A Fundamental Tax Reform in Norway

A comparison of the Allowance for Corporate Equity system and the Comprehensive Business Income Tax system in a Norwegian setting

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Research Master's Thesis

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Preface

This master thesis is written as a part of the double degree master program between Norwegian School of Economics (NHH) MSc in Economics and Business Administration and UCL Louvain School of Management Master in Management. The thesis was finished spring 2014.

Internationally there is a trend towards lower corporate taxes in order to prevent undesirable cross-border adjustments from multinational companies. The Norwegian government has appointed a tax-commission to consider the Norwegian tax rules in general, and corporate tax in particular. In my thesis I attend to examine some of the topics the tax-commission is to consider and provide a recommendation of a fundamental tax reform in Norway.

During the work with my thesis, I have learned a lot about tax distortions and design of tax systems in addition to how multinational companies engage profit shifting in order to save tax. I think my work has been interesting, and I hope that my interest and engagement capture the readers.

I would like to thank my supervisors at NHH and LSM, Guttorm Schjelderup and Marcel Gérard, for good supervision and feedback. I have appreciated your expertise and essential inputs.

Brussels, May 21, 2014

Ole Kristian Riskjell

Executive Summary

This thesis seeks to answer what are the main distortions in the Norwegian tax system and to determine which of the ACE or CBIT systems that best could replace the current system.

First, the thesis considers the current distortions in the Norwegian tax system. I find that the current tax system is distortive with regards to the tax-treatment of debt versus equity, as only cost of debt is deductible for tax purposes, while cost of equity is not. Moreover, the current system is distortive regarding depreciations, as the system implies inequality between real economic depreciations and taxable depreciations.

I also do an analysis on multinational companies (MNCs)' use of transfer pricing and thin capitalization. I show that MNCs shift profits out of Norway, which reduces the Norwegian tax base. To cope with such problems, I suggest a decrease in the Norwegian tax rate.

Second, the thesis examines two fundamental tax systems, Allowance for Corporate Equity (ACE) and Comprehensive Business Income Tax (CBIT). I analyze both tax systems with regards to the distortions I found in the current system.

Both systems are less distortive than the current system. As ACE allows deductions of cost of equity, I find the system to increase symmetry regarding tax-treatment between debt and equity. Moreover, I show that ACE ensures correct depreciations. ACE also reduces a firm's cost of capital, and thus increases investments. I find that CBIT ensures equal treatment between debt and equity, as the system disallows deductions for both cost of debt and cost of equity. However, the system does not solve the problems of incorrect depreciations, as real economic depreciations are still different from taxable depreciations. CBIT decreases investments due to increased cost of capital.

Based on research on welfare-effects by implementing ACE or CBIT, I understand CBIT to raise welfare in economies with high tax rates and a large multinational sector. The CBIT system increases the tax base, which is favorable as I also recommend a decline in the Norwegian tax rate. As a conclusion I recommend an implementation of the CBIT system.

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1.0 Introduction

In this chapter I present the background of my topic and explain the purpose of my thesis, introduce the research question and provide the reader with the outline of the paper.

1.1 Background

Increased globalization, with more integrated markets and thus greater mobility of tax bases, has increased the importance of taxes in investment decisions. Different tax rates between countries provide adaptability for multinational companies, which use deduction possibilities and transfer pricing to shift profits from high-tax countries to low-tax countries. This has led to an international trend towards lower corporate tax rates, with intention to prevent undesirable adjustments across borders in terms of transfer pricing and thin capitalization. The Norwegian corporate tax rate has remained unchanged since 1992[1]. At the same time the average corporate tax rate within the EU has fallen from 36,6 % in 1995 to 25,1 % in 2013. Moreover the corporate tax base is changing. Many countries have shifted their tax burden from income taxes to consumption taxes. The change in the international conditions raises the need to consider the Norwegian tax system. (Ministry of Finance, 2013)

March 15th 2013, the Norwegian government appointed a tax-commission to consider the Norwegian corporate taxation in the light of international developments. Among other topics, the commission is to consider if the corporate tax rate should be changed, analyze possibilities of moving income and deductions between countries in order to save tax, and examine the possibility of protecting Norwegian corporate taxation by treating debt and equity equally. An important guiding principle is that the commission's proposal should be approximately revenue-neutral. (Ministry of Finance, 2013)

The consideration of treating debt and equity equally involves a fundamental tax reform in Norway, either by implementing the Allowance for Corporate Equity system or the Comprehensive Business Income Tax system.

1.2 Purpose

The purpose of this thesis is to contribute in the recent discussion on Norwegian corporate tax policy, and come up with a well-argued point of view in this debate. The main objective is to examine the current Norwegian tax system and illustrate its distortions, in addition to analyze

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[1] After I started to work on my thesis the Norwegian government changed the tax rate from 28 % to 27 %.

the ACE and CBIT systems and recommend which system should be implemented taking into account the mandate of the tax commission.

This thesis will focus on corporate taxation, but the reader should notice that the Norwegian corporate tax- and personal tax systems are highly integrated, c.f. sub-section 2.3.1.

1.3 Research question

«What are the main distortions in the current Norwegian tax system, and which of the ACE or CBIT systems will best replace the current Norwegian system?»

To answer this research question I will first examine tax neutrality of important features in the current Norwegian tax system; *tax-treatment of debt versus equity* and *tax-treatment of depreciations*. Second, I will assess the ACE and CBIT systems with regards to important components; *investment behavior*, *tax-treatment of debt versus equity* and *tax-treatment of depreciations*, and the affect on the tax base. Moreover, I include a discussion on welfare effects under each tax reform.

An important guideline for the tax commission is a revenue-neutral proposal. To build a thorough recommendation on which of the ACE or CBIT systems that should be implemented, the impact on the tax base should thus be assigned considerable attention. As the commission should consider a change in the tax rate, which has significant impact in the tax base, I see it as necessary to include an analysis on whether the tax rate is likely to decline or not.

1.4 Outline

In chapter 2 I present the characteristics of a solid tax system, describe the main distortions in a tax system, and give an overview of the current Norwegian tax system, in addition to introduce tax in an international context. Chapter 3 contains an analysis on distortions in the Norwegian system, and includes an analysis on changing the tax rate based on the behavior of MNCs. In chapter 4 I introduce two sufficient alternatives to the current system, Allowance for Corporate Equity and Comprehensive Business Income Tax. I analyze both systems in chapter 5 with regards to investment behavior, tax-treatment of debt versus equity and tax-treatment of depreciations, and discuss their impact on the tax base and economic welfare. Chapter 6 concludes and chapter 7 suggests topics for future research.

2.0 Tax Systems

In this chapter I present the characteristics of a solid tax system, describe the main distortions in a tax system, give an overview of the current Norwegian tax system and introduce tax in an international context.

2.1 A solid tax system

The main purpose of a tax system is to cover the public sector's demand for goods and services (Sandmo, 1999). This can be done in several ways, which has led to various tax systems. Despite their differences they should all try to fulfill these main requirements: *efficiency*, *simplicity* and *fairness*.

1. *Efficiency*: Tax policies should be designed such that an economic efficiency loss caused by taxes is minimized. A tax system where firms take the same decisions before and after taxes are introduced implies an efficient system. The tax system is thus neutral.
2. *Simplicity:* A tax system should be easy to run by the authorities and minimize costs. This does not only mean minimizing costs related to administration by the government and tax authorities, but also opportunity costs[2], i.e. compliance costs and transition costs for companies adapting to a new system, and individual taxpayers having problems with their tax returns.
3. *Fairness*: A tax system should be designed in a way that is understood as fair among the taxpayers, in terms of reallocation of capital and of the tax burden.

A solid tax system should fulfill all three requirements. However, it is not easy to design a tax system that fully meets all of them. One system might be efficient and simple, but is understood among the taxpayers as unfair. Another system might be fair, but less efficient. (Sandmo, 1999)

2.2 Taxes and firm behavior

This thesis will assess the first requirement, *efficiency.* The optimal design of a tax system implies that taxes do not distort a firm's production decisions. If taxes do not change a firm's decision, the tax system is efficient, and the tax is *neutral.* (Sandmo, 1989)

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[2] Opportunity costs are costs of an alternative that must be forgone in order to pursue a certain action (Oxford University, 2014).

2.2.1 A neutral tax system

Given perfect competition I will look at how taxes affect a firm's decision. The following simple model is based on Schjelderup (2012). The pre-tax profits of a firm can be seen as

$$\pi^V = F(K) - rK$$

where $F(K)$ is the revenues, r is the cost of capital and K equals total capital (debt and equity).

The firm will produce an extra unit up to that point where it is not longer possible to increase profits by producing another unit. This is the firm's optimal fit. The first derivative from the expression above can show this.

$$\frac{d\pi^V}{dK} = F'(K) - r = 0$$

$$F'(K) = r \iff MR = MC$$

The first order condition (FOC) shows that marginal revenues (MR) equal marginal costs (MC). Let me introduce a tax (t) on the firm's profits and then examine what is the firm's optimal fit.

The taxable profits are given by the following expression

$$\pi^t = F(K) - rK$$

Combining the pre-tax and taxable profits gives the after-tax profits. After-tax profits are illustrated by the maximization expression V:

$$V = \pi^V - t\pi^t$$

$$V = [F(K) - rK] - t[F(K) - rK]$$

By maximizing V with respect to K, I get the first order condition below

$$\frac{dV}{dK} = (1 - t)[F'(K) - r] = 0$$

$$F'(K) = r \iff MR = MC$$

In this model the tax is neutral. The tax does not affect the firm's decision, and there is thus zero efficiency loss. Such a tax is called a *pure profit tax*, due to the assumption that the firm's actual revenues and costs equal the taxable revenues and costs. (Schjelderup, 2012) The result is shown graphically in Figure 1.
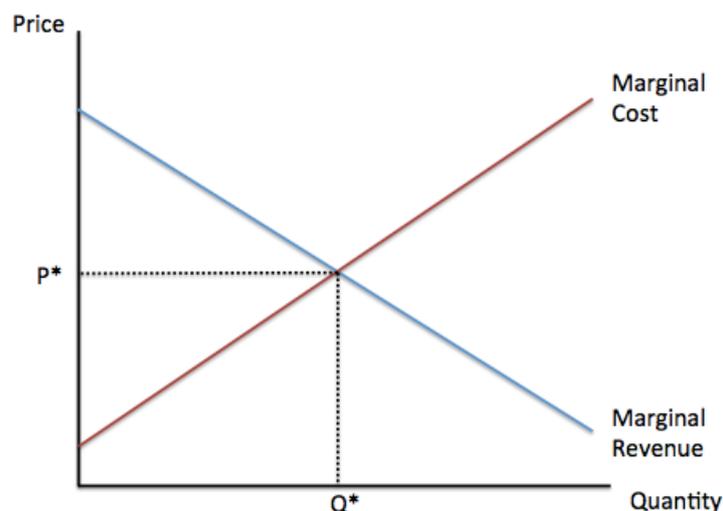
Figure 1: When MR=MC the tax is non-distortive and the firm's production decisions are not affected by the tax. The figure shows that the tax imposes zero dead-weight loss. (Pindyck & Rubinfeld, 2012)

2.2.2 Distortions in the tax system

The assumption in Schjelderup (2012) with regards to the pure profit tax does not represent the reality. In general tax systems often cause distortions, which implies a non-neutral tax system. A distortion is a violation of the conditions for social efficiency and occurs when prices, because of taxes, do not reflect true costs (Christiansen, 2006). The main tax-distortions are the following three:

