*	20
	(-0.905)	(2.113)**	(0.574)	(0.110)			
USA(a)	-162.39	55.33	68.68	5.766		13.20***	21
	(-2.471)	(1.130)	(0.965)	(0.125)			
USA(b)	-35.75	89.23	-95.81	17.55		13.23***	20
	(-0.911)	(3.124)**	(-1.979)**	(0.687)			

Comments: Explanatory variables are: INDP, REXCH and RELTAX; ***, **, * show significance at the 1, 5 and 10% level, respectively; N is the number of observations and LR is the value of the likelihood ratio statistic; t-values in parentheses.

Table 13.11: Results of regressions of initial transfers for individual host countries, Model 3: OLS and Tobit estimation.

	Constant	R	INDP	REXCH	AVGTAX	R^2	F-value	N
OLS								
France	23.91	-59.60	7.778	-28.07	3.600	0.04	0.13	17
	(0.161)	(-0.282)	(0.261)	(-0.229)	(0.101)			
W-Germany	12.42	-174.61	5.994	-3.288	-4.207	0.21	1.04	21
	(0.645)	(-1.025)	(0.935)	(-0.894)	(-0.270)			
Norway	-5.436	59.04	-1.186	2.024	5.278	0.39	2.11	18
	(-0.251)	(1.620)	(-0.642)	(0.092)	(0.494)			
Finland	-2.520	-6.783	1.037	2.107	-0.859	0.28	1.45	20
	(-0.531)	(-0.366)	(1.706)*	(0.624)	(-0.243)			
USA(a)	-245.26	1404.05	-97.12	228.02	248.39	0.48	3.75**	21
	(-2.898)	(1.493)	(-1.392)	(2.370)**	(1.654)*			
USA(b)	-66.83	777.88	13.51	-9.468	97.86	0.43	2.80*	20
	(-1.159)	(1.409)	(0.304)	(-0.137)	(1.084)			
TOBIT							LR	
France	48.96	-168.33	11.72	-50.78	0.554		1.38	17
	(0.371)	(-0.807)	(0.445)	(-0.465)	(0.018)			
W-Germany	14.60	-196.17	5.261	-3.430	-2.263		4.87	21
	(0.832)	(-1.263)	(0.900)	(-1.029)	(-0.159)			
Norway	-13.65	79.81	-0.965	4.355	14.05		8.45*	18
	(-0.563)	(2.008)**	(-0.476)	(0.175)	(1.136)			
Finland	-2.564	-5.101	1.093	1.771	-0.671		7.54	20
	(-0.611)	(-0.311)	(2.027)**	(0.591)	(-0.214)			
USA(a)	-242.10	475.43	-29.19	177.31	248.06		15.11***	21
	(-2.610)	(0.381)	(-0.352)	(1.660)*	(1.443)			
USA(b)	-62.91	257.56	55.96	-45.37	96.83		13.59***	20
	(-1.003)	(0.355)	(1.063)	(-0.594)	(0.939)			

Comments: Explanatory variables are: R, INDP, REXCH and AVGTAX; ***, **, * show significance at the 1, 5 and 10% level, respectively; N is the number of observations and LR is the value of the likelihood ratio statistic; t-values in parentheses.

Table 13.12: Results of regressions of initial transfers for individual host countries, Model 4: OLS and Tobit estimation.

	Constant	R	INDP	REXCH	RELTAX	R^2	F-value	N
OLS								
France	0.809	-1.107	-0.240	-0.302	0.094	0.47	2.62	17
	(1.072)	(-1.119)	(-1.845)*	(-0.463)	(0.727)			
W-Germany	15.40	-156.95	9.980	-4.650	-8.170	0.30	1.74	21
	(0.850)	(-0.981)	(1.543)	(1.365)	(-1.520)			
Norway	-0.544	42.93	-0.797	-0.984	0.750	0.38	2.03	18
	(-0.028)	(1.589)	(-0.447)	(-0.045)	(0.200)			
Finland	-4.158	-8.848	-1.145	2.945	0.607	0.28	1.48	20
	(0.917)	(-0.468)	(1.795)*	(0.737)	(0.368)			
USA(a)	-124.24	510.71	5.136	98.71	-12.74	0.25	2.65*	21
	(-1.545)	(0.569)	(0.110)	(1.434)	(-0.292)			
USA(b)	-31.86	512.43	49.20	-63.51	11.71	0.39	2.42*	20
	(-0.683)	(1.040)	(1.843)*	(-1.379)	(0.481)			
TOBIT							LR	
France	0.809	-1.107	-0.240	-0.302	0.094		2.96	17
	(1.276)	(-1.331)	(-2.195)**	(-0.552)	(0.865)			
W-Germany	17.25	-175.99	9.45	-4.66	-8.027		7.38	17
	(1.045)	(-1.206)	(1.606)	(-1.507)	(-1.648)*			
Norway	-3.894	51.85	-0.630	3.641	-2.230		7.36	21
	(-0.171)	(1.732)*	(-0.305)	(0.139)	(-0.484)			
Finland	-4.287	-9.387	1.218	2.793	0.763		7.77 *	20
	(-1.070)	(-0.562)	(2.153)**	(791)	(0.522)			
USA(a)	-153.28	-159.87	60.71	63.33	-3.806		13.22***	21
	(-1.575)	(-0.126)	(0.926)	(0.761)	(0.078)			
USA(b)	-42.97	133.51	84.64	-91.34	18.99		13.26***	20
	(-0.790)	(0.193)	(2.311)**	(-1.714)*	(0.716)			

Comments: Explanatory variables are: R, INDP, REXCH and RELTAX; ***, **, * show significance at the 1, 5 and 10% level, respectively; N is the number of observations and LR is the value of the likelihood ratio statistic; t-values in parentheses.

Table 13.13: Results of regressions of initial transfers for individual host countries, Model 5: OLS estimation.

	Constant	INDP	REXCH	MARGTAX	R^2	F-value	N
France	-28.92	3.980	-6.690	91.56	0.12	0.74	21
	(-0.465)	(0.613)	(-0.155)	(0.961)			
Italy	15.54	15.05	-18.35	-182.27	0.25	1.87	21
	(0.358)	(0.821)	(-0.834)	(-1.504)			
Netherlands	4.600	6.760	-11.79	-0.430	0.11	0.70	21
	(0.231)	(1.152)	(-1.143)	(-0.011)			
West-Germany	8.51	10.90	-0.87	-38.24	0.16	1.05	21
	(0.213)	(1.159)	(-0.310)	(-0.379)			
Denmark	19.60	-1.23	-20.47	6.25	0.05	0.31	21
	(0.871)	(-0.294)	(-0.834)	(0.215)			
Norway	-4.64	0.29	7.36	-5.87	0.23	1.68	21
	(-0.406)	(0.305)	(0.643)	(-0.819)			
Finland	-0.829	1.544	0.922	-0.028	0.17	1.18	21
	(-0.829)	(1.544)	(0.922)	(-0.028)			
UK	5.47	-9.29	-1.34	27.19	0.21	1.52	21
	(0.304)	(-1.002)	(-0.174)	(1.591)			
USA(a)	-69.23	1.35	83.83	-46.57	0.39	3.62*	21
	(-0.519)	(0.031)	(1.407)	(-0.255)			
USA(b)	73.44	44.32	-80.46	-96.57	0.40	3.57*	20
	(1.000)	(1.871)*	(-2.025)**	(-1.003)			
Canada	-1.98	0.78	0.05	3.19	0.22	1.60	21
	(-0.490)	(0.707)	(0.010)	(1.084)			

Comments: Explanatory variables are: *INDP*, *REXCH* and *MARGTAX*; ***, ** and * show significance at the 1, 5 and 10%-levels; *N* is the number of observations; t-values are in parentheses.

Table 13.14: Results of regressions of initial transfers for individual host countries, Model 5: TOBIT estimation.

	Constant	INDP	REXCH	MARGTAX	LR	N
France	-25.51	3.590	-8.73	88.73	2.30	21
	(-0.439)	(0.591)	(-0.217)	(0.998)		
Italy	0.660	28.53	-20.71	-125.17	5.55	21
	(0.009)	(0.912)	(-0.606)	(-1.575)		
Netherlands	26.87	11.61	-21.76	-58.08	2.76	21
	(1.010)	(1.414)	(-1.545)	(-0.994)		
West-Germany	6.430	10.34	-0.670	-33.28	3.39	21
	(0.171)	(1.174)	(-0.254)	(-0.352)		
Denmark	11.93	1.240	-13.41	-2.920	1.11	21
	(0.495)	(0.272)	(-0.514)	(-0.094)		
Norway	-0.480	0.780	2.340	-7.190	5.74	21
	(-0.033)	(0.623)	(0.153)	(-0.826)		
Finland	-3.200	0.840	2.520	-0.270	4.47	21
	(-0.844)	(1.720)*	(0.918)	(-0.095)		
UK	2.400	-7.970	-1.020	30.40	5.40	21
	(0.138)	(-0.881)	(-0.137)	(1.820)		
USA(a)	-123.39	47.18	61.16	-30.61	13.38***	21
	(-0.802)	(0.908)	(0.930)	(-0.146)		
USA(b)	52.84	71.13	-99.34	-98.20	13.89***	20
	(0.633)	(2.519)**	(-2.294)**	(-0.893)		
Canada	-2.250	2.700	-3.650	4.930	5.10	21
	(-0.263)	(0.987)	(-0.332)	(0.739)		

Comments: Explanatory variables are: $INDP$, $REXCH$ and $MARGTAX$; ***, ** and * show significance at the 1, 5 and 10% level of significance for two-tailed test; LR is the value of the likelihood ratio statistic and N is the number of observations; t-values are in parentheses.

Chapter 14

Payout Behavior and Taxes

Swedish companies are taxed on their worldwide income, i.e., they cannot defer the payment of Swedish tax on their foreign source income. However, intercompany dividends are not taxed if the recipient holds at least 25% of the voting stock of the paying company. This implies that dividends paid from abroad to the Swedish parent is not subject to any extra tax, apart from withholding taxes on dividends in the source country. If, however, a host country uses a so called "split rate system," i.e., taxing distributed profits at a lower rate than undistributed profits, the payout decision may influence the multinational company's total tax liability.

14.1 A Common Framework

A common framework for analyzing different corporate tax systems and systems for double taxation relief has been developed by Alworth [2]; we will use part of his model to analyze the cost of dividend distributions for a Swedish parent firm. This framework is general and pertains both to the issue of alleviating double taxation of dividends in the closed economy setting, as well as intercompany dividends between a subsidiary and its parent in an international firm.

Alworth defines a variable, θ, which is a measure of the degree of discrimination between retentions and gross dividends G, before personal taxes. θ equals the additional dividends, considering the effects of credits, imputations, split rate taxes etc., which reaches the shareholder for each \$ of gross dividends that leaves the company. To illustrate the principle further, for the case of a domestic company, define retained earnings R, as $Y - G - T$, where Y is total taxable profits and T are total tax payments net of credits on dividends. θ may be defined as $\theta = -dG/dR$; i.e., if one unit of retentions is distributed, $(-dR)$, shareholders receive θ and $1-\theta$ goes away in tax. Therefore, the additional tax liability per unit of dividends received by the shareholder before personal tax is $(1-\theta)/\theta$. The total tax revenue T on corporate income Y and gross dividends before personal tax is:

$$T = \tau Y + \frac{1-\theta}{\theta} G \tag{14.1}$$

With a personal tax on dividend income of t_p, the net dividend D received by the individual shareholder is $D = (1 - t_p)G$. This implies that an extra dollar of taxable profits earned by the company gives the shareholder a net amount of $(1 - t_p)\theta(1 - \tau)$.

14.1.1 Classical and split-rate system

The ***classical system***, which is in force in Sweden, implies that the effective corporate tax rate on taxable income, τ^*, equals the statutory tax rate, τ, and that $\theta = 1$. This implies that there is no correction at the shareholder level for taxes paid by the company, i.e., no integration of company and personal tax systems. The classical tax system makes for a simple tax administration, but also works as a disincentive to pay dividends.

The ***split rate system***, applies a lower corporate tax rate on distributed profits (τ_d^*) than on retained (τ_u^*). In this case we get:

$$T = \tau_u^*(Y - G) + \tau_d^* G \tag{14.2}$$

Dividing through by Y gives the average corporate tax rate $T/Y = \bar{\tau}$ as a weighted average of the two tax rates; the weights are given by the payout ratio $p = G/Y$:

$$\bar{\tau} = \tau_u^*(1 - p) + \tau_d^* p \tag{14.3}$$

Since $\tau_d^* < \tau_u^*$, $\bar{\tau}$ will be lowered if p is increased, ceteris paribus. The marginal corporate tax rate is given by

$$\frac{dT}{dY} = \tau_u^* \tag{14.4}$$

θ in turn is given by

$$\theta = -\frac{dG}{dR} = \frac{1}{1 + \tau_d^* - \tau_u^*} \tag{14.5}$$

For example, if the individual shareholder has a marginal tax rate of $t_p = 0.6$, the corporate tax rate is $\tau = 0.5$ and the classical system is used, the net dividend D derived from a \$ of distributed taxable income is

$$D = (1 - 0.6)(1 - 0.5) = 0.2 \tag{14.6}$$

If a split rate system is used instead and distributed profits are taxed at the lower rate of $\tau_d^* = 0.3$, the net dividend is

$$D = \frac{1}{1 + 0.3 - 0.5} \cdot (1 - 0.6)(1 - 0.5) = 0.25 \tag{14.7}$$

14.1.2 Imputation and deduction system

In the *imputation system*, part of the corporate taxes paid is considered as a prepayment of personal tax. Shareholders receive a gross dividend, G, but pay taxes on an amount that is "grossed up" by a certain coefficient, which is bigger than one, and are given a credit for part of the tax that has already been paid by the company. If τ is the corporate tax rate and s is the rate of imputation, the total tax liability net of the tax credit is

$$T = \tau Y - sG \tag{14.8}$$

thus,

$$\begin{aligned} \frac{dT}{dY} &= \tau \\ \frac{-dG}{dR} &= \frac{1}{1-s} \quad (=\theta) \end{aligned}$$

The imputation system may be combined with a split-rate system, as in West-Germany, such that distributed profits is taxed at a lower rate that also is the rate of tax credit; i.e., $s = \tau_d$.

$$\begin{aligned} T &= \tau_u(Y-G) + \tau_d G - sG \\ &= \tau_u(Y-G) \\ \frac{dT}{dY} &= \tau_u \\ \frac{-dG}{dR} &= \frac{1}{1-\tau_u} \quad (=\theta) \end{aligned} \tag{14.9}$$

The deduction method puts equity finance directly on a more equal basis with debt finance, by allowing deductibility of dividends (in the same way as interest is deductible). Assume that a fraction x of each dollar of dividends can be deducted against the tax base, the total tax liability then becomes

$$T = \tau(Y - xG) \tag{14.10}$$

This may be rewritten as: $T = \tau Y - \tau x G$. We may note that this is equivalent to the tax liability for the split rate system if we put $\tau = \tau_d^*$, and if $\tau x = (\tau_d^* - \tau_u^*)$.

14.2 The Payout Decision in the International Firms

The discussion so far has pertained to systems of double taxation relief between the individual shareholder and the domestic corporations. Our aim is now to develop a similar framework[1] for dividend distributions from a foreign subsidiary to its parent. One dollar of taxable income earned by a subsidiary is liable to tax in both the host and home country; in addition, when income is repatriated through dividends, a withholding tax (τ_w) is levied by the host country. The total tax liability on Y taxable income, is therefore:

$$\bar{T} = T^* + T = \tau^* Y^* + \tau Y + \tau_w G \tag{14.11}$$

An important question is the definitions of taxable income in the host country (Y^*) and home country (Y). However, we will not consider that issue here and will assume that no difference exists between these income definitions, and define the taxable income as $\bar{Y}$. The total tax liability is thus

$$\bar{T} = (\tau^* + \tau)\bar{Y} + \tau_w G \tag{14.12}$$

If the home country uses a credit system, with a per country limitation and the host country uses a *classical system*, the total tax liability becomes

$$\bar{T} = [\tau^* + (\tau - c)]\bar{Y} + \tau_w G \tag{14.13}$$

$$\text{where} \quad c = \begin{cases} \tau^* + \tau_w p & \text{if } \tau^* + \tau_w p \leq \tau \quad (1a) \\ \tau & \text{if } \tau^* + \tau_w p > \tau \quad (1b) \end{cases}$$

In regime (1a) the total tax liability is;

$$\bar{T} = \tau\bar{Y} \tag{14.14}$$

and in regime (1b);

$$\bar{T} = (\tau^* + \tau_w p)\bar{Y} \tag{14.15}$$

In regime (1a) the total tax liability is independent of the payout ratio, which is not the case in regime (1b). In figure 14.1, T is drawn as a function of p, it illustrates the case when $(\tau^* + \tau_w > \tau > \tau^*, \tau_w$. At a high enough p we switch from regime (1a) to (1b), in the latter region total tax is an increasing function of p. The value of p where we shift regimes is: $p^* = (\tau - \tau^*)/\tau_w$. For example, if we have the following values on the tax parameters: $\tau = 0.5$, $\tau^* = 0.4$ and $\tau_w = 0.15 \quad \rightarrow \quad p^* = 0.66$.

We now assume that the host country uses a *split rate system*, which also applies to foreign shareholders. Here the tax liability is

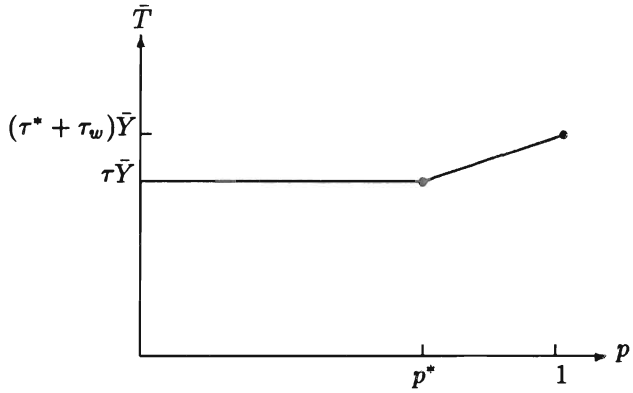
$$\bar{T} = [\tau_u^*(1-p) + \tau_d^* p + (\tau - c) + \tau_w p]\bar{Y} \tag{14.16}$$

$$\text{where} \quad c = \begin{cases} \Gamma & \text{if } \Gamma \leq \tau \quad (2a) \\ \tau & \text{if } \Gamma > \tau \quad (2b) \end{cases}$$

where $\Gamma = \tau_u^*(1-p) + (\tau_d^* + \tau_w)p$.

[1] This is an extension of the analysis of Alworth [3].

Figure 14.1: Total tax liability as a function of the payout-ratio in a classical system.