1) Interests on debt are tax deductible, while the opportunity cost of equity is not entitled to tax deduction. This discriminates equity financing, and favors debt financing, which is unfortunate. First, a high debt ratio will lead to reduced solvency and increased risk of bankruptcy. Second, this leads to a lower fraction of equity-financed investments and a higher fraction of debt-financed investments than what is optimal. Deviating from the optimal capital structure due to tax discrimination may cause adverse welfare implications. (de Mooij & Devereux, 2010)

2) Incorrect tax depreciation compared to real depreciation costs. In order to avoid that taxes affect investment behavior, the tax depreciations should equal the actual economic depreciations. However, it is difficult to assess the true depreciation cost, and the best solution is to group similar assets into asset classes with equal depreciation rate. Overestimating an asset's rate of depreciation lowers the tax burden in companies using that asset, and biases them to use that asset. Underestimating the rate of depreciation penalizes companies using the asset, and discourages its use. (de Mooij & Devereux, 2010)

3) Variable and uncertain inflation[3]. Inflation affects the efficient corporate taxation in two ways. First, nominal interests are deductible, whilst the difference between real and nominal interests is not. Second, depreciation is provided on a nominal basis and not by replacement cost. (Gammie, 1991)

A market economy is efficient when the consumer and the producer face the same market prices. However, the tax system creates distortive elements in the market by causing *tax wedges* to distort the prices between the consumer and the producer (Sandmo, 1999). A tax wedge is the difference between pre-tax and after-tax profits. If an imposed tax causes the firm's optimal fit to shift, the tax wedge creates a dead-weight loss. The dead-weight loss caused by taxation increases more than proportionally along with the tax-rate. (OECD, 2014)
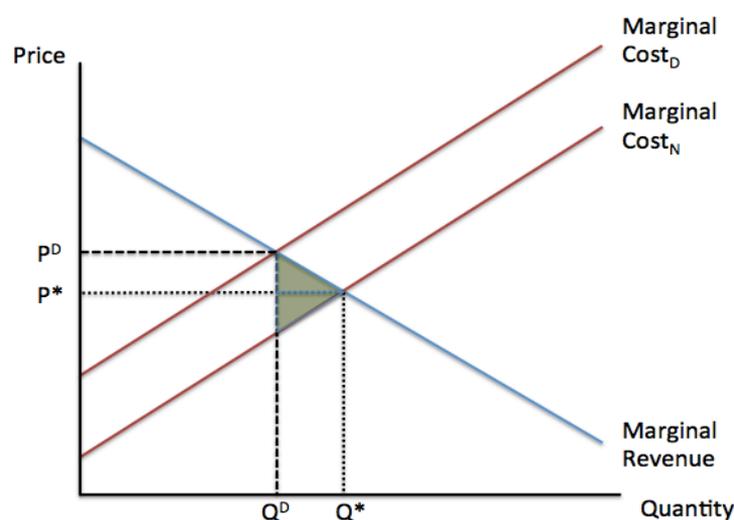
Figure 2: Distortions in the tax system impose extra costs for both the government and companies. These costs lead to a dead-weight loss, illustrated by the green triangle. (Pindyck & Rubinfeld, 2012)

Figure 2 shows the economic effect caused by disturbances in the tax system. Distortions will lead to higher costs for a firm, which is illustrated by a negative shift in the marginal cost curve. The fully cost of an investment is not tax deductible. Taxes will thus affect a firm's decisions. This leads to a dead-weight loss illustrated by the green triangle in Figure 2.

[3] As we are in a period with low inflation I will not analyze the distortion caused by inflation into further extent.

2.3 The current tax system in Norway

Norway is characterized as an ambitious welfare state having an open economy with strong economic interaction with other countries. Because of this, the tax system has to generate sufficient tax revenues, safeguard efficiency and take into account capital mobility. (Jacobsen & Schjelderup, 2012)

2.3.1 An integrated tax system

In 1992, an extensive tax reform was implemented in Norway. This led to an integration of the personal income tax- and the corporate income tax systems, where the tax rate on ordinary income is applied in both corporate and personal taxation. This uniform rate is believed to have reduced the possibility of tax avoidance associated with different tax rates. If these two tax rates differ, the Norwegian Government is afraid that two problems may emerge. The first problem is *transfer pricing*. By having a lower tax rate on capital income, a person would shift his income into his own company and tax this income at a lower tax rate than if the income was personal income. The owner of the company would then take out this income as dividend, instead of wage. The second problem is related to *deductions*. If the corporate tax rate is lower than the personal tax rate, it is profitable to incur debt as a private person instead of in the company, due to larger debt deductions as a private person. (Regjeringen, 2013)

The implication of this integration is that Norway has to change its personal income tax rate if the corporate tax rate is changed. Changing the Norwegian tax rate has thus a larger impact on the tax base compared to countries with separated personal and corporate tax systems. Changing the corporate tax rate in other countries will only affect the tax base from corporate tax revenues. When comparing ACE and CBIT in chapter 4 and 5, the impact on the tax base is important to take into account. The discussion in sub-section 2.3.1 is thus important to keep in mind.

2.3.2 The Norwegian tax level compared to the OECD

As part of the tax reform of 1992, the corporate tax rate was reduced alongside with a broadening of the tax base. During the last two decades, several other OECD-countries have done the same. (Haufler, Klemm, & Schjelderup, 2007) Figure 3 shows the development of the OECD average tax rate compared to Norway.
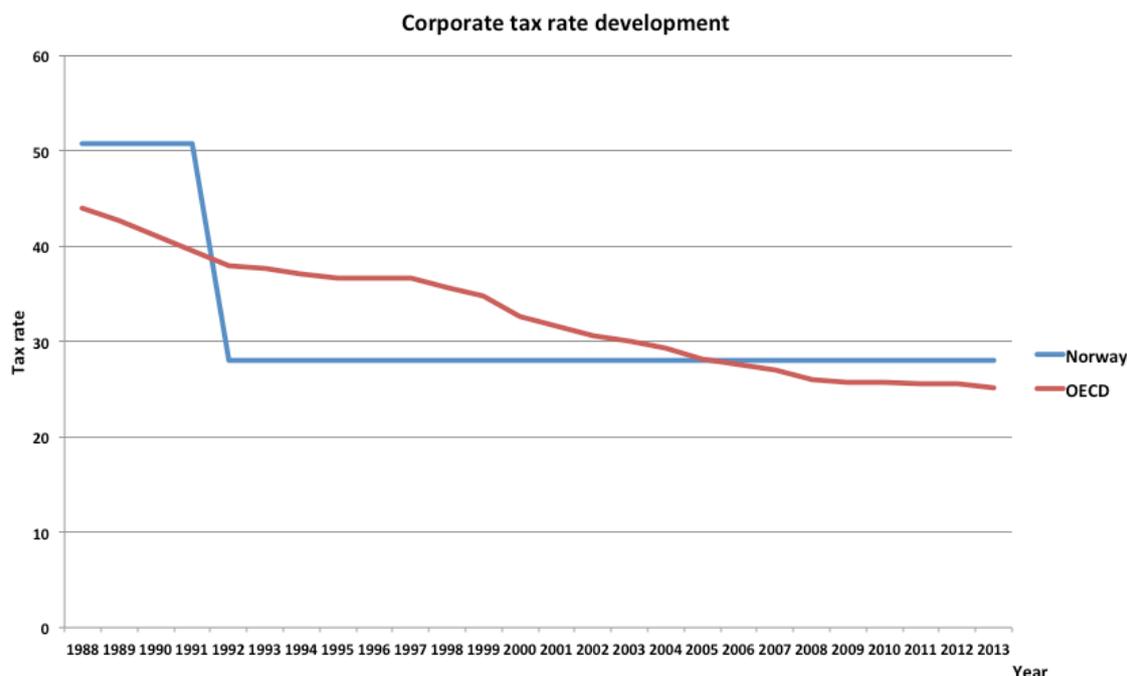
Figure 3: OECD average tax rate compared to Norway. (OECD, 2014)

Figure 3 shows a declining trend in the OECD average tax rate. Until 2005 the OECD average tax rate was above the Norwegian rate. In the years after, the Norwegian tax rate has been above the OECD average. Figure 3 shows formal tax rates. However, it is the effective tax rate that is crucial for companies when making investment decisions. The effective tax rate is the average tax rate at which pre-tax profits are taxed (United States Government Accountability Office, 2013)**.** The effective tax rate might be rather different from the formal rate, due to the deduction possibilities for the calculation of the tax base. (Center for European Economic Research, 2009)

$$Effective\ tax\ rate = \frac{Total\ tax\ liabilities}{Earnings\ before\ taxes}$$

Formula: Effective tax rate

A tax system with a broad tax base and few deduction possibilities implies greater consistency between formal and effective tax rates. As both Norway and several OECD countries broadened their tax bases during the last decades, the effective and the formal tax rates are hence more consistent. Research has shown that Norway has higher effective tax rates than both the Nordic countries and the EU-countries. (Center for European Economic Research, 2009)

Moreover, the Norwegian tax-revenues to GDP are high compared to the OECD average. Figure 4 indicates that the Norwegian tax-revenues to GDP ratio is approximately 43 % in 2010, well above the OECD average.
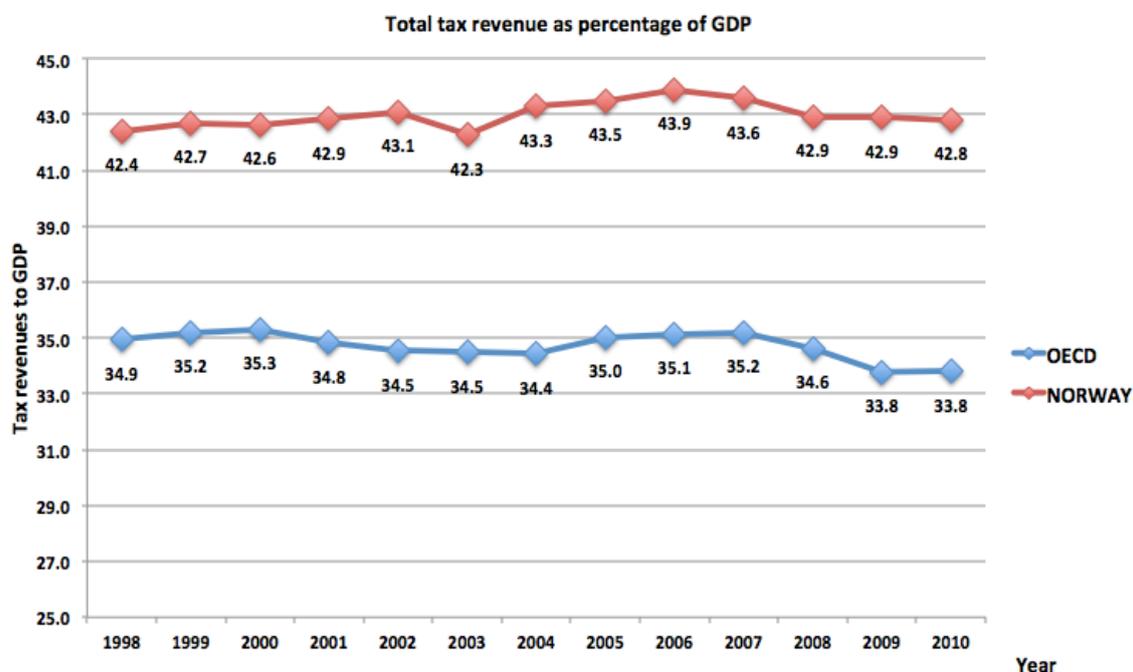
Figure 4: Tax revenues as percentage of GDP. The figure contains data from year 1998 to latest available data. (OECD, 2013)