In regime (2a) we again have that: $\bar{T} = \tau\bar{Y}$, while in regime (2b):

$$\bar{T} = [\tau_u^*(1-p) + (\tau_d^* + \tau_w)p]\bar{Y} \tag{14.17}$$

If the constellation of tax parameters is the following: $\tau_u^* > \tau > \tau_d^* + \tau_w$; the tax regime will change as p is varied over the interval: $[0,1]$. This case is illustrated in figure 14.2. At $p = 0$ we're in regime (2b) where $\bar{T} = \tau\bar{Y}$; while at $p = 1$ we're in regime (2a) where $\bar{T} = (\tau_u^*(1-p) + \tau_d^* + \tau_w)\bar{Y}$. At p^* we switch regime; this happens at

$$p^* = \frac{\tau - \tau_u^*}{(\tau_d^* + \tau_w - \tau_u^*)} \tag{14.18}$$

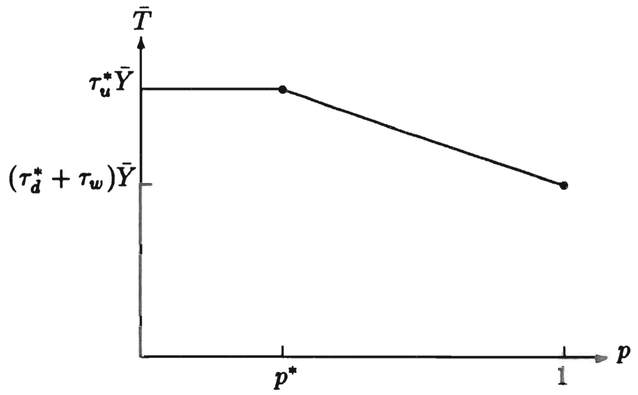
If, for example, $\tau = 0.5$, $\tau_d^* = 0.30$, $\tau_u^* = 0.6$ and $\tau_w = 0.10$; $p^* = 0.50$. In figure 14.2 we can see that a tax minimizing firm facing these constellations of tax rates, have an incentive to increase it payout ratio from zero initially, to make use of the host countries lower tax on distributions. However, at the point where the combined host country tax rate is equal to the home tax rate the marginal gain from further increase in the payout ratio is zero.

The ***imputation system*** will usually not be operative for foreign shareholders; so from the perspective of the multinational company, the imputation system with a single tax rate on all profits, is equivalent to the classical system. The combined imputation and split rate system is also equivalent to the ordinary split-rate system, as is the ***deduction system***.

14.2.1 Exemption

If ordinary income and dividends from foreign subsidiaries are exempt from tax in the home country, it will only be the host country's tax rate and the withholding

Figure 14.2: Total tax liability as a function of the payout-ratio in a split rate system.



tax rate that determines the tax liability on the foreign source income:

$$T^* = \tau^* + \tau_w G \tag{14.19}$$

it is also assumed that the parent company cannot credit the withholding tax against any home income.

If the *classical system* is used, it will only be the withholding tax rate that affects the tax liability, a higher such tax rate, ceteris paribus, should imply lower dividend payout.

If the host country has a *split-rate system*, the tax liability will be

$$T^* = [\tau_u^*(1-p) + (\tau_d^* + \tau_w)p]Y^* \tag{14.20}$$

in this case we have that

$$\frac{d\bar{\tau}}{dp} = \begin{cases} < 0 & \text{if } \tau_u^* > \tau_d^* + \tau_w \\ \geq 0 & \text{if } \tau_u^* \leq \tau_d^* + \tau_w \end{cases} \tag{14.21}$$

14.3 Dividend Theories

It was argued in section 3.2 in part I, that with a tax preference for capital gains over dividends, firms shall never pay dividends. Asymmetric information was argued to favor some dividend payout, however.

Explanations based on signaling under asymmetric information are plausible for the domestic firm–shareholder relationship, but they are not necessarily valid in the case of multinationals. Within a multinational company direct supervision is more feasible than in the typical shareholder–manager relationship. Alworth suggests the following explanation instead

Table 14.1: Domestic firms' dividend behavior.

Type of company:	Publicly Traded	Private
Paid dividends each year	37	8
Never paid dividends	0	23
Paid dividends some years	6	11
Dividends in % of after tax profits	53	40
	(44)	(41)
Dividends in % of cashflow	11.9	14.5
	(8)	(15)

Comments: Standard deviations in parentheses.

> Firms operating abroad seek to achieve a stable payout ratio of less than unity and more than zero (...) as an indication to host and parent country tax authorities that they do not wish to 'exploit' the host country and that they do not wish to accumulate profits in low tax countries. [2, pp. 185-186]

However, while this explanation may have some merit in particular cases. Alworth himself points out that it cannot explain the level at which a stable payout-ratio should be established and how one should balance these benefits against the tax costs.

We may conclude from this discussion that the search for an explanation of dividend behavior of multinational firms is far from completed. Our approach is therefore to try different specifications of payout functions to let the data speak on the issue. This *ad hoc* procedure is the best one can do at the present stage. It will, however, permit us to test the tax hypotheses discussed, but not against any sharp theoretical alternatives.

14.4 Empirical Payout Behavior

In this subsection we shall study some empirical facts of dividend payout behavior. We will start with the distributions of Swedish parents to their shareholders (which could be other Swedish firms and institutional investors).

In a study of mergers and acquistions between Swedish manufacturing firms, Modén[73] found the dividend behavior reported in table 14.1.

It is apparent from this table that publicly trade companies regularly make dividend payments while private companies less so. The publicly traded companies that didn't make dividend payments certain years were all sustained loss-makers. The dividend payout numbers pertain to regularly dividend paying firms and show a large variation for the first definition (dividend as a percentage of reported after tax profits). This, however, depends on a large variation in the

Table 14.2: Dividend behavior of subsidiaries in various host countries, 1965.

	No. of firms	Proportions that pay dividends	Payout ratio (mean)	Payout ratio (total)
France	23	17.4	0.12	0.56
Italy	17	11.8	0.09	0.52
Netherlands	31	19.4	0.08	0.29
West-Germany	37	25.9	0.29	0.55
Denmark	31	29.0	0.19	0.39
Norway	28	25.0	0.07	0.19
Finland	23	20.8	0.24	0.64
United Kingdom	26	19.4	0.07	0.49
United States	16	13.0	0.10	0.32
Canada	9	22.2	0.29	0.81

Comments: The *mean* payout ratio is the average of all subsidiaries payout ratios in each country; the *total* payout ratio is the sum of all dividend payments divided by after tax profits of all subsidiaries, in each country.

denominator, the size of which is under the (substantial) discretion of the companies, and, furthermore, is often negative. The second definition shows much less variation, which is expected since the cashflow is largely predetermined in a particular year. The remaining variation depends on the wish to provide a stable 'absolute' level of dividends each year; the dividend payout-ratio will thus change step by step with changes in cashflow.

Private companies should not be subject to the principal-agent problem discussed above and their incentives are such that they ought not to pay dividends. Table 14.1 confirms this conjecture, although there are some dividend payments from private firms left unexplained.

The comparison with private firms in the domestic context could be instructive for analyzing the behavior of multinational firms. If one assumes that the problem of asymmetric information between subsidiary and parent is unimportant, there may be more room for tax explanations in the international context. I.e., if, without taxes, there does not exist any preferred payout level, the introduction of taxes may be sufficient to generate preferred payout ratios between zero and one, in the manner discussed above.

Tables 14.2 to 14.5 provide summaries of the dividend behavior of subsidiaries located in various host countries, for four survey periods (1965, 1970, 1978 and 1986).

One may observe from these tables that the percentage of firms paying dividends has been low throughout the period (on average in the range 20-30%). However, there has been some variation across countries. The two last columns in each table show the average payout-ratios (the average of dividend divided by net profit, for firms with positive net profits only), and the total payout to

Table 14.3: Dividend behavior of subsidiaries in various host countries, 1970.

	No. of firms	Proportions that pay dividends	Payout ratio (mean)	Payout ratio (total)
France	28	21.4	0.07	0.31
Italy	20	30.0	0.15	0.41
Netherlands	29	27.6	0.16	0.28
West-Germany	50	28.8	0.22	0.40
Denmark	29	27.6	0.24	0.40
Norway	27	33.3	0.18	0.41
Finland	26	19.2	0.13	0.44
United Kingdom	27	25.8	0.18	3.05
United States	21	16.0	0.04	0.10
Canada	6	22.2	0.22	0.55

Table 14.4: Dividend behavior of subsidiaries in various host countries, 1978.

	No. of firms	Proportions that pay dividends	Payout ratio (mean)	Payout ratio (total)
France	45	24.4	0.12	0.29
Italy	19	36.8	0.13	0.29
Netherlands	33	22.2	0.19	0.28
West-Germany	49	31.8	0.24	0.50
Denmark	25	40.0	0.16	0.48
Norway	17	52.9	0.30	0.51
Finland	39	25.6	0.43	0.74
United Kingdom	43	37.5	0.12	0.20
United States	35	19.0	0.10	0.37
Canada	16	12.5	0.06	0.13

Table 14.5: Dividend behavior of subsidiaries in various host countries, 1986.

	No. of firms	Proportions that pay dividends	Payout ratio (mean)	Payout ratio (total)
France	52	24.3	0.10	0.11
Italy	32	21.9	0.16	0.24
Netherlands	24	28.0	0.16	0.41
West-Germany	60	19.7	0.16	0.57
Denmark	29	35.9	0.28	0.43
Norway	21	24.1	0.13	0.36
Finland	40	39.0	0.40	1.18
United Kingdom	49	23.7	0.14	0.30
United States	73	9.7	0.06	0.11
Canada	16	5.9	0	0

earnings ratios (the sum of all firms dividends divided by the total net profits for firms with positive net profits).

It has been observed for a long time that retained earnings are a prime source of investment funds for rapidly growing firms. At a later stage a certain positive payout-ratio is usually established (at least if the firm has gone public). In our multicountry context, one may assume that high-growth countries have a larger proportion of expanding firms, which thus retain larger proportions of their earnings. This reasoning points toward an explanation of dividends that depends on the growth prospects of the firm.

The Hartman model, explained in section 10.3, does not consider growth in demand per se, but it suggests that new firm's will start with a size below the long-run optimum and subsequently grow by retaining earnings until it reaches it steady state capital stock. Thus we would expect to observe that countries that have a large proportion of new firms will have low payout ratios and vice versa for countries with many old firms.

As an alternative hypothesis we suggest that firm's will not pay dividends at all unless their cashflow is at satisfactory level. Since we've argued that the signaling argument is weaker for controlled companies, they may change their payout frequently, and maybe in step with their cashflow.

14.4.1 Econometric Models

For the empirical testing we will assume that the desired level of dividend repatriations, G_t^*, may be expressed as a function of current cashflow Π_t, and expected future earnings ρ_t, a tax-variable, θ_t^* and an 'age-index' (ψ) plus a random component, ϵ_t

$$G_t^* = F(\Pi_t, \rho_t, \theta^*, \psi, \epsilon) \tag{14.22}$$

The data set is not detailed enough so that we can measure cashflow as conventionally defined, instead we use operating profits before depreciation deductions divided by total assets. A proxy for ρ_t can normally be obtained from the price earnings ratios in the stock market, however, since we are dealing with controlled subsidiaries, that avenue is not open for us. We use the change in the host countries' GDPs during the survey year instead. This measure may capture changes in the expected outlook for sales and economic expansion in general for the individual host countries. The age-index is constructed so that firms that have existed for at least twenty-five years are assigned the index one and firms started during the survey year get the index zero. Intermediate ages are assigned an indexnumber according to: $\psi_i = (T - t_i)/25$, where $T =$ the survey year and t_i the year of firm i's formation.

It is common to use the logarithmic transformation of the variables, when specifying an econometric model to be estimated, for example:

$$\log G_t = \alpha_0 + \beta_1 \log \Pi_t + \beta_2 \log \rho_t + \beta_3 \log \theta_t^* + \log \psi_t + \epsilon_t \qquad (14.23)$$

The logarithmic transformation is not the most appropriate specification in the current context, however, since we have a majority of observation with $G = 0$. We have a continuous variable with a positive range (negative dividends or equity-transfers are not observed), which is censored at zero. We therefore use a 'Tobit' model specification instead.

14.4.2 Definition of the tax variable

The theoretical discussion has shown that the host country's tax rate may or may not influence the subsidiaries' payout decision. It depends on what type of corporate tax system the host country uses and the magnitudes of the different pertinent tax rates, as well as the method of double taxation relief employed by the home country.

Sweden has in principle a credit system without deferral, but this will in practice only be applicable to individuals and branches to Swedish corporations. Branches are, however, exceptions and in most cases the subsidiary is incorporated in the host country and the parent is not liable for tax on its income in Sweden. Dividends received from such a subsidiary are also exempt from Swedish corporate tax if the parent owns at least 25% of the subsidiary. We will consider this as the typical case in the econometric analysis below.

It was shown above that in the case of exemption, and a classical system of double taxtion in the host country, only the withholding tax rate will matter with respect to the payout decision. We therefore include the withholding tax rate (τ_w) and expect the payout ratio to be negatively related to this variable. In the case of a split-rate system, the effect on the payout ratio depends on the relationship among the three tax rates (on undistributed and distributed profits respectively and the withholding tax rate). We define $\theta = (\tau_u^* - \tau_d^* - \tau_w)$; a higher value of this variable ought to imply higher incentives to payout dividends. We also included a dummy variable, D, defined as 1 if the host country uses a split

Table 14.6: Result of Tobit-estimation on a cross-section of subsidiaries, for each survey year separately. Dependent variable: Dividends/Assets.

Variable	α	ψ	Π	ρ	θ	τ_w
1965:	-0.137	0.070	0.410	0.014	0.099	0.018
	(-4.076)**	(4.100)**	(5.221)**	(0.022	(1.973)**	(0.091)
1970:	-0.129	0.052	0.411	0.185	0.046	-0.136
	(-5.814)**	(3.203)**	(6.886)**	(0.567)	(0.980)	(-0.743)
1978:	-0.053	0.031	0.225	-0.194	-0.024	-0.003
	(-4.990)**	(4.204)**	(8.151)**	(-0.845)	(0.576)	(-0.039)
1986:	-0.204	0.152	0.539	-1.159	-0.013	-0.095
	(-3.556)**	(5.656)**	(6.326)**	(-0.695)	(-0.099)	(-0.362)

Comments: ψ = ageindex of each subsidiary; Π = operating profits divided by total assets; ρ = change in host country's GDP; $\theta = (\tau_u - \tau_d - \tau_w)$ if host country uses a split-rate system, zero otherwise; t_w=withholding tax rate.
Numbers in parentheses are t-values; ** is 5-% level of significance.

rate system, and 0 otherwise. We did not include this variable separately, but instead as an interaction variable with θ, to isolate the split-rate countries.

Table 14.8 contains the value of the statutory tax corporate tax rates in each included host country, in 1986, as well as withholding tax rates and the sign of the derivative of the tax liability with respect to the payout ratio, $d\bar{T}/dp$.

14.4.3 Estimation Result

The results of the Tobit estimation of the model of dividend repatriation behavior, are given in tables 14.6 and 14.7, the first of these tables gives the results for cross-section for each survey year, while the second gives the results of pooling these cross-sections. The results suggest that, Π, is strongly and positively related to the payout level, while, ρ, the measure of future growth prospects, is insignificant. The time index, ψ, is positive and highly significant in all cases, which lends support to the Hartman model of the evolution of foreign subsidiaries. The coefficient of θ, is only significant in the first cross-section and later insignificant. The withholding tax rate is not significant in any model. The pooled estimates show the same picture, with θ significant at the 10%-level. All signs are as expected and the model is highly significant.

Taxes seem to play a minor role in the payout decisions; double taxation treaties have lowered the withholding tax rates, especially for share holdings in excess of 50%. In countries with split rate systems, there is some room for a tax-explanation, but the best predictors of the payout ratio are the age factor and current profits.

Table 14.7: Result of Tobit-estimation on a pooled-cross-section of subsidiaries. Dependent variable: Dividends/Assets.

D65	D70	D78	D86	ψ	Π	ρ	θ	τ_w
-0.147	-0.147	-0.144	-0.148	0.077	0.423	0.004	0.059	-0.063
(-8.588)**	(-9.711)**	(-10.585)**	(-11.342)**	(8.547)**	(12.892)**	(0.015)	(1.829)*	(-0.672)

Comments: D_i are dummy variables, one for each survey year ψ = ageindex of each subsidiary, Π = operating profits divided by total assets; ρ = rate of return (excluding dividends) on host country's stock marketindex during the survey year; $\theta = (\tau_u - \tau_d - \tau_w)$.
Numbers in parentheses are t-values; ** is 5% level of significance and * is 10% level of significance.

Table 14.8: Tax factors in the host countries, 1986; the Swedish corporate tax rate is $\tau = 52\%$

	τ^*	τ_w	$\frac{dT}{dp}$
France	45/25 †	0	+
Italy	30 †	15/10 ⋄	+
Netherlands	43 ⋆	15/0	+
West-Germany	56/36 †∘	15/5	-
Denmark	50 †	15/5	+
Norway	27.8/50.8 ∘	15/5	-
Finland	43/49 ∘	10/5	-
United Kingdom	35 †	5/0	+
United States	46 ⋆	15/5	+
Canada	44†	15	+

Comments: † = imputation- or credit system,
⋆ = classical system,
∘ = split-rate system.
⋄ The second number for the withholding tax rate refers to companies with a certain level of shareholding in the subsidiary, usually more than 50 %.
Source: Price-Waterhouse [83] & Alworth [2].

Chapter 15

Conclusions

This study's aim has been to discuss factors that decide the taxation of capital in general in an open economy. It is not possible to cover all relevant aspects of this question in a study with a limited scope. We have therefore concentrated on taxation of corporate income and focused on systems of taking into account the effects on localization of direct investments when both the home and host country tax the same income. An interesting theoretical and practical question is whether the level of taxation of internationally mobile, long term capital, across countries is coordinated, either explicitly or implicitly. We know as a fact that explicit coordination is nonexistent, but the question of implicit coordination is still open. We have tried to model a situation where indiviual countries set tax rates and tax incentives in order to maximize national advantages. This, much simplified, theoretical discussion points toward a level of taxation which is not Pareto optimal if countries compete with tax incentives, and explicit tax coordination may improve welfare. Explicit coordination of tax rates is almost nonexistent, but bilateral agreements to avoid double taxation, i.e., to reduce the total level of taxation on foreign owned capital, have been growing in importance during the postwar period.

An important distinction is between "small" and "large" countries; smaller countries may act as "followers" in a sequential tax setting game. Small and open countries cannot affect the world interest rate by trying to restrict capital flows, and their best strategy is to adjust their tax rates to the larger countries'. Another strategy is to put capital controls on capital flows, making it harder or impossible to localize abroad. This strategy has usually been applied to short-term, or portfolio investments, while long-term capital-flows have been less restricted. The prevailing trend during the last decade has also been toward less restricted capital flows, of all types.

It may be argued that if all countries adhere to the principle of taxing only their own residents' income, wherever it is earned, the negative effects of tax competition could be overcome. Furthermore, there would be no need for explicit tax coordination and each country could choose its preferred mix of tax instruments, and tax rates, to finance its public sector. International agreements should then be directed toward cooperation in reporting sources of tax within one country which are taxable in another country. In reality it seems likely that this will be difficult to accomplish (it may require the cooperation of *all* countries), at least for short-term capital. The very complicated web of individual country rules and bilateral double taxation agreements, coupled with lingering capital controls in some countries, has produced an actual system which is far from the theoretical ideal. If, however, countries adjust their rules endogenously when they perceive that these rules has put them at a competitive disadvantage vis-à-vis the rest of the world, effective marginal tax rates may be equalized across countries. This implies then that location decisions are governed by pre-tax rates of return, or that gross marginal products tend to be equalized, which is the criterion for production efficiency discussed in section 8. This does not imply, however, that the level of (world) capital income taxation is set at an optimum, tax competition may produce a too low level.