In order to better illustrate the differences between Norway and the OECD, I separate total tax revenues into main headings. This is shown in Figure 5. The biggest difference is in tax revenues from *Personal and corporate income taxes*, illustrated by the green area. The Norwegian level is high above the OECD average. Based on an OECD publishing from 2014 the main reason is differences from corporate income taxes. While the tax revenues from corporate taxes as a percentage of GDP is 9,7 % in Norway, it is only 2,9 % in the OECD. (OECD, 2014) One major explaining factor of this result is the large tax payments from the petroleum sector (Denk O., 2012). Another important difference is tax revenues from *Property taxes*, where the Norwegian tax-revenues to GDP ratio is only two thirds of the OECD average.
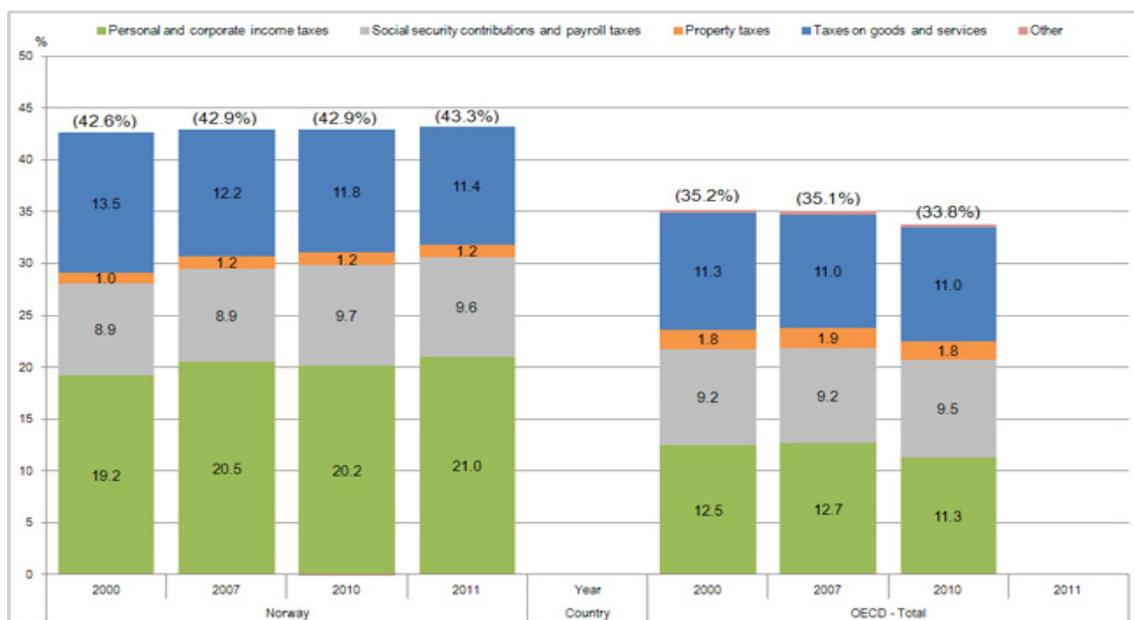
Figure 5: Tax revenues split in main headings (OECD, 2013)

As Figure 6 illustrates, Norway has the fourth highest level of consumption taxes within the OECD area. The main reason is that the standard value added tax (VAT) rate in Norway is 25 %, while the OECD average rate is 19 %. The VAT-rate in the OECD-area has increased throughout the last decades, as numbers of countries decided to raise their VAT rates as part of their fiscal consolidation measures (OECD, 2011). While the VAT rate was 16,7 % in 1990, it had risen to 18,0 % in 2010. OECD states that the VAT rate in 2012 was 18,7 %. This shows an increasing trend, contrary to the decreasing corporate tax rate trend.
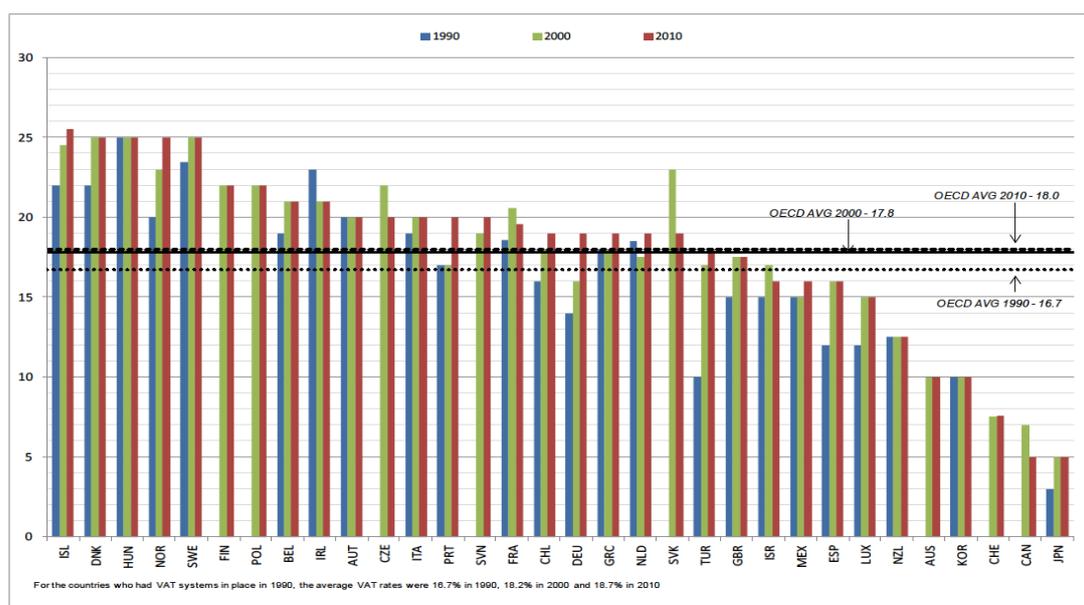
Figure 6: Development of standard VAT rates in the OECD during the last three decades. The international trend is increasing VAT-rates. (OECD, 2011)

2.4 Tax in an international context

I choose to include this section because the impact of increased globalization, and especially the behavior of multinational companies and their tax strategies, is important background information in conjunction to my discussion on the Norwegian tax rate level in section 3.2.

Increased globalization implies positive features such as integrated markets, but also negative implications arise. Problems with multinational companies in terms of transfer pricing and thin-capitalization occur. Globalization has made countries amend their tax rules, considering the role of the multinational companies in greater extent. (Ministry of Finance, 2013)

2.4.1 Globalization

Increased globalization throughout the recent years has impacted the world economy, affecting taxation within countries and across borders. Due to globalization, it is today easier to move goods and capital from one country to another. Institutional barriers on movement of goods and capital have fallen the last decades, resulting in decreased costs of moving both real capital and taxable profits across countries. International trade theory infers that firms invest where it is relatively cheaper. Even though capital is immobile in short and medium long term, capital is perfect mobile in long term. Lower taxes in country A distort investments from country B to A. (Griffith, Hines, & Sørensen, 2008)

2.4.2 Multinational companies and their tax strategies

The multinational company is characterized by having affiliates in at least one other country, facing international differences in tax rates and gaining profits by shifting profits to low-tax countries. The marginal profitability of MNCs engaging in profit shifting increases with a higher tax rate and decreases with a lower tax rate. MNCs can in contrast to domestic companies transfer their tax burden from high-tax countries to low-tax countries by exploiting the national tax system. The most commonly used tax-strategies for MNCs are transfer pricing and thin capitalization. (Schindler & Schjelderup, 2013)

Thin capitalization implies that multinational companies can exploit the tax advantage of debt more aggressively than national companies, by shifting debt from affiliates in low-tax countries to affiliates in high-tax countries, and thus maximize the value of debt deductions. Debt shifting can be divided into external and internal debt shifting. External debt shifting implies that MNCs excessively load affiliates generating high net tax savings with external debt. Internal debt shifting implies a mechanism where the MNC deducts interests in high-tax

countries and earns interests in low-tax countries in such way that the tax savings in high-tax countries exceed the increased tax liability in low-tax countries. (Ruf & Schindler, 2012)

Transfer pricing is a tax motive that arises when intra-firm trade takes place between subsidiaries in different tax jurisdictions, and includes pricing of transactions of goods and services. In order to minimize their tax liabilities, MNCs shift profits by choosing transfer prices that increase the costs in high-tax jurisdictions. As an example, MNCs often localize their patent rights in a low-tax country, even though the patent was developed in a high-tax country. This means that the income related to the patent is taxed in the low-tax country, while the related investments are deducted at a high tax rate somewhere else. (Schjelderup, 2013).

In Norway, multinational companies constitute between 30-35 % of the revenue base from corporate taxation (Jacobsen & Schjelderup, 2012). However, MNCs pay less tax than domestic companies, which has also been proved to be the case in Norway. The loss in tax revenues due to mispriced intra-firm transactions could be as much as 30 % of the potential tax revenues from MNCs. (Balsvik, Møen, Jensen, & Tropina, 2009).

2.4.3 The Arm's length principle

The arm's length principle is the international standard in transfer pricing issues. The main principle is that prices in intra-firm transactions should be equal to prices between two independent firms (OECD, 1995). Tax authorities may adjust a transfer price among related entities by reference to the conditions that would have been obtained between independent enterprises in a comparable transaction. However, the principle is difficult to apply for MNCs with integrated production of highly specialized goods, intangibles and provision of specialized services. It might be a problem for both taxpayers and tax authorities to obtain enough information to apply the arm's length principle properly. It is costly and in some situations it is difficult to compare transactions to determine the arm's length price. Lack of coordinated rules makes zero taxation on income still occur. (Torvik, 2013)

The arm's length principle is also used to curb debt shifting. The arm's length principle assesses whether i) the interest rate paid on internal debt equals the interest rate that should be paid if the debt had been issued from an unrelated third part, ii) the loan could be obtained from an unrelated third part under the same terms, and iii) if the debt-to-equity ratio would have been the same if only external debt financing had been possible. The arm's length principle would be optimal under perfect competition since it ensures justice for each

individual case. However, in the real world with asymmetric and limited information, the administration costs would be too high both for the tax authorities assessing if the debt level is in accordance to the arm's length principle, and also for firms having to prove that their financial structure is within arm's length. (Ruf & Schindler, 2012)

The arm's length principle is thus not an optimal measure to cope with MNCs and their tax strategies. After examining the ACE and CBIT systems, I will understand if these systems better cope with transfer pricing and thin capitalization compared to the current arm's length principle.

2.4.4 Base Erosion and Profit Shifting (BEPS)

The current profit shifting rules do not always address the way multinational companies operate in a globalized environment, which leaves MNCs able to shift profits in order to save taxes. This undermines the tax systems. Because of such problems, the OECD has initiated a project called Base Erosion and Profit Shifting (BEPS). The project examines whether the current tax rules allow companies to allocate taxable profits to different locations than those where their business activity actually takes place. Further, BEPS assesses what could be done to change this. In July 2013 the OECD launched an Action Plan as an instrument to address challenges related to BEPS. The aim of the plan is to prevent double non-taxation, and requires international cooperation, transparency and reporting across countries. (OECD, 2013)

2.4.5 A discussion of the corporate tax rate in the academic literature

OECD states that current tax rules are not sufficient in order to prevent undesirable profit shifting. As profit shifting is triggered by differences in the corporate tax rate, a change in the tax rate might therefore be the most efficient mean to reduce such problems. Mentioned in 2.4.2, the marginal profitability of MNCs engaging in profit shifting decreases with a lower tax rate.