As capital controls are abolished, and if tax coordination is not perfect, one ought to be able to test whether favorable effective taxrates in a particular host country leads to a redirection of capital flows to that country. We have investigated the case of Sweden, a country which over the investigated period has had relatively free opportunities for domestic companies to invest, long-term, abroad. Sweden uses in principle a resident system in taxing foreign source income, however, when applied to corporations with subsidiaries incorporated in the host countries, only profit repatriations are subject to Swedish tax. Furthermore, the internal tax rules in Sweden grants a tax relief to intercorporate divdends, which also applies to foreign subsidiaries to Swedish parent corporations. If the foreign operations is not an independent legal entity, but a branch to the Swedish firm, the issue of double taxation and tax credits is relevant. In our empirical study all included foreign firms were independent subsidiaries, this may be an efficient organizational structure but the choice of organizational form may also be due to tax consequences just discussed. In sum, the effective system of foreign source taxation of corporate income in Sweden is the territorial system. This in turn implies that host countries tax rates ought to influence the choice of location, something which is not true if residence system is used. In the theoretical section it was shown that a small country, using a credit method method to ameliorate double taxtion, is likely to act as a follower to a larger country, in setting its tax rates. The fact that Sweden has chosen, effectively, a territorial system of corporate taxation may be a consequence of this dependency on the larger countries.

Our results indicate that the Swedish effective corporate taxrates, have adjusted smoothly to the foreign taxrates. Since the Swedish statutory rates increased gradually[1] over time, more generous tax incentives had to be granted to keep the effective tax rate in par with, the generally declining, foreign rates. Furthermore, this high degree of responsiveness does not seem to be limited to

[1] This was due to the inclusion in the corporate tax rate of the local taxrates, until 1984, which have increased steadily over the last three decades.

Sweden. Our results indicate that most of the major host countries of Swedish investments, have adjusted to each other, and a clear tendency of convergence has also been uncovered. The conclusion is that it is likely that the U.S. has been a leader in the tax game, possibly together with West-Germany.

The empirical analysis has not been able to uncover any clear relationship between tax changes and localization of Swedish direct investments. The factors discussed above may explain this. A possible exception is the case of the U.S. in its alleged role as leader in tax setting. The U.S. tax reform of 1981 has been argued to have attracted capital from the rest of the world (see e.g. [95]). Our analysis is not conclusive on this point, due to both a lack of a survey for the 1982, which should have been conducted if the normal time pattern had been followed. This resulted in a low degree of confidence in the estimates of direct investments for the years around 1980. Furthermore, our data is ill conditioned for a particular year (1986), which tend to influence the estimates considerably.

The international coordination of taxation has mostly been in the form of bilateral double taxation treaties. The most notable effects of these treaties have been to reduce taxrates on income repatriation flows from subsidiaries to parents. Our results indicate that this has had the intended effects of not, directly at least, affecting the payout decision of subsidiaries. However, particular rules in each host country about taxation of distributed and undistributed profits, do seem to influence the payout decision.

We should point out that we have neglected a host of issues in international taxation, which have bearing on the questions discussed in this study. One example is the issue of transfer pricing. We do not consider this issue as unimportant, but we lack any direct evidence on transfer pricing.

Appendix II.A Dynamic Optimization

II.A.1 The Subsidiary's Optimization Problem

The subsidiary's optimization problem is solved by optimal control techniques. An introduction to these techniques is given in, e.g., Kamien&Schwartz ; the particular problem solution presented here follows Sinn [94].

One starts from the arbitrage equation 10.14 and integrate it with respect to time to get the value of the subsidiary at time t as:

$$V_t = \int_t^\infty \left[Div_s \left(\frac{1-\xi}{1-c} \right) - Z_s \right] e^{-r\left(\frac{1-\tau}{1-c}\right)(s-t)} ds \tag{II.A.1}$$

The transversality condition is assumed to be satisfied, i.e., that $lim_{t \to \infty} V_t = 0$. The equality of sources and uses of funds is summarized in the cashflow constraint (dropping time subscripts);

$$Div = F(K)(1-\zeta) - I + Z. \tag{II.A.2}$$

where $F(K)$ is assumed to have the following properties: $F(K) \geq 0, F_K(K) > 0$ and $F_{KK}(K) < 0$.

The subsidiary is founded at time $t = 0$ by an initial transfer from the parent; K_0. Subsequent equity transfers must be non-negative, i.e., $Z_t \geq 0$, which defines a second constraint on the optimization problem, which can be written formally as:

$$\max_{\{\dot{K}, Z, K_0\}} V_0 - K_0 \quad \text{s.t.} \quad K_0, Z, Div \geq 0 \quad \text{and} \quad \dot{K} = I \tag{II.A.3}$$

K is the state variable and $\dot{K}, Z$ and K_0 are control variables. This constrained dynamic optimization problem is solved by appending lagrange multipliers λ_D and λ_Z, to the dividend and transfer constraint respectively, and a co-state variable (q) to the constraint on the evolution of the capital stock.

The Hamiltonian is formed by substituting in the cashflow constraint:

$$\begin{aligned} \mathcal{H}_t &= \left[\left(\frac{1-\xi}{1-c} + \lambda_D \right) (F(1-\zeta) - I + Z_t) - (1-\lambda_Z) Z_t \right. \\ &\left. \quad + qI_t \right] e^{-r\left(\frac{1-\tau}{1-c}\right)t} \end{aligned} \tag{II.A.4}$$

The first order necessary conditions are:

$$\mathcal{H}_I : q = \left(\frac{1-\xi}{1-c} + \lambda_D\right) \tag{II.A.5}$$

$$\mathcal{H}_Z : \frac{1-\xi}{1-c} + \lambda_D = (1 - \lambda_Z) \tag{II.A.6}$$

Combining the first-order conditions, we may derive the following relationships: $\lambda_D + \lambda_Z = (\xi - c)/(1-c)$ and $\lambda_Z = 1 - q$.

The Kuhn-Tucker complementary slackness conditions imply that:

$$\lambda_D Div = 0, \quad \lambda_D \geq 0, \quad Div \geq 0$$
$$\lambda_Z Z = 0, \quad \lambda_Z \geq 0, \quad Z \geq 0$$

The first-order conditions and the Kuhn-Tucker conditions together imply certain restrictions on the variables. If $c < \xi$, we can see that λ_D and λ_Z cannot be zero simultaneous. Therefore, if for example $\lambda_Z = 0$, $Z \geq 0$ and if $\lambda_D = 0$; $Div \geq 0$, therefore Z and Div cannot both be positive simultaneously; or the subsidiary shall never receive transfers and pay dividends simultaneously. We may also note that maximization of equation II.A.3 will imply that $q_0 = \partial V_0/\partial K_0 = 1$; therefore $\lambda_{Z_0} = 0$ and hence $\lambda_{D_0} > 0$.

The next question is what will happen to q and the subsidiary's capital stock after the initial period. This can be seen by differentiating the Hamiltonian with respect to K:

$$-\mathcal{H}_K = \dot{q} = r\left(\frac{1-\tau}{1-c}\right)q - \left(\frac{1-\xi}{1-c} + \lambda_D\right)F_K(1-\zeta) \tag{II.A.7}$$

Substituting for λ_D from the first-order conditions and rearranging a bit yields:

$$\dot{q} = \left\{r\left(\frac{1-\tau}{1-c}\right) - F_K(1-\zeta)\right\}q \tag{II.A.8}$$

After the initial equity injection the subsidiary will not receive any more transfers; i.e., $Z_t = 0$ for $t > t_0$. This can be seen from the condition $\lambda_Z = 1 - q$, since $Z_t > 0$ will imply that $\lambda_Z = 0$ and therefore that $\dot{q} = 0$, from equation II.A.8 we can see that this means that K must stay constant. However, if $Z_t > 0, Div_t = 0$, and this will imply that K increases through retentions, which contradicts the requirement that K is constant. After the initial period we can only have two regimes or phases; the first phase has been called the "immature" and the second the "mature" phase by Hartman[43].

During the immature phase the subsidiary will retain all its earnings and its capital stock changes according to the following differential equation:

$$\dot{K} = F(K)(1-\zeta) \tag{II.A.9}$$

During the mature phase the firm starts paying dividends and thus λ_D and from the cash-flow constraint we have that: $Div = F(K)(1-\zeta) - I$. The question is now whether I is positive or whether all earnings are repatriated. We may note that it will just pay to retain an additional dollar if the resulting change in value, after capital gains taxes, is just equal to the opportunity cost, or: $\dot{V}/V(1-c) = r(1-\tau)$, which is a condition that may be called investment equilibrium. Now, $\dot{V}/V = \dot{q}/q$ and from equation II.A.8 we have that: $\dot{q}/q + F_K(1-\zeta) = r(1-\tau)/(1-c)$. Therefore the subsidiary will only be in investment equilibrium if $F_K(1-\zeta) = r(1-\tau)/(1-c)$, or equivalently if $\dot{q} = 0$. In the mature phase, then, we have that $\dot{K} = I = 0$ and that $Div = F(K)(1-\zeta)$. Furthermore, the gross marginal product is:

$$F_K = r \cdot \frac{1-\tau}{(1-\zeta)(1-c)} \tag{II.A.10}$$

that is the subsidary's cost of capital when retained earnings are the marginal source of funds. Finally, we can solve for the equlibrium value of q as:

$$q = \left(\frac{1-\xi}{1-c}\right) < 1 \tag{II.A.11}$$

II.A.2 The Parent's Global Optimization Problem

The combined problem of the subsidiary and the parent can be analyzed by starting from equation (10.6). Into this equation we substitute for Div from the parents cash-flow constraint, which may be written:

$$(1-\xi)[(1-\zeta)F^*_K + Z - I^*] + (1-\tau) + E = I + Z + Div \tag{II.A.12}$$

The starred variables denote those of the subsidiary.

We assume now that $Z = E = 0$, and that both firm's are financed by retained earnings. The Hamiltonian may be written:

$$\begin{aligned}\mathcal{H}_t \;=\; & \left[\left(\frac{1-t_p}{1-c}\right)\{(1-\xi)(1-\zeta)F^* + (1-\tau)F - ((1-\xi)I^*_t + \right. \\ & \left. I_t)\} + q^*I^* + qI_t\right] e^{-\frac{\rho}{1-c}t} \end{aligned} \tag{II.A.13}$$

Where ρ equals the required rate of return demanded by the parent's owners after personal tax. This second tier problem was neglected earlier and we considered $r(1-\tau)$ as the required rate of return facing the subsidiary. ρ is determined by the owners opportunity investment returns and the marginal tax rate on these investments.

The first-order conditions and the co-state equation, found by differentiating the Hamiltonian are:

$$\mathcal{H}_I : \quad q = \left(\frac{1-t_p}{1-c}\right) \tag{II.A.14}$$

$$\mathcal{H}_{I^*} : \quad q^* = \left(\frac{1-t_p}{1-c}\right)(1-\xi) \tag{II.A.15}$$

$$\dot{q} = \frac{\rho}{1-c}q - \left(\frac{1-t_p}{1-c}\right)F_K(1-\tau) \tag{II.A.16}$$

$$\dot{q^*} = \frac{\rho}{1-c}q^* - \left(\frac{1-t_p}{1-c}\right)F^*_{K^*}(1-\xi)(1-\zeta) \tag{II.A.17}$$

In steady state equilibrium, we will have that $\dot{q} = \dot{q^*} = \dot{K} = \dot{K^*} = 0$, which imply the following value for q and q^*:

$$q = \frac{1-t_p}{1-c}$$

$$q^* = \frac{(1-t_p)(1-\xi)}{1-c}$$

and the following cost-of-capital:

$$F_K = r \cdot \frac{1-t_p}{(1-c)(1-\tau)}$$

$$F^*_{K^*} = r \cdot \frac{1-t_p}{(1-c)(1-\zeta)}$$

II.A.3 The Subsidiary's Optimization Problem: An Example

In this section we will follow up the discussion in section 10.3, about the subsidiary's optimization problem. Table 10.1 shows the definition of the various tax rates discussed, for the different taxation methods. We will focus on the case of credit with deferral here, and analyze the effects on the initial and steady state capital stock of changes in different tax rates.

Effects of a change in τ^*

Effect on the initial capital stock. Equation (10.21), shows the size of the initial capital stock, or the initial transfer of capital, as the subsidiary is formed. The change in the size of the initial transfer as the host country corporate tax rate is increased, is the sum of two effects:

$$\frac{dK_0}{d\tau^*} = \frac{dK_0}{d\xi}\frac{d\xi}{d\tau^*} + \frac{dK_0}{d\zeta}\frac{d\zeta}{d\tau^*} \tag{II.A.18}$$

The sign of the first effect depends on whether τ is greater or less than τ^* initially. If greater, the extra tax payable at home on repatriation, γ declines, therefore $d\xi/d\tau^* < 0$. The effect on the initial capital stock on a change in ξ is given by

$$\frac{dK_0}{d\xi} = \frac{r}{\alpha}\left(\frac{1-\tau}{1-\xi}\right)^{1/\alpha}(1-\zeta)^{-(1/\alpha+1)} > 0 \tag{II.A.19}$$

The second term in II.A.18, is positive since $d\xi/d\tau^* = 1$, and $dK_0/d\zeta > 0$. Since the terms have different signs the total effect is ambiguous. However, if $\tau^* > \tau$ initially, the first term is zero and the total effect is positive. This is the case illustrated in figure 10.3, for the numerical example discussed in the text.

Effect on the steady state capital stock. The steady state capital stock is given by equation (10.22), and the effect of an increase in τ^* is given by

$$\frac{dK_{SS}}{d\zeta} = -\frac{1}{1-\alpha}B^{1/(1-\alpha)}(1-\zeta)^{\alpha/(1-\alpha)} < 0 \tag{II.A.20}$$

where,

$$B = \frac{\alpha}{r}\cdot\frac{1-c}{1-\tau} \tag{II.A.21}$$

In this case the effect is unambiguously negative.

Effects of changes in τ and c.

Effects of a change in τ. The change in the initial transfer changes due to a *change in τ* is given by

$$\frac{dK_0}{d\tau} = \frac{\partial K_0}{\partial\tau} + \frac{\partial K_0}{\partial\xi}\cdot\frac{d\xi}{d\tau} \tag{II.A.22}$$

where

$$\frac{\partial K_0}{\partial\tau} = -\frac{1}{\alpha}C^{1/\alpha}(1-\tau)^{1/\alpha-1} < 0 \tag{II.A.23}$$

where,

$$C = \frac{r}{(1-\xi)(1-\zeta)} \tag{II.A.24}$$

We also have that $d\xi/d\tau > 0$ if $\tau > \tau^*$, and zero otherwise and $dK_0/d\xi > 0$ from above, it follows that if $\tau^* > \tau$ initially, the effect total effect is negative, otherwise it is ambiguous.
Likewise,

$$\frac{dK_{SS}}{d\tau} = \frac{1}{1-\alpha} D^{1/1-\alpha}(1-\tau)^{(\alpha-2)/(1-\alpha)} > 0 \tag{II.A.25}$$

where,

$$D = \frac{\alpha}{r}[(1-c)(1-\zeta)] \tag{II.A.26}$$

therefore, the change in the steady state capital stock of the subsidiary is unambiguously positive when the home corporate tax rate changes.

Effects of a change in c. In this case we get the following effects on the initial and steady state capital stocks:

$$\frac{dK_0}{d\tau} = 0 \tag{II.A.27}$$

$$\frac{dK_{SS}}{dc} = -\frac{1}{1-\alpha} \cdot E^{\frac{\alpha}{1-\alpha}} < 0 \tag{II.A.28}$$

where

$$E = \frac{\alpha(1-c)(1-\zeta)}{r(1-\tau)} \tag{II.A.29}$$

Appendix II.B Figures and Tables

Figure II.B.1: Direct Investment Abroad by Swedish firms and Foreign Direct Investment into Sweden, divided by GNP.

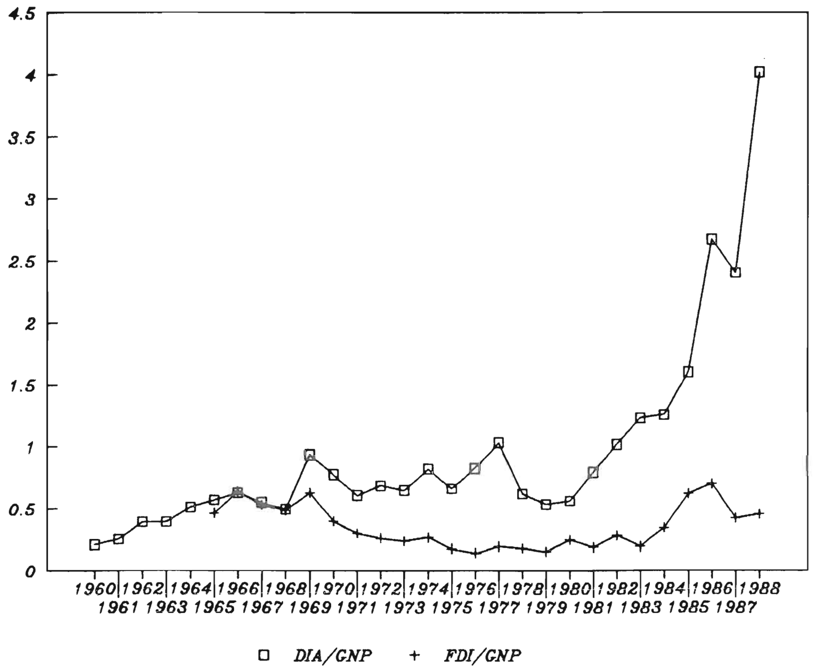


Figure II.B.2: Swedish foreign controlled assets in various host countries 1965.