As MNCs minimize their taxes through tax strategies, leaving only domestic companies with high tax rates, a question is if there should be corporate taxation at all. However, there are several reasons to have a positive corporate tax rate. In Norway, the corporate tax rate affects both the return on equity and the effort of the owners in the firm. If the tax rate were abolished, there would be incentives to distribute all earnings to the firm, and thus finance private consumption through loans from the firm. Then the owners would avoid income tax. Another reason of having positive corporate tax is due to allocation policy. The income from the highest income groups mainly stems from capital. By reducing the capital tax rate, these

groups would increase their earnings, while lower-income groups, where income mainly stems from labor, would be relatively worse offset. Maintaining the corporate tax rate will thus increase *fairness* in the tax system. (Jacobsen & Schjelderup, 2012) However, one main reason of not having a positive corporate tax rate is the high and growing international mobility of capital. If the tax rates are too high, taxpayers might hide their assets from the tax authorities by investing them abroad. By eliminating the corporate tax rate countries will prevent capital flight. (Griffith, Hines, & Sørensen, 2008)

Griffith et al. (2008) advocate that capital income should be taxed at a relatively low flat rate below the top marginal tax rate applied to earned income (Griffith, Hines, & Sørensen, 2008). One of the reasons why the capital tax rate should be relative low is the high and growing international mobility of capital combined with the practical difficulties[4] of taxing foreign capital income. A lower corporate tax rate would reduce incentives for profit shifting and strengthen the country as a location for multinational investments (Keuschnigg, 2011). Another reason for having a low corporate tax rate is that some types of income from capital are difficult to tax for administrative or political reasons. By choosing a low tax rate on those forms of capital income, the government reduces the inter-asset distortions on the savings pattern that arises when some types of capital income go untaxed. Moreover, a low tax rate makes it easier to broaden the tax base, i.e. extend taxation of other sources, e.g. taxation on property and value added taxes. (Griffith, Hines, & Sørensen, 2008).

The reasoning above suggests that a low tax rate, combined with a broad tax base, is the most efficient. This will reduce problems with profit shifting, cope with capital flight and increase investments.

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[4] The difficulties stems from the fact that source country authorities have little incentives to provide necessary information to the authorities of the home country.

3.0 Analysis part 1: Analyzing the Norwegian tax system

In this chapter I examine the Norwegian tax system. First, I analyze the current system with respect to the general distortions in a tax system, *tax-treatment of debt versus equity* and *tax-treatment of depreciations*. Second, I discuss the Norwegian system in an international context, and conclude whether the Norwegian tax rate is likely to change.

3.1 Distortions in the current Norwegian system

To assess the distortions in the current system, I have developed my own model based on the simple model introduced in section 2.2. To examine the tax-treatment of debt and equity I use a one-period model for a firm with revenues *F(K)* assuming that the only costs are cost of debt and cost of equity, given by r_D and r_E respectively, and where *D* is debt capital and *E* is equity capital. The cost of equity is in fact the opportunity cost of equity. Total capital (*K*) is thus *D + E*. To examine the tax-treatment of depreciations I extend the model into a two-period model. I will clarify this model further in sub-section 3.1.2. For an overview of model notation see Appendix 1.

3.1.1 Tax-treatment of debt versus equity

The pre-tax profits function of the firm is given by

$$\pi^V = F(K) - r_D D - r_E E$$

As the current Norwegian tax system only allows deduction of cost of debt, and not cost of equity, the taxable profits function is different from the pre-tax function:

$$\pi^t = F(K) - r_D D$$

Combining the pre-tax and taxable profits functions leads to the following after-tax expression, including the tax rate, *t*.

$$V = \pi^V - t\pi^t$$

$$V = [F(K) - r_D D - r_E E] - t[F(K) - r_D D]$$

From chapter 2, I understood taxes to be neutral when marginal costs equal marginal revenues. In order to determine whether this is the case under the current system, I optimize expression *V*. By solving this maximization problem with respect to *D* and *E* respectively, the first order constraints will imply whether the tax-treatment is neutral or not.

$$\frac{dV}{dD} = [F'(K) - r_D] - tF'(K) + tr_D$$

$$(1 - t)F'(K) = (1 - t)r_D$$

$$F'(K) = r_D$$

The FOC of debt implies neutral tax-treatment of debt, as marginal revenue equals marginal cost. The interpretation of this result is that debt financing is not distorted by the tax.

By solving the maximization problem with respect to E I get the following result:

$$\frac{dV}{dE} = [F'(K) - r_E] - tF'(K)$$

$$(1 - t)F'(K) = r_E$$

$$F'(K) = \frac{r_E}{1 - t}$$

The FOC of equity shows that the current Norwegian system is not neutral towards equity financing. The denominator illustrates that equity financing is affected by tax. As long as the tax rate is positive ($t > 0$) the current system imposes an additional cost on equity capital, illustrated by the denominator. As the current tax system does not allow deduction of the opportunity cost of equity, this result is expected.

By comparing the FOC of debt with the FOC of equity, I find that the current Norwegian tax system prefers debt to equity. A tax wedge under equity financing, and no such tax distortion under debt financing, illustrates this. The system distorts firms toward less equity-financed investments compared to a tax-neutral system.

The fact that the current tax system is non-neutral implies a dead-weight loss. This is unfortunate in several ways. First, high leverage might contribute to lower solvency in companies, and hence increased bankruptcy costs. Second, it implies a too low share of equity-financed investments. The dead-weight loss caused by too low equity financing is shown in Figure 7. This figure and its accompanying explanation are based on Sørensen (2010).

The falling curve shows the marginal product of capital. When the investment level increases, the profitability of investments goes down, and hence will the rate of return decrease when capital stock goes up. The curves labeled C^d and C^e show the rate of return on debt-financed and equity-financed investments respectively. Curve i illustrates the international real interest rate.
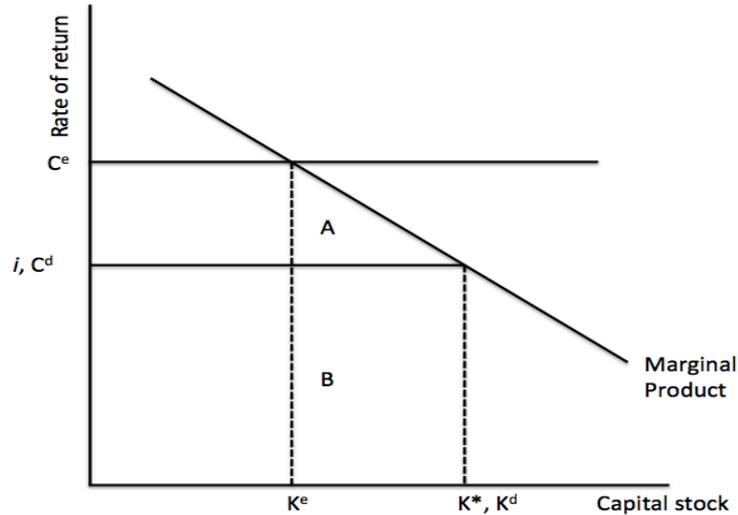
Figure 7: The dead-weight loss from non-neutral tax-treatment of equity is given by area A

Area A illustrates the dead-weight loss caused by less equity financed investments than optimal. By increasing equity financed investments from K^e to K^*, total output would increase with A+B. Since investments in equilibrium ($i=K^*$) suggest that output is increased with B, the net welfare effect by increasing equity financed investments up the K^* is given by A. A is hence the dead-weight loss caused by non-neutral tax-treatment of debt and equity.

3.1.2 Tax-treatment of depreciations

To examine the tax impact on depreciations, I extend my model into a two-period model. In period 1 the firm invests K. In period 2 the investment generates revenues of $F(K)$ and has accompanied depreciations equal to δ, leaving $(1 - \delta)K$ as the remaining capital that can be sold in period 2. In this model I do not split total capital (K) into debt and equity.

The pre-tax profits of the firm are equal to

$$\pi^V = F(K) + (1 - \delta)K$$

As cost of debt is tax deductible, but cost of equity is not, the model allows only deducting a fraction of cost of capital, where this fraction equals α, and r is cost of capital. Theta (θ) illustrates the deductible fraction of depreciation-costs. The taxable profits function is thus:

$$\pi^t = F(K) - (\alpha r + \theta \delta)K$$

Combining the pre-tax and taxable profits functions, I get the after-tax profits. The value of the investment in period 1 equals

$$V = -K + \frac{\pi^V - t\pi^t}{1 + r}$$

$$V = -K + \frac{[F(K) + (1 - \delta)K] - t[F(K) - (\alpha r + \theta \delta)K]}{1 + r}$$

I get the following FOC by maximizing the expression above with respect to K

$$\frac{dV}{dK} = -1 + \frac{[F'(K) + 1 - \delta] - t[F'(K) - \alpha r - \theta \delta]}{1 + r}$$

$$F'(K) = \left[\frac{1 - \alpha t}{1 - t}\right] r + \left[\frac{1 - \theta t}{1 - t}\right] \delta$$

Both $\left[\frac{1-\alpha t}{1-t}\right]$ and $\left[\frac{1-\theta t}{1-t}\right]$ represent tax wedges. The first tax wedge concerns cost of capital. The second tax wedge regards depreciations:

- If $\theta = 1$: True economic depreciation equals depreciation for tax purposes. In this case the tax wedge vanishes and the system is neutral, i.e. not distorted by the tax.
- If $\theta < 1$: The firm is not able to fully deduct the real cost of depreciation, and the taxable costs are lower than real economic costs. The result will be decreased investments compared to a neutral system, and thus a disturbance.
- If $\theta > 1$: The firm is able to deduct more than the real cost of depreciation, and the taxable costs are higher than real economic costs. The result will be increased investments compared to a neutral system, and thus a disturbance.

In principle, if the tax depreciation should not affect investment behavior, tax depreciation should be deducted aligned with actual economic depreciation. However, in reality it is difficult to have correct depreciation for every asset. Due to administrative purposes, Norway has a certain amount of asset classes with different depreciation rates. Within the same asset class the depreciation rate will be too high for some assets, and too low for other assets. This means that there will be improper depreciation rates for different assets, implying that there will be over- or under-investments of these types of assets (Jacobsen & Schjelderup, 2012). The tax-wedge will therefore be valid, and I can conclude that the current system is non-neutral with regards to depreciations.

3.2 Analyzing the impact from MNCs on the Norwegian tax base

This section analyzes multinational companies' possibilities of shifting profits through thin capitalization and transfer pricing in order to save tax. Such possibilities are triggered by tax-rate differences between countries. The purpose of this section is to examine Norway as a high-tax country in relation to thin capitalization and transfer pricing, and use these analyses to build an argument whether Norway should change its tax rate in order to cope with such problems.

3.2.1 Norway as a high tax country and thin capitalization

For a MNC it is profitable to debt finance affiliates in countries with high corporate tax rates and then deduct interests on debt in these affiliates. This weakens the tax base in these countries. In this sub-section I will show how a MNC structures its affiliates' debt-to-asset ratios in order to maximize its tax savings. The model I use to show this is based on the model from the paper *International Debt Shifting: Do Multinationals Shift Internal or External Debt?* by Møen et al (2011).

A MNC has fully owned affiliates in countries $i = (1,…, n)$. Each affiliate has revenues equal to $F(K_i)$ and cost of capital given by r. Capital (K_i) is financed either by equity (E_i), external debt (D_i^E) or internal debt (D_i^I) from related affiliates. The use of external and internal debt incurs both benefits and costs in an affiliate. In this model I assume that cost functions of external and internal debt are separable (see Appendix 3). The use of external debt entails costs related to the risk of bankruptcy. However, in this model I assume no overall bankruptcy costs. For an overview of model notation see Appendix 2.