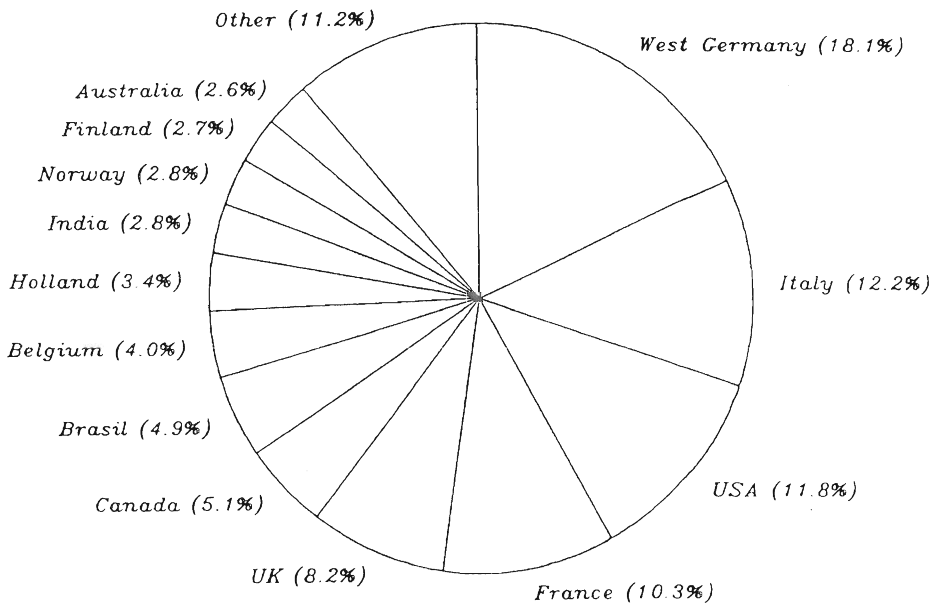


Figure II.B.3: Swedish foreign controlled assets in various host countries 1986

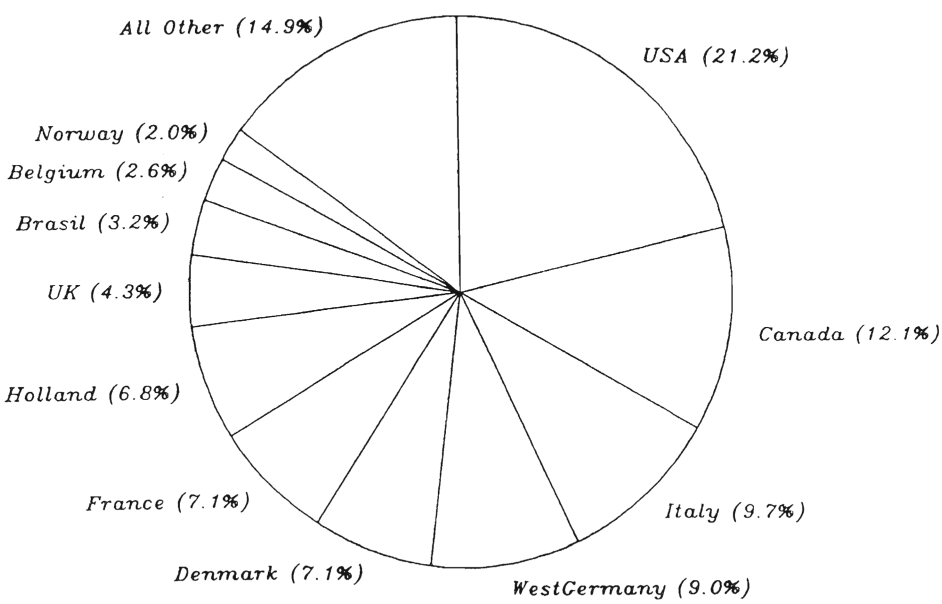


Figure II.B.4: Distribution of DIA over host countries, 1982-1988. National accounts data.

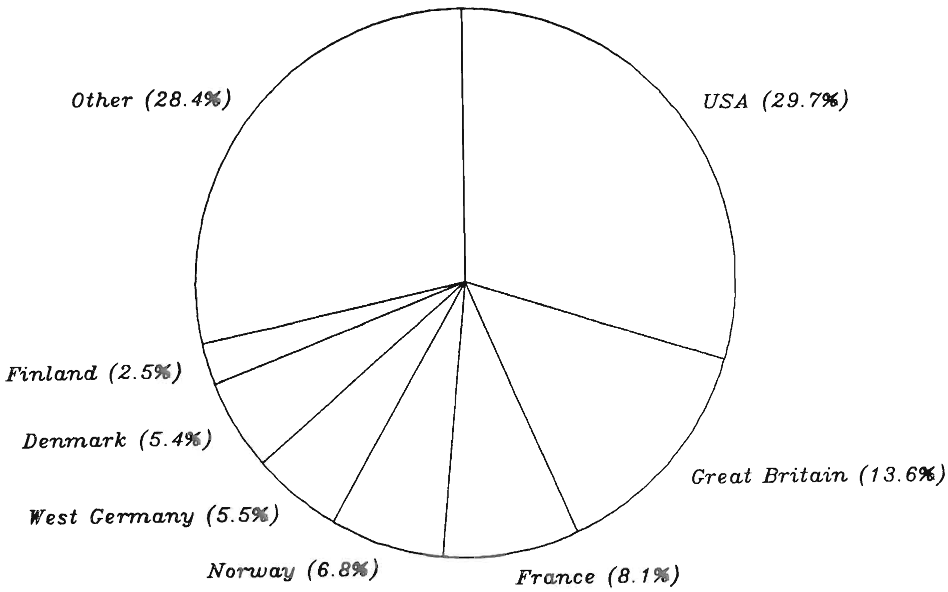


Figure II.B.5: Sources of funds for DIA's, 1982-85. *Source: Riksbanken.*

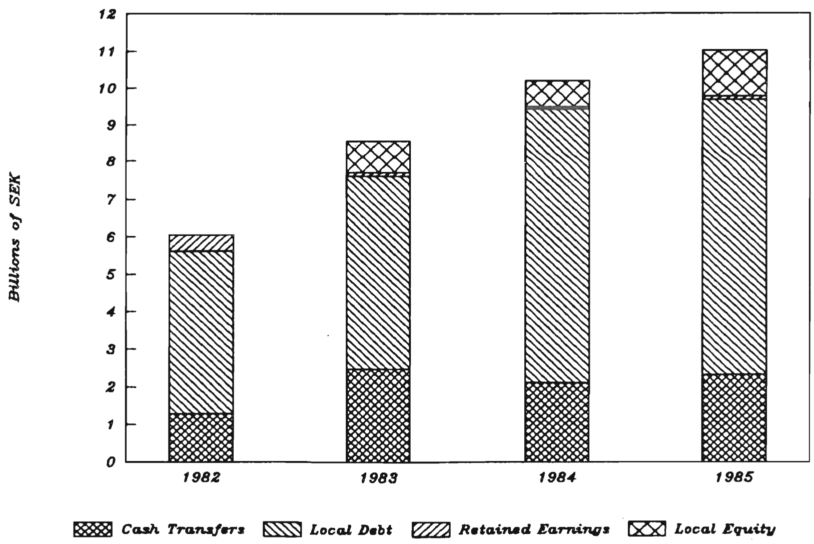


Figure II.B.6: The evolution of the aggregate gearing-ratio, 1965-1986

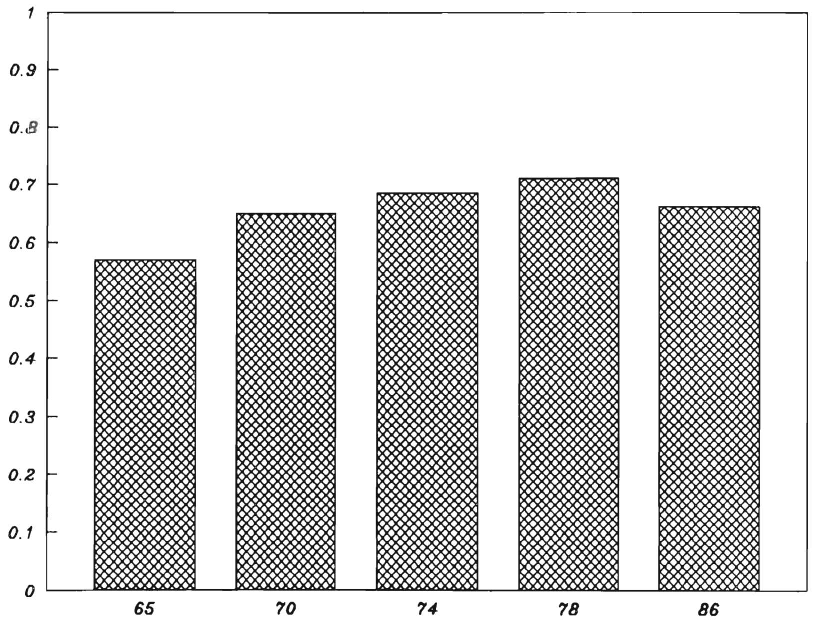


Table II.B.1: Developments of statutory corporate tax rates (τ); investment tax credits or -deductions (α), and tax depreciation factors (δ) in USA, UK and Canada; each entry refers to the year of change of the respective tax factor.

	USA			UK			Canada		
	τ	α	δ	τ	α	δ	τ	α	δ
1965	0.480	0.07	•	0.400	0.20	0.3 DB	0.500	0.05	0.50 SL
1966		0			0.25				
1967									
1968	0.528						0.514		
1969		0.07							
1970	0.492								1.15 SL
1971	0.480	0.07		0.425	0	0.6 DB	0.467		
1972			★			1.0 DB	0.465		0.50 SL
1973							0.490		
1974				0.52			0.506		
1975		0.10					0.482		
1976							0.460		
1977									
1978									
1979	0.460								
1980							0.478		
1981			†						0.25/0.5‡
1982									
1983							0.440		
1984				0.500		0.75 DB			
1985				0.450		0.50 DB		0.07	0.20 SL
1986		0		0.400		0.25 DB			

• Straight line depreciation over useful life of equipment.

SL = Straight line depreciation; DB = declining balance depreciation.

★ "Asset Depreciation Range"; asset lifetimes could be adjusted for tax purposes by 20%, upwards or downwards, from their guideline lifetimes.

† "Accelerated Cost Recovery System"; items are classified in 'recovery classes', the most common is the five-year class, which grants cost recovery of 15% the first year, 22% the second year and 21% during the remaining three years.

‡ 25% depreciation deduction the first year and 50% straight line of the remainder thereafter.

Sources: [19], [49], [50], [31], [59], [78], [83].

Table II.B.2: Developments of statutory corporate tax rates (τ); investment taxcredits or -deductions (α), and tax depreciation factors (δ) in France, West-Germany and the Netherlands; each entry refers to the year of change of the respective tax factor.

	France			West-Germany			Netherland		
	τ	α	δ	τ	α	δ	τ	α	δ
1965	0.500	0.00	0.1-0.2 SL/DB	0.51/0.15⋆	0	†	0.46	0.08·2‡	0.083 SL
1966		0.10					0.47		
1967		0.00							0.167 SL
1968		0.10		0.535/0.155⋆			0.46		
1969								0.5·2‡	
1970									
1971	0.59/0.25*	0.00							
1972	0.50/0.25*								
1973				0.55/0.16⋆			0.48		
1974									
1975		0.10		0.535/0.155⋆					
1976									
1977				0.56/0.36*					
1978									
1979									
1980									
1981									
1982		0.00							
1983									
1984							0.43	0.125	
1985									
1986	0.45/0.25*								

* Imputation system; second entry is the imputation rate.

SL = Straight line depreciation; DB=declining balance depreciation.