Pre-tax profits in affiliate i are defined as

$$\pi_i^V = F(K_i) - rK_i - C^E(b_i^E) - C^I(b_i^I)$$

$C^E(b_i^E)$ and $C^I(b_i^I)$ are the cost functions of external and internal debt respectively. Too much use of external debt can lead to excessive borrowing and risk of bankruptcy. The use of internal debt incurs costs, such as tax engineering expenses, in order to avoid tax regulations. The reader should notice that the cost functions are not related to cost of capital r. See Appendix 3 for description and definition of these cost functions. $b_i^E = \frac{D_i^E}{K_i}$ and $b_i^I = \frac{D_i^I}{K_i}$ represent the external and internal debt-to-asset ratios in affiliate i.

Cost of debt is tax deductible[5] while cost of equity is not. The taxable profits in affiliate i are

$$\pi_i^t = F(K_i) - r[D_i^E + D_i^I] - C^E(b_i^E) - C^I(b_i^I)$$

Combining the pre-tax profits and the taxable profits and applying that $b_i^I = \frac{D_i^I}{K_i}$ lead to the following after-tax profits

$$\pi_i = \pi_i^V - t_i\pi_i^t = (1 - t_i)F(K_i) - rK_i + t_ir(b_i^E + b_i^I)K_i - (1 - t_i)[C^E(b_i^E) + C^I(b_i^I)]$$

---

[5] In real life, countries use thin capitalization rules to prevent an abnormal level of indebtedness. In this analysis I disregard such rules in order to illustrate the main mechanics behind thin capitalization and debt shifting.

The total after-tax profits for the MNC can be written as

$$\Pi = \sum_i \pi_i$$

In a real capital market, all interest expenses on internal debt must show up in the balance sheet of another affiliate as interest income received. Therefore, total interest expenses on internal debt must equal zero. The lending constraint on internal debt is thus equal to

$$\sum_i rb_i^I K_i = 0$$

By applying the after-tax profits and the lending constraint on internal debt, I can create the maximization problem for the tax efficient financial structure in affiliate i. The maximization problem is defined as

$$\underset{b_i^E, b_i^I}{Max\ \Pi} = \sum_i \{(1 - t_i)F(K_i) - rK_i + t_i r\left(b_i^E + b_i^I\right)K_i - (1 - t_i)\left[C^E\left(b_i^E\right) + C^I\left(b_i^I\right)\right]\}$$

$$s.t. \sum_i rb_i^I K_i = 0$$

As I have a lending constraint, I would like to design this problem as a LaGrange problem instead of using simple substitution. By designing this as a LaGrange problem I get

$$\mathcal{L}\left(b_i^E, b_i^I, \lambda\right) = \sum_i \{(1 - t_i)F(K_i) - rK_i + t_i r\left(b_i^E + b_i^I\right)K_i - (1 - t_i)\left[C^E\left(b_i^E\right) + C^I\left(b_i^I\right)\right]\}$$

$$- \lambda(\sum_i rb_i^I K_i)$$

By maximizing $\mathcal{L}$ with respect to b_i^E and b_i^I respectively, I derive the first order conditions

$$\frac{d\mathcal{L}}{db_i^E} : t_i rK_i - (1 - t_i)C^{E'}\left(b_i^E\right) = 0$$

$$\frac{d\mathcal{L}}{db_i^I} : (t_i - \lambda)rK_i - (1 - t_i)C^{I'}\left(b_i^I\right) = 0$$

From the FOCs I understand that the firm uses both external and internal debt until the marginal costs associated with each type of debt equal the respective marginal tax savings. The first FOC shows external debt. In the case of this model, MNCs will not use external debt

shifting, as there are no bankruptcy costs. Affiliates of the MNCs will thus have the same external leverage level as comparable domestic firms.

The second FOC shows internal debt. λ is the Lagrange-multiplier and illustrates the shadow price of shifted interest expenses. It is proved by Schindler & Schjelderup (2012) that λ equals the lowest tax rate t_i among the MNC's affiliates. This implies that in order to maximize its internal debt tax shield, the MNC should let the affiliate with the lowest effective tax rate conduct internal lending. Relating this to Norway, this means that a MNC operating in an affiliate with a lower tax rate than Norway will conduct internal lending in this low-tax affiliate and shift debt to Norway for deductions here. This will weaken the Norwegian tax base. $(t_i - \lambda)$ is defined as the net tax advantage. The bigger the difference is between t_i and λ, the more profitable is debt shifting. If $t_i = \lambda$, i.e. shifted interest income is taxed at the same rate as deductions are claimed, the MNC will not use internal debt.

By substituting $C^E{}'(b_i^E)$ and $C^I{}'(b_i^I)$ with the specifications given in the cost functions of external and internal debt, I can model the total leverage of the MNC. The calculations how to get to total leverage are shown in Appendix 3 as I did not find it necessary to include them in the main text. The total leverage of the MNC is given by

$$b_i = b_i^E + b_i^I = b^* + \frac{r}{\mu} \cdot \frac{t_i}{1 - t_i} + \frac{r}{\eta} \cdot \frac{t_i - \lambda}{1 - t_i}$$

I can illustrate how a change in the tax-rate will affect a MNC's choice of thin capitalization by doing comparative statics on the expression of total leverage. I examine what will happen if Norway decreases its tax rate in order to cope with thin capitalization problems.

$$\frac{db_i}{dt_i} = \frac{db_i^E}{dt_i} + \frac{db_i^I}{dt_i} = \frac{r}{\mu} \cdot \frac{1}{(1 - t_i)^2} + \frac{r}{\eta} \cdot \frac{(1 - \lambda)}{(1 - t_i)^2} > 0$$

This result implies that a decrease in the Norwegian tax rate will make affiliates in Norway decrease both their external and internal leverage since reduced tax shields make use of debt less profitable and thus less attractive.

This result suggests that Norway should reduce its tax rate in order to cope with problems related to thin capitalization and debt shifting. Reducing the tax rate will increase investments and reduce the problems of a weakened tax base caused by debt shifting.

3.2.2 Norway as a high tax country and transfer pricing

In this sub-section I will illustrate how MNCs use transfer pricing to reduce their overall tax expenses by using a simplified version of the basic model developed by Schjelderup (2013) in *Multinationals and Transfer Pricing.*

The model illustrates a MNC composed of two affiliates. The first affiliate is located in a low-tax country (country L), and the second affiliate is located in Norway (country N). Norway is thus a high-tax country in this model. In the model, the affiliate in the low-tax country is called firm L and the Norwegian affiliate is called firm N. The MNC's objective is to maximize global profits net of tax and it has the possibility to do this by shifting profits from Norway to the low-tax affiliate. The low-tax affiliate is the parent firm.

Even though Norway applies the arm's length principle, which implies restricted transfer pricing, I choose to use a model with unrestricted transfer pricing. This will better illustrate the intention behind transfer pricing. I assume no import costs by the Norwegian government.

Firm L produces quantities Q_L and Q_N with a cost function $C(Q_L+Q_N)$. The cost function's properties equal $C' \geq 0$ and $C'' \geq 0$. Quantity Q_L is sold in country L at price $P_L(Q_L)$ yielding revenue $R_L(Q_L)=P_L(Q_l)Q_1$. The quantity Q_N is imported by country N at a transfer price of p, leaving pQ_N as the cost of firm N. Q_N is resold in country N at a price $P_N(Q_N)$ yielding revenue $R_N(Q_N)=P_N(Q_N)Q_N$. The revenue functions' properties equal $R' \geq 0$ and $R'' \leq 0$. The profit functions of the two affiliates are defined as

$$\pi_L = R_L(Q_L) - C(Q_L + Q_N) + pQ_N$$

$$\pi_N = R_N(Q_N) - pQ_N$$

The tax rate in country L is t_L and the tax rate in Norway is t_N. I assume perfect exemption. Taking into account the tax rates, the taxable profits[6] in the two affiliates equal

$$\pi_L = (1 - t_L)[R_L(Q_L) - C(Q_L + Q_N) + pQ_N]$$

$$\pi_N = (1 - t_N)[R_N(Q_N) - pQ_N]$$

The MNC's global after-tax profits (global profit function) can then be defined as

$$\pi = (1 - t_L)[R_L(Q_L) - C(Q_L + Q_N) + pQ_N] + (1 - t_N)[R_N(Q_N) - pQ_N]$$

---

[6] In real life, countries use the arm's length principle to secure correct prices in intra-firm transactions. In this analysis I disregard this principle in order to illustrate the main mechanics behind transfer pricing.

By maximizing the MNC's after-tax profits with respect to the transfer price p, I get the FOC:

$$\frac{d\pi}{dp} = Q_N(t_N - t_L)$$

This is an important result. The FOC implies that the bigger the difference is between t_N and t_L, the bigger is the motivation for MNCs to exploit the tax rate difference. As the Norwegian tax rate has been fixed the last 20 years and the OECD-average tax rate has fallen, the motivation for MNCs to shift profits out of Norway should have increased.

The FOC above implies a corner type solution. As I assumed no import costs, a high transfer price would be infinite, while a low transfer price would equal zero.

As country L is a low-tax country and Norway is a high-tax country $t_N > t_L$. This implies a positive FOC and it is thus optimal to set a high transfer price. A high transfer price enables the MNC to shift profits from Norway to country L.

The MNC coordinates all decisions and faces a two-stage maximization problem. In order to maximize global profits, the MNC has to choose quantities Q_1 and Q_2 and transfer price p. First, the MNC needs to find the optimal transfer price (p^*). Second, the MNC maximizes global profits taking into account the optimal transfer price. This is done by inserting p^* in the global profit function and thus find optimal quantum.

As the MNC seeks to minimize profits in the Norwegian affiliate, the optimal transfer price is so high that profits in Norway equal zero[7]. If the transfer price is set so that profits in Norway equal zero, the MNC shifts all profits from Norway to country L. By solving $\pi_N = 0$ for p, the optimal transfer price is defined as

$$p^* = \frac{R_N(Q_N)}{Q_N}$$

Next, I substitute the optimal transfer price into the global profit function. This enables me to find optimal sales in each country.

$$\pi = (1 - t_L)[R_L(Q_L) - C(Q_L + Q_N) + p^* Q_N] + (1 - t_N)[R_N(Q_N) - p^* Q_N]$$

$$\pi = (1 - t_L)\left[R_L(Q_L) - C(Q_L + Q_N) + \frac{R_N(Q_N)}{Q_N}Q_N\right] + (1 - t_N)\left[R_N(Q_N) - \frac{R_N(Q_N)}{Q_N}Q_N\right]$$

---

[7] I do not allow the MNC to deduct losses abroad against taxable income in the residence country, as most countries do not allow this.

$$\pi = (1 - t_L)[R_L(Q_L) - C(Q_L + Q_N) + R_N(Q_N)]$$

Now the global profit function depends only on quantities. I maximize the function with respect to quantities Q_L and Q_N and get the following FOCs

$$\frac{d\pi}{dQ_L} = (1 - t_L)[R_L' - C'] \leftrightarrow R_L' = C'$$

$$\frac{d\pi}{dQ_N} = (1 - t_L)[-C' + R_N'] \leftrightarrow R_N' = C'$$

The optimal fit for both firm L and firm N is when marginal revenue equals marginal cost. As I assumed absence of the arm's length principle and import costs, MC = MR for both firms. If I had included an import tariff, the marginal cost in Norway would be higher. The result implies a monopoly price-setting situation, and enables the firms to price a good above the marginal cost of this good. The MNC is not affected by national tax rates and can thus choose a transfer price so high that the profits in the Norwegian affiliate equal zero. The tax burden in Norway is thus zero, and all taxable profits are taxed in the low-tax country L. This weakens the Norwegian tax base.