⋆ Split rate system; second entry is the rate on distributed profits.

† Straight line depreciation over useful life of equipment.

‡ Investment tax credit in two successive years.

Sources: [49], [50], [31], [78], [83].

Table II.B.3: Developments of statutory corporate tax rates (τ); investment tax credits or -deductions (α), and tax depreciation factors (δ) in Italy, Denmark and Norway; each entry refers to the year of change of the respective tax factor.

	Italy			Denmark			Norway		
	τ	α	δ	τ	α	δ	τ	α	δ
1965	0.25	Regional	Sl-life**	0.528	0.20†	0.30 DB	0.5325	0	‡
1966				0.440					
1967									
1968				0.360			0.5425		
1969							0.5450		
1970							0.5050		
1971							0.5060		
1972							0.5080		
1973									
1974	0.30		⋆	0.370					
1975	0.35				0.000				
1976					0.200				
1977					0.100				
1978	0.40*								
1979									
1980				0.400					
1981					0.050				
1982									0.30 DB
1983	0.30				0.025				
1984							0.43		0.35 DB
1985					0.25†				
1986				0.500					

* Average of state (0.25) + local tax rates.

⋆ Straight line depreciation 40% over 4 first years, max 15% per year.

** SL-life Straight line depreciation over useful life of equipment.

† Investment fund system; the percentage of investment cost which is deductible against the tax base.

‡ Scheduled depreciation deductions: 15% over the first three years. 10% the next five years and 5% the ninth year.

Sources: [15], [49], [50], [31], [78], [83].

Table II.B.4: Developments of statutory corporate tax rates (τ); investment tax credits or -deductions (α), and tax depreciation factors (δ) in Finland and Sweden; each entry refers to the year of change of the respective tax factor.

	Finland			Sweden		
	τ	α	δ	τ	α	δ
1965	0.42/0.48•	0	0.30 DB	0.50†	0.40⋆	0.30 DB or 0.20 SL
1966						
1967	0.62					
1968	0.71					
1969	0.63					
1970	0.61					
1971	0.58					
1972						
1973						
1974						
1975	0.59					
1976					0.25‡	
1977					0.25‡	
1978					0.25‡	
1979			1.00			
1980			0.30 DB		0.50⋆,0.20‡	
1981						
1982						
1983						
1984				0.58†		
1985				0.52		
1986	0.49	0.50⋆				

• Split rate system, the second entry is the rate on distributed profits.

⋆ Investment fund system; the percentage of investment cost which is deductible against the tax base.

† The national rate was 0.40 throughout the period 1965-1983, the local rate was deductible the next year, the numbers refer to the effect on average of national plus local rates; in 1984 the national rate was lowered to 0.32 as a transitional measure since by 1985 corporation pay only national tax.

‡ Investment deductions in place 1976-78 and from 1980 and onwards.

Sources: [15], [49], [50], [31], [78], [83], [103], [102].

Table II.B.5: Results of regressions of direct investment abroad by Swedish multinationals.

Model No.	Constant	CF	INDP	REXCH	R	r	R^2	F-value
1'	-0.055	0.125	0.105	-0.078			0.28	2.26
	(-0.179)	(0.909)	(1.796)	(-0.220)				
2'	-0.468	0.123	0.107	-0.090	0.041		0.26	1.32
	(0.129)	(0.811)	(1.548)	(-0.209)	(0.041			
3'	0.150	0.052	0.235	-0.338	-0.358	0.046	0.38	1.68
	(0.410)	(0.343)	(2.267)**	(-0.768)	(-0.362)	(-1.599)		
4'	0.191	0.043	0.229	-0.391		-0.291	0.37	2.20
	(0.567)	(0.297)	(2.306)**	(-0.971)		(-1.606)		

Comments: Timeseries from 1965-86; The dependent variable is total direct investment divided by total assets of parent companies. Numbers in parentheses are t-values. ** and * show significance at the 5% and 10% levels, respectivley.

Table II.B.6: Results of regressions of direct investment abroad by Swedish multinationals.

Model No.	Constant	CF	INDP+1	REXCH	R	r	R^2	F-value
1"	0.261	0.151	0.100	-0.395			0.46	4.62**
	(1.577)	(2.341)**	(3.014)**	(-2.038)				
2"	0.228	0.160	0.097	-0.350	-0.214		0.44	2.70*
	(1.200)	(2.247)**	(2.435)**	(-1.512)	(-0.447			
3"	0.143	1.189	0.031	-0.226	-0.133	0.138	0.53	2.93*
	(0.763)	(2.711)**	(0.560)	(-0.975)	(-0.293)	(1.617)		
4"	0.161	0.184	0.031	-0.250		0.014	0.53	3.90**
	(0.937)	(2.805)**	(0.577)	(-1.192)		(1.716)		

Comments: Timeseries from 1965-86; The dependent variable is total direct investment divided by total assets of parent companies. $INPD+1$ is the level of industrial production in the next period. Numbers in parentheses are t-values. ** and * show significance at the 5 and 10% levels, respectivley.

Table II.B.7: Results of "seemingly unrelated regressions" of initial transfers for five host countries.

	France	West-Germany	Norway	Finland	USA
Model 1					
Constant	25.13	-19.73	-3.379	-5.306	-206.69
	(0.442)	(-1.217)	(-0.175)	(-1.589)	(-3.389)
INDP	-3.544	17.79	0.001	1.388	-67.44
	(-0.384)	(1.513)	(0.001)	(2.471)**	(-1.416)
REXCH	-28.73	-4.821	8.506	3.560	243.01
	(-0.634)	(-1.336)	(0.406)	(1.356)	(3.543)**
AVGTAX	28.45	4.133	-9.895	0.008	143.00
	(1.345)	(0.277)	(-1.533)	(0.005)	(1.126)
Model 2					
Constant	31.26	-32.70	-1.742	-5.508	-191.32
	(0.475)	(-1.321)	(-0.105)	(-1.479)	(-2.422)
R	5.630	103.13	82.57	4.984	-801.6
	(0.063)	(0.645)	(2.908)**	(0.332)	(-0.504)
INDP	-5.359	23.45	-1.854	1.321	-40.46
	(-0.570)	(1.669)*	(-1.192)	(2.393)**	(-0.451)
REXCH	-35.78	-3.720	-3.648	3.364	225.31
	(-0.687)	(-0.889)	(-0.199)	(1.307)	(2.340)**
AVGTAX	36.34	3.107	8.527	0.385	173.47
	(1.434)	(0.201)	(0.925)	(0.137)	(1.318)

Comments: Explanatory variables are: R, INDP, REXCH and AVGTAX; **, * show significance at the 5 and 10% levels, respectively; t-values in parentheses.

Table II.B.8: Results of "seemingly unrelated regressions" of initial transfers for five host countries.

	France	West-Germany	Norway	Finland	USA
Model 3					
Constant	48.20	-13.13	-16.40	-4.736	-122.4
	(0.934	(-0.197)	(-0.905)	(-1.418)	(-2.097)**
INDP	-4.758	23.01	0.428	1.237	-8.187
	(-0.487)	(1.755)*	(0.299)	(2.276)**	(-0.199)
REXCH	-49.81	-5.143	13.16	2.923	-22.45
	(-1.127)	(-1.551)	(0.629)	(1.076)	(-0.603)
RELTAX	10.32	-8.302	4.235	-0.327	22.45
	(1.119)	(-1.601)	(1.491)	(0.400)	(-0.603)
Model 4					
Constant	83.61	-28.56	-1.450	-7.15	-176.2
	(1.612)	(-1.267)	(-0.088)	(-1.821)	(-2.110)
R	-77.08	112.2	52.22	-15.09	758.9
	(-1.064)	(0.763)	(2.649)**	(-1.001)	(0.444)
INDP	-6.214	29.59	-1.511	1.488	-41.79
	(-0.672)	(2.143)**	(-0.958)	(2.408)**	(-0.479)
REXCH	-81.99	-4.890	0.577	4.910	175.87
	(-1.821)*	(-1.343)	(0.031)	(1.487)	(2.099)**
RELTAX	14.59	1.877	0.803	1.877	4.335
	(1.564)	(1.349)	(0.285)	(1.349)	(0.108)

Comments: Explanatory variables are: R, INDP, REXCH and RELTAX; **, * show significance at the 5 and 10% levels, respectively; t-values in parentheses.

Table II.B.9: Results of "seemingly unrelated regressions" of initial transfers for nine host countries.

	France	Italy	Netherlands	West-Germany	Denmark
Model 5					
Constant	-414.19	-5.80	9.28	21.95	18.43
	(-2.518)	(-1.391)	(1.053)	(0.739)	(1.653)
INDP	12.04	1.32	5.67	26.59	-1.47
	(3.922)**	(3.299)**	(1.618)	(1.473)	(-0.596)
REXCH	42.57	2.01	-7.75	1.95	-18.40
	(3.458)**	(0.881)	(-2.138)**	(0.789)	(-1.444)
MARGTAX	1025.49	10.83	-20.49	-70.67	5.50
	(2.235)**	(2.053)**	(-2.033)**	(-0.944)	(0.279)

	Norway	Finland	UK	USA
Constant	18.24	-6.17	-5.82	40.70
	(2.991)	(-3.782)	(-0.724)	(1.708)
INDP	0.50	1.04	5.79	19.65
	(0.830)	(3.727)**	(1.426)	(2.361)**
REXCH	-11.35	4.00	-0.38	-34.20
	(-1.844)*	(3.619)**	(-0.102)	(-2.351)**
MARGTAX	-16.81	2.63	2.95	-61.74
	(-4.016)**	(1.771)*	(0.314)	(-2.066)**

Comments: Explanatory variables are: INDP, REXCH and MARGTAX; ** and * show significance at the 5 and 10% levels, respectively; t-values in parentheses.

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ISSN 1102-6057
ISBN 91-7204-442-X