This analysis illustrates that MNCs will shift profits from Norway towards affiliates in low-tax countries. In this model I showed that MNCs would choose a transfer price so high that the profits in the Norwegian affiliate will be zero. In reality, under regulation of the arm's length principle, the consequence will not be this severe. However, the tendency is the same. As MNCs exploit tax differences, taxable profits in Norway will decrease. To cope with problems from transfer pricing, this result suggests a decline in the tax rate.

3.2.3 Conclusion

Both my analyses show that MNCs exploit tax rates differences in order to shift profits from high-tax countries to low-tax countries. Both thin capitalization and transfer pricing strategies affect Norway. As Norway is a high-tax country, I showed that MNCs shift debt into Norwegian affiliates to generate large tax deductions. Moreover, I showed that MNCs set a high transfer price on intra-firm trade in order to shift profits from Norway to an affiliate in a low tax country. Both tax strategies reduce Norwegian tax revenues.

Under both analyses, I saw that the bigger the difference is between the Norwegian tax rate and the tax rate abroad, the more profitable is profit shifting and thus the bigger is the

motivation for MNCs to exploit tax rate differences. Based on this result I suggest a decline in the corporate tax rate.

The reader should notice that decreasing the tax rate in order to mitigate debt shifting and transfer pricing will reduce tax revenues. To make a sound argument for lower tax rates, I should instead of my simple models use a real tax competition model. This would allow trading additional real investments against losses in tax revenue. Such an analysis could also help determine how much the tax rate can be lowered.

3.3 Chapter conclusion

This chapter examines the distortions in the current Norwegian tax system and assesses how MNCs can exploit tax rates differences between Norway and low-tax countries.

I find that the current tax system is distortive. The system favors debt to equity and is thus non-neutral with regards to the tax-treatment between debt and equity. This leads to reduced solvency and increased risk of bankruptcy costs in addition to a too low fraction of equity financed investments. The system is also non-neutral regarding depreciations, as the system does not treat depreciations for tax purposes equal to real depreciations. This distorts firms' investment behavior.

Moreover, this chapter proves that the Norwegian tax system is pressured by the behavior from MNCs. I show that MNCs will reduce their tax burden in Norwegian affiliates by shifting profits out of the country by using transfer pricing and thin capitalization. This reduces the tax revenues in Norway. To cope with this problem I think it is likely and wise that the government reduces the Norwegian tax rate.

In order to solve the shortcomings in the current system a solution could be a fundamental tax reform in Norway. There are today several alternative systems if a new one should be implemented. However, I would like to analyze only two of them. These are the Allowance for Corporate Equity system and the Comprehensive Business Tax Income system. In the next chapter I will introduce these systems, taking a deeper look into the various side of them, and in chapter 5 compare these and conclude which is better for Norway. The recommendation of which one is best will be considered taking into account a declining Norwegian tax rate. The new system should therefore reflect the implications of a lower tax rate, especially with regards to the tax base.

4.0 Two alternative tax systems

In this chapter I introduce and explain two tax systems proposed in the literature. The first system, Allowance for Corporate Equity, is to some extent introduced in several countries. The second system, Comprehensive Business Income Tax, is not introduced anywhere. Both systems have attractive and unattractive features, and – according to the literature – they have features that will improve the current Norwegian tax system. Which one is the best will be determined based on the results of my analysis in chapter 5.

4.1 Allowance for Corporate Equity

4.1.1 Description of the ACE system

The ACE tax system was proposed by the Capital Taxes Committee of the Institute for Fiscal Studies in 1991. The purpose of the ACE system is to cope with tax-imposed distortions and create neutrality between debt and equity financing and ensure correct depreciations. Under the ACE system, firms are allowed to deduct an imputed normal return on their equity from the corporate income tax base, in addition to deduction of interests on debt. (Griffith, Hines, & Sørensen, 2008) A pure ACE will exempt the cost of raising finance at the company level from taxation, and will only subject the profits exceeding a *normal rate of return* to taxation (Radulescu & Stimmelmayr, 2006).

4.1.2 Impact on important components under an ACE system

Cost of capital and investment behavior

Deducting the opportunity cost of equity implies that the cost of capital will decline, as the effective tax rate declines. Reduced cost of capital means that more investment projects will be profitable on the margin so that investments will increase. Moreover, as the effective tax rate is reduced, ACE will strengthen a country's attractiveness as a location for multinational investments. (Keuschnigg, 2011)

Tax-treatment of debt and equity

One of the main ideas behind the ACE system is to address the difference in the tax-treatment of debt and equity by allowing firms to deduct the cost of equity as well as cost of debt. This ensures neutrality for financing alternatives of companies. (de Mooij & Devereux, 2010)

Tax-treatment of depreciations

Another attraction of the ACE system is that it offsets investments distortions made by deviations between real economic depreciations and tax depreciations. The argument behind this statement is as following. If taxable depreciations are higher than real economic

depreciations within a certain time-period, the taxable income will be relatively low, as the firm can deduct higher tax-costs than real economic costs. This can be seen as a tax credit. High tax deductions will also reduce the book value of assets in the tax accounts. This will reduce the ACE allowance in upcoming years, and exactly offset the benefits from the tax credit in terms of present value. (de Mooij & Devereux, 2010) As higher depreciations decrease the ACE allowance, such as the tax credit benefit is offset, firms will be independent with regards to the rate at which firms write down their assets. This is among others proved by Jacobsen & Schjelderup (2012).

Inflation

Inflation does not affect the ACE system. An increase in monetary profits because of inflation will be offset by a higher notional return, since the notional interest rate also will be higher due to the inflation (Gammie, 1991).

Multinational companies

Due to symmetric treatment of debt and equity, a parent company will be indifferent between financing a Norwegian subsidiary either with debt or equity and thus will ACE eliminate the need for thin capitalization rules to protect the domestic tax base (Jacobsen & Schjelderup, 2012). If all countries adopt the ACE system, MNCs will not have any incentives to adjust their intercompany debt-equity structures. However, if only one country introduces ACE, MNCs will find it attractive to shift their equity into this country, as returns will be partly untaxed. (de Mooij & Devereux, 2010)

ACE does not offset the problem with profit shifting. ACE provides neutrality between debt and equity, but as it is still possible to deduct cost of capital, MNCs will have incentives to transfer profits out of, and shift debt into, high-tax subsidiaries such as Norway. (de Mooij & Devereux, 2010)

Tax base

An important disadvantage of the ACE system is narrowing of the tax base. Allowing companies to deduct both cost of debt and equity will reduce the taxable profit in a firm and hence reduce the government revenues. De Mooij (2011) calculates the direct revenue loss from a Norwegian ACE model to be 7 billion NOK (0.3 % of GDP) (De Mooij, 2011). However, Jacobsen & Schjelderup (2012) argues that this number is too high, and estimates a revenue loss of 1.1 billion NOK.

The corporate tax rate under ACE

To cope with the problems of a narrowed tax base, the government has to increase the tax rate to neutralize the revenue effect (Griffith, Hines, & Sørensen, 2008). This is however contrary to the OECD-trend with declining tax rates. Increasing the tax rate is not desirable in a globalized world with high capital mobility, and where a higher tax rate has negative effect on the behavior from MNCs (Radulescu & Stimmelmayr, 2006).

A higher corporate tax rate will increase the incentives for profit shifting and weaken a country as a location for multinational investments (Keuschnigg, 2011). This has negative impact on the location decisions of firms and the amount of foreign direct investments. To avoid these effects, the government should therefore not increase the tax rate, and the result will be reduced government revenues. (Centre for tax policy and administration, 2007) This argument is also in compliance with the report of Mooij and Devereux (2010). They found that if ACE were financed by higher tax-rates, the tax base would erode because of profit shifting and adverse effects on the locations of profitable investments. To cope with the problem of narrower tax-base, and not increase the tax rate, the government should in stead increase the VAT or other taxes. (de Mooij & Devereux, 2010) OECD has argued that the VAT is a neutral tax (OECD, 2012).

Implementing ACE

In order for ACE to ensure neutral tax-treatment, the imputed rate of return on equity has to be correct determined. ACE ensures neutrality for investments and financing decisions only if the tax rate falls on the net cash flow of shareholders. This argument implies that in order to obtain tax neutrality, the imputed rate of return must equal the rate that shareholders use to discount their tax savings from their future ACE allowances. The shareholder discount rate is different from shareholder to shareholder, and is dependent on a shareholder's individual degree of riskiness. In order to choose the imputed return, the government might require firm-specific information from all companies. It is therefore difficult and too costly for the tax authorities to determine this rate of every single company. For administrative purposes, the probable outcome is hence to use a common imputed rate of return for all companies. In countries with a well-developed bond-market, it is suggested in an article by Griffith et al (2008) that the interest rate on short-term government bonds should be used as the imputed rate of return on equity. (Griffith, Hines, & Sørensen, 2008)

There will also occur transition problems. Should the ACE allowance be granted only for additional equity after the introduction of the ACE reform, or should the allowance be

applicable to all equity? To minimize the revenue cost, the ACE allowance should be granted only for new equity. (Griffith, Hines, & Sørensen, 2008)

4.1.3 Empirical evidences
The discussion on the important components of the ACE system is based on the theoretical aspects of the system. For a deeper understanding it is interesting to also look at some empirical studies from abroad experiences.

Belgium
In 2006, a Belgian tax reform introduced the *system of the notional interest deduction.* This system introduced an equity tax shield, similar to the debt tax shield. This means similar tax deductibility on cost of equity as on cost of debt. Using a model showing how the equity tax shield affected the capital structure of a company, Princen (2012) found that the empirical results were consistent with theoretical prediction. She found a significant negative impact on the leverage in companies subject to the equity shield introduced by the ACE system. Her result suggested that adopting the same favorable tax-treatment for equity as for debt reduced the debt ratio of a company. (Princen, 2012)

In practice, Belgian companies enjoy a reduction in the cost of capital equal to the risk free interest rate multiplied with the marginal tax rate. The tax rate in Belgium is 33.99 %, and by assuming a risk-free rate of 3 %, the required percentage return on equity will be 1.02 %, which is multiplied with total equity and constitutes the equity tax shield. (Colmant & Hübner, 2007)

Italy
In December 2011, the Italian Government presented a reform including the «*Aiuto alla Crescita Economia*», as an instrument to stimulate company capitalization. The purpose of the Italian ACE-variant was to discourage Italian companies from excessively high leverage. A CESifo working paper showed that the results of an Italian ACE were higher profits among firms (from lower cost of capital) and reduced leverage. (Panteghini, Parisi, & Pighette, 2012)

Other experiences
Also Austria, Brazil and Croatia have introduced partial ACE systems. The Croatian system is similar to the Belgian ACE, allowing deduction of a notional return. The notional return in Austria is taxed at a lower rate than the standard rate, making equity more preferred. In the Brazilian system, dividends can be paid as interest on equity, deductible for all corporate income taxes. (Klemm, 2006)

4.2 Comprehensive Business Income Tax

4.2.1 Description of the CBIT system

The Comprehensive Business Income Tax system was proposed by the US Treasury in 1992, and is a model that increases the efficient taxation on debt financed investments. The purpose of CBIT is to make the corporation tax neutral between debt and equity financing by disallowing exemption of interest on debt. A main characteristic of this system is that return on total capital is fully taxed, i.e. no allowance for deduction of debt interests. While ACE is subject only to profits exceeding a normal rate of return, CBIT is subject to both rate of return to capital and normal rate of return. CBIT transforms the corporate income tax into a broad-based tax on capital at firm level. (de Mooij & Devereux, 2010)

4.2.2 Impact on important components under a CBIT system

Cost of capital and investment behavior
The cost of capital will rise since incurred interests on debt are no longer deductible. This implies that fewer investment projects will be profitable on the margin, and investments will thereby decline. In the most extreme consequence, CBIT might increase the cost of debt capital until corporations are driven into bankruptcy. CBIT will also lead to lower foreign direct investments, as the cost of debt for foreign investors increases. (Centre for tax policy and administration, 2007)

Tax-treatment of debt and equity
A main attraction under CBIT is that the distortion in capital structure is neutralized due to the disallowance of deducting cost of debt. This means there will be no discrimination between debt and equity financing. (de Mooij & Devereux, 2010)

Tax-treatment of depreciations
A disadvantage is that CBIT does not solve the problem regarding incorrect depreciation between tax costs and real economic costs (Jacobsen & Schjelderup, 2012). In a CBIT system, there will still be different asset classes with different depreciation rates, where these rates are too high for some assets, and too low for other assets. CBIT is thus non-neutral with regards to tax-treatment of depreciations.

Inflation
The current problem with inflation still exists under CBIT (Jacobsen & Schjelderup, 2012).

Multinational companies

An attractive feature is that CBIT offsets incentives for MNCs regarding profit shifting in terms of financial structure. Since the CBIT system is neutral regarding the choice between debt and equity, excessive debt financing will not be stimulated and thin capitalization rules will not be necessary (Centre for tax policy and administration, 2007). However, CBIT does not prevent MNCs from profit shifting with regards to the tax rate. It is still profitable to shift profits to low-tax countries. According to de Mooij & Devereux (2010) countries that face high corporate tax rates and that are relatively sensitive to profit shifting because of having a large multinational sector, gain most from introducing the CBIT system if they simultaneously lower the corporate tax rate (de Mooij & Devereux, 2010).

Tax base

A quality under CBIT is that due to the disallowance of interest deductions there will be a broadening of the tax base, which will raise tax revenues. (de Mooij & Devereux, 2010)

The corporate tax rate under CBIT

If the tax revenue impact should be neutralized, i.e. having the same tax revenues under CBIT as under the current system, the tax rate should be reduced (de Mooij & Devereux, 2010). Ceteris paribus, this reduces the cost of capital and hence increases investments.

Implementing CBIT

CBIT will make it easier for the tax authorities to run the tax system, compared both to the current system and especially ACE. Under ACE, the authorities will have a difficult job determining the proper deductible equity rate. However under CBIT, the authorities do not even have to consider debt deductions. It will also be easier for the taxpayers to understand the CBIT system, since the number of deduction-posts in their tax returns is reduced.

There will be transition problems when implementing a new system, e.g. how to handle firms that already have debt. How should old and new debt be treated? One proper solution might be to decide that cost of old debt can be deducted, while cost of new debt is not to be deducted. (de Mooij & Devereux, 2010)

4.2.3 Empirical evidences

There are no real-world experiments of actual CBIT-regimes. However, some countries have introduced tax reforms that limit deductibility of interests to some extent.

Several European countries have introduced thin-capitalization rules. Such rules imply that interests are not deductible from profit if the debt-to-equity ratio exceeds a certain threshold.

This means that a company can deduct interest up to a certain limit, and thereafter deprive the right to deduct. In Germany the government disallows interest deductibility above 30 % of EBITDA. Also the Netherlands has introduced rules stating that interests received and paid face a reduced rate of 5 %-points. Both the German and the Netherland examples go in the direction of a CBIT system. (de Mooij & Devereux, 2010)

In an analysis of the effectiveness of thin-capitalization rules in preventing debt financing, Buettner et al (2008) find that these rules are associated with a significant reduction in leverage. This increases neutrality regarding tax-treatment of debt and equity by increasing the FOC of debt. (Buettner, Overesh, Schreiber, & Wamser, 2008)

4.3 Summarizing the ACE and CBIT systems

	ACE	CBIT
Cost of capital and investment behavior	Reduced cost of capital Increased investments	Increased cost of capital Decreased investments
Treatment of debt and equity	Neutral	Neutral
Treatment of depreciations	Neutral	Non-neutral
Inflation	Not affected by inflation	Affected by inflation
Behavior from MNCs	Increased investments	Offsets incentives for MNCs regarding profit shifting in terms of financial structure Decreased investments
Affection on the tax base	Reduced tax base	Increased tax base
Affection on the tax rate	To maintain the current tax base, the tax rate should *increase*	To maintain the current tax base, the tax rate could *decrease*
Implementation	Difficult to determine the ACE allowance	Transition costs

Table 1: The table gives a summary of important features within the ACE and CBIT tax systems.

5.0 Analysis part 2: An analytical comparison of ACE and CBIT

From my analyses in chapter 3, I proved that the current Norwegian system is distortive with regards to both tax-treatment of debt and equity and tax-treatment of depreciations. From chapter 4, I understood that a firm's investment behavior is closely linked to a country's tax system. In this chapter I therefore analyze *investment behavior*, *tax-treatment of debt and equity*, and *tax-treatment of depreciations* under both ACE and CBIT. I also discuss each system's impact on the tax base and on economic welfare.

5.1 Assumptions and clarifications

To analyze these features I apply the same model as I developed in chapter 3, and adapt the model to include the components of ACE and CBIT described in chapter 4. To illustrate the properties of the two systems in the best way possible, I will simplify the model under each sub-analysis to highlight only the most important features.

Under the *investment behavior* sub-analysis I will adapt the model to only consider total capital (K), and not split between debt and equity. By only examining total capital, I can more easily show the impact on cost of capital under each tax-regime. In this sub-analysis I examine ACE under two scenarios. The first scenario allows a firm to fully deduct cost of equity. The second scenario allows the firm only to deduct a fraction of its cost of equity.

When I analyze the *tax-treatment of debt and equity* I split total capital into debt and equity in order to better understand the characteristics of ACE and CBIT. This allows me to compare the FOC of debt and equity under both systems, and examine if the imposed tax affects debt and equity equally or differently. Also in this sub-analysis I examine ACE under the two scenarios.

Both under the analysis on investment behavior and the analysis on tax-treatment of debt and equity, I exclude depreciations with intention only to consider the most important results for each feature. However, in section 5.4, *Tax-treatment of depreciations,* I proceed with the two-period model from sub-section 3.1.2, including depreciations.

For an overview of model notation see Appendix 1.

5.2 Investment behavior

According to the theory in chapter 4, the ACE system reduces a firm's cost of capital and hence increases investments, whilst the CBIT system increases a firm's cost of capital and hence decreases investments. The purpose of section 5.2 is to analyze a firm's investment behavior under both systems.

5.2.1 ACE

Under an ACE system, both debt and equity costs are deductible. In the first part of this analysis I assume that all costs of capital are deductible to the full extent. However, I find it difficult for the government to determine the actual cost of equity for all firms. Therefore, I extend the analysis to also consider a situation where only a fraction (α) of the cost of capital is deductible.

i) Assuming cost of equity is fully deductible
The pre-tax profits function is given by

$$\pi^V = F(K) - rK$$

Under the assumption that all cost of capital is deductible, the taxable profits function equals

$$\pi^t = F(K) - rK$$

By setting this up as a maximization problem I get the after-tax profits

$$V = \pi^V - t\pi^t$$

$$V = [F(K) - rK] - t[F(K) - rK]$$

To find the marginal cost of capital under the ACE system I maximize expression V with respect to K

$$\frac{dV}{dK} = F'(K) - r - tF'(K) + tr$$

$$(1 - t)F'(K) = (1 - t)r$$

$$F'(K) = r$$

This result shows that the marginal revenue under the ACE system equals marginal cost. This result implies that ACE is neutral regarding investment behavior, meaning that a firm's investment decision is not affected by tax. However, this result assumes the non-realistic assumption where the tax-deductible equity cost equals the real cost of equity. In the next paragraph I use a more realistic assumption, where the firm cannot deduct the full cost of equity.

ii) Assuming only a fraction of cost of equity is deductible

The pre-tax profits function is the same as above and given by

$$\pi^V = F(K) - rK$$

Allowing only a fraction of the equity cost to be deducted, the taxable profits function is different compared to the one under the previous paragraph.

$$\pi^t = F(K) - \alpha rK$$

where $0 < \alpha < 1$. Under this assumption, the new maximization problem equals

$$V = [F(K) - rK] - t[F(K) - \alpha rK]$$

I get the first order condition by maximizing this expression with respect to K.

$$\frac{dV}{dK} = F'(K) - r - tF'(K) + t\alpha r$$

$$(1 - t)F'(K) = (1 - t\alpha)r$$

$$F'(K) = \left[\frac{1 - t\alpha}{1 - t}\right]r$$

Under this assumption there will be a distortion, implied by the tax wedge. ACE is no longer neutral with respect to investment behavior. It is evident that the marginal cost of a firm is higher when it is not allowed to fully deduct equity costs, and the firm will invest less.

Implementing ACE in favor of the current system will decrease a firm's cost of capital due to the allowance of equity deduction. This will increase investments compared to today's level.

5.2.2 CBIT

Under CBIT the pre-tax profit function is the same as before and given by

$$\pi^V = F(K) - rK$$

As a CBIT system does not allow deduction of any cost of capital, the taxable profits function equals

$$\pi^t = F(K)$$

The after-tax profits are thus

$$V = [F(K) - rK] - t[F(K)]$$

By maximizing the expression with respect to K, I find

$$\frac{dV}{dK} = F'(K) - r - tF'(K)$$

$$(1 - t)F'(K) = r$$

$$F'(K) = \frac{r}{(1 - t)}$$

The FOC shows that the CBIT system is non-neutral, as the tax imposes a tax-wedge. Under CBIT the tax increases the marginal cost. This is intuitive since the firm is not allowed to deduct any cost of capital. The interpretation of this result is that under a CBIT system the marginal cost is positively correlated with the tax rate; the higher the tax rate is, the higher the marginal cost will be.

Implementing CBIT in favor of the current system will increase a firm's cost of capital due to the disallowance of deducting any cost of capital. This will reduce investments compared to today's level.

5.2.3 Comparing ACE and CBIT

By comparing the marginal cost given by each FOC, I can compare the two systems. I choose to compare the more realistic ACE case, where the firm cannot deduct the fully cost of equity.

$$\underset{CBIT}{\frac{r}{(1 - t)}} > \underset{ACE}{\left[\frac{1 - t\alpha}{1 - t}\right]r}$$

The expression above shows that the marginal cost under a CBIT system is higher that under an ACE system, when $0 < \alpha < 1$. The interpretation of this result is simple. Since the firm is allowed to deduct the fully cost of debt, and at least a fraction of cost of equity under ACE, while not allowed to deduct any cost of capital under CBIT, the marginal cost of capital would be higher under a CBIT system. Assuming that the tax rate is equal under both tax-regimes, a firm would invest more under ACE than CBIT due to lower cost of capital.

Considering only investment behavior, ACE is preferred to CBIT.

5.3 Tax-Treatment of debt and equity

The purpose of this section is to examine whether the tax-treatment of equity and debt is neutral or distortive under each of the ACE and CBIT systems. Notice that $K = D + E$.

5.3.1 ACE

As when analyzing investment behavior, I will also in this section analyze ACE under two different scenarios; i) the firm can deduct its fully cost of equity, and ii) the firm can only deduct a fraction of its cost of equity.

i) Assuming cost of equity is fully deductible
The pre-tax function of the firm is equal to

$$\pi^V = F(K) - r_D D - r_E E$$

The related taxable profits function is given by

$$\pi^t = F(K) - r_D D - r_E E$$

The new maximization problem is thus equal to

$$V = [F(K) - r_D D - r_E E] - t[F(K) - r_D D - r_E E]$$

I maximize this expression with respect to first D, and second E, which gives me two FOCs.

$$\frac{dV}{dD} = F'(K) - r_D - tF'(K) + tr_D$$

$$(1-t)F'(K) = (1-t)r_D$$

$$F'(K) = r_D$$

The FOC of debt implies neutral tax-treatment of debt capital, as marginal revenue equals marginal cost.

$$\frac{dV}{dE} = F'(K) - r_E - tF'(K) + tr_E$$

$$(1-t)F'(K) = (1-t)r_E$$

$$F'(K) = r_E$$

The FOC of equity implies neutral tax-treatment of equity capital, as MR = MC.

This result implies that ACE ensures neutrality between debt and equity financing, based on the assumption that all costs of capital are deductible.

ii) Assuming only a fraction of cost of equity is deductible
The firm's pre-tax profits function is the same as before

$$\pi^V = F(K) - r_D D - r_E E$$

However, by deducting only a fraction of cost of equity ($0 < \alpha < 1$) the taxable profits function is changed

$$\pi^t = F(K) - r_D D - \alpha r_E E$$

This provides the following maximization problem

$$V = [F(K) - r_D D - r_E E] - t[F(K) - r_D D - \alpha r_E E]$$

Yet again I will end up with two FOCs as I maximize the expression with respect to both debt and equity.

$$\frac{dV}{dD} = F'(K) - r_D - tF'(K) + tr_D$$

$$(1 - t)F'(K) = (1 - t)r_D$$

$$F'(K) = r_D$$

The FOC of debt implies neutral tax-treatment of debt capital.

$$\frac{dV}{dE} = F'(K) - r_E - tF'(K) + t\alpha r_E$$

$$(1 - t)F'(K) = (1 - t\alpha)r_E$$

$$F'(K_E) = \left[\frac{1 - t\alpha}{1 - t}\right]r_E$$

The FOC of equity includes a tax wedge, implying that the firm is affected by the tax.

By comparing the first order conditions I can see if cost of debt and equity is affected by the tax or not. As the tax creates a tax wedge for equity capital, and does not create a tax wedge for debt capital, I understand that the tax is neutral in the debt-case but not with regards to equity. This means an ACE regime favors debt over equity. Under the assumption of only a fraction cost of equity deductible, the ACE system does no longer enhance symmetric treatment of debt and equity.

As a fraction of cost of equity is deductible, an ACE system reduces the tax distortion between debt and equity compared to the current system, and is thus a more neutral system. ACE is hence preferred to the current system.

5.3.2 CBIT

The pre-tax profit function under CBIT is the same as under ACE.

$$\pi^V = F(K) - r_D D - r_E E$$

Since the firm is no longer allowed to deduct any cost of capital, the taxable function equals

$$\pi^t = F(K)$$

Combining the pre-tax and taxable profits, I get the following maximization problem

$$V = [F(K) - r_D D - r_E E] - t[F(K)]$$

Again I solve the expression with respect to both D and E.

$$\frac{dV}{dD} = F'(K) - r_D - tF'(K)$$

$$(1 - t)F'(K) = r_D$$

$$F'(K) = \frac{r_D}{(1 - t)}$$

The FOC implies that the cost of debt is affected by the tax.

$$\frac{dV}{dE} = F'(K) - r_E - tF'(K)$$

$$(1 - t)F'(K) = r_E$$

$$F'(K) = \frac{r_E}{(1 - t)}$$

The FOC implies that the cost of equity is affected by the tax.

Although r_E and r_D is not equal, the denominators in both FOCs are equal. The interpretation of this result is that CBIT ensures symmetric tax-treatment of debt and equity, as the tax affects the FOCs equally. The marginal cost of debt and equity is however affected by the tax, but this has implications on cost of capital and investment behavior and not tax-treatment of debt versus equity.

As CBIT ensures symmetric treatment of debt and equity, and the current system does not, CBIT is preferred to the current system.

5.3.3 Comparing ACE and CBIT

Under the ACE system, assuming that only a fraction of cost of equity is deductible, I found that ACE is not neutral between debt and equity financing. ACE favors debt over equity, and firms will thus choose more debt financing. Contrary to ACE, my analysis showed that the CBIT system is neutral between debt and equity financing.

Considering only the tax-treatment of debt and equity, CBIT is preferred to ACE.

Compared to the current system in Norway, an implementation of CBIT will make equity more preferred than what it is today. This would be beneficial for the economy, since firms will reduce their debt financing, and hence increase solvency and decrease bankruptcy costs.

5.4 Tax-treatment of depreciations

The purpose of this section is to prove how depreciations are treated under the different systems by using the same two-period model as I did in sub-section 3.1.2. By using this model I can show how δ is treated in period 2, after investing K in period 1.

5.4.1 ACE

The pre-tax and taxable functions are the same as under the current Norwegian tax system:

$$\pi^V = F(K) + (1 - \delta)K$$

$$\pi^t = F(K) - (\alpha r + \theta \delta)K$$

Combining pre-tax and taxable profits gives me the following after-tax expression

$$V = -K + \frac{\pi^V - t\pi^t}{1 + r}$$

$$= -K + \frac{[F(K) + (1 - \delta)K] - t[F(K) - (\alpha r + \theta \delta)K]}{1 + r}$$

By maximizing this expression with respect to K, I get the first order condition

$$\frac{dV}{dK} = F'(K) = \left[\frac{1 - \alpha t}{1 - t}\right]r + \left[\frac{1 - \theta t}{1 - t}\right]\delta$$

The first term of the expression concerns cost of capital, while the second part of the FOC concerns depreciations. The tax-treatment of depreciations is dependent on the fraction deductible. Benefits from earlier depreciations are exactly offset by a fall in the ACE allowance. This implies that the company can deduct its fully cost of depreciations. This means that θ equals 1 in the model. By substituting theta by 1, the tax wedge vanishes.

$$F'(K) = \left[\frac{1 - \alpha t}{1 - t}\right]r + \delta$$

The tax wedge implies that the firm is still affected by the tax concerning cost of capital as already shown in 5.2.1. Moreover, the result shows that tax-treatment of depreciations is neutral, meaning that the firm is not affected by the tax. The implication of this result is that production decisions are not distorted and the firm sets marginal revenue equal to marginal cost. As the current system is non-neutral with regards to depreciations, ACE is preferred.

5.4.2 CBIT

The pre-tax and taxable profits functions are the same as under the current Norwegian system.

$$\pi^V = F(K) + (1 - \delta)K$$

$$\pi^t = F(K) - (\alpha r + \theta \delta)K$$

Combining pre-tax and taxable profits gives me to the following after-tax expression

$$V = -K + \frac{\pi^V - t\pi^t}{1 + r}$$

$$= -K + \frac{[F(K) + (1 - \delta)K] - t[F(K) - (\alpha r + \theta \delta)K]}{1 + r}$$

By maximizing this expression with respect to K, I get the first order condition

$$\frac{dV}{dK} = F'(K) = \left[\frac{1 - \alpha t}{1 - t}\right] r + \left[\frac{1 - \theta t}{1 - t}\right] \delta$$

The FOC under CBIT is equal to ACE. However, the fractions deductible regarding alpha and theta are different. While alpha is greater than 0 and less than 1 under ACE, it is equal to zero under CBIT. Theta is dependent on the allowed deduction, which is given by Norwegian law, and is different from asset class to asset class. The tax-wedge will hence persist. Taking into account that alpha equals zero, and theta remains, the FOC under CBIT is given by

$$F'(K) = \left[\frac{r}{1 - t}\right] + \left[\frac{1 - \theta t}{1 - t}\right] \delta$$

The first term concerning cost of capital is already explained in sub-section 5.2.2. The second term of the FOC illustrates that the treatment of depreciations under CBIT is equal to the current system. The result implies that the tax system is non-neutral if $\theta \neq 1$. The firm is hence affected by the tax under CBIT.

5.4.3 Comparing ACE and CBIT
The model in this section illustrates the tax-treatment of depreciations. My models suggest that ACE ensures neutral tax-treatment of depreciations, while CBIT treats depreciations equal to the current system, i.e. non-neutral treatment. ACE is neutral as the imposed ACE allowance offsets the deviations between true economic depreciations and taxable depreciations. The implication is that the company deducts the true economic depreciations in their tax accounts. As CBIT has no such allowances, the tax-treatment of depreciations is equal to the current system, where assets are sorted into classes, and then assigned a fixed depreciation rate. CBIT is, as the current tax system, non-neutral.

Considering only the tax-treatment of depreciations, ACE is preferred to CBIT.

5.5 Impact on the tax base

This section deals with how Norway should consider the impact on tax revenues under each of the proposed systems. While an ACE system will reduce the tax base, a CBIT system increases the tax base. The reader should remember the guideline of a revenue neutral proposal. Quantifying the tax-base impact is difficult due to uncertain transitional provisions under both ACE and CBIT; e.g. if both old and new equity should be proceeded under ACE or only new equity; and in the CBIT-case if both old and new debt should be considered or only new debt. Thus, I do not try to quantify the revenue impact.

5.5.1 ACE

An ACE system will reduce the government's tax revenues. This implies that if Norway should neutralize the tax revenues impact, either the tax rate should increase, or Norway has to increase their government revenues by other means.

Increasing the corporate tax rate will increase the tax revenues. However, this is contrary to the trend in the OECD, where the corporate tax rate has decreased through the last decades. As stated in chapter 4, increasing the corporate tax rate might have a negative impact on the location of firms and on the amount of foreign direct investments. If Norway increases the corporate tax rate, investments will be distorted from Norway to abroad. Moreover, increasing the corporate tax rate will increase problems regarding transfer pricing and thin capitalization. Hence, I will not suggest an increase in the corporate tax rate. Furthermore, the analyses in section 3.2 suggested a decline in the corporate tax rate.

Under an ACE system Norway therefore has to increase the government revenues by other means. Two sufficient financing alternatives are increased tax on property or increased value added taxes.

The argument for increasing property taxes can be made with a basis in Figure 5; *Tax revenues split in main headings* in chapter 2. Since the Norwegian property tax level is only two thirds of the OECD average level, it seems reasonable to increase tax on property. Moreover, taking into account that consumption taxation in Norway is the fourth highest in the OECD, increasing property taxes emerges as a good alternative.

However, microeconomic theory advocates that it is most efficient if taxes are spread out on a maximum basis, i.e. the taxes should be spread on as many goods or services as possible. Taking this into account, it seems better to increase the value added taxes, instead of just increase a tax on a specific good; property. By spreading the tax base on several goods and

services, the efficiency loss will be lower compared to an alternative of taxing only property or income. The tax-distortion caused by the VAT is less damaging, and VAT is thus a less damaging tax than alternative taxes.

In order to finance the ACE system, I suggest an increase in the value added taxes, rather than increasing the standard tax rate or taxes on property. How much the value added taxes should increase is difficult to determine, and is dependent on transition determinations by implementing ACE and the tax reform's impact on the tax base.

5.5.2 CBIT

A CBIT system will increase the tax base by not allowing deduction of either cost of debt nor equity. This implies that Norway can reduce their tax revenues – either by reducing the corporate tax rate, or reducing other tax rates, e.g. VAT-rates – and still secure the same government revenues as in the current tax system.

In terms of problems regarding MNCs' tax strategies, it is beneficial if the Norwegian corporate tax rate is reduced. How much the tax revenues will increase by implementing the CBIT system, and thus how far the corporate tax rate can be reduced, is hard to say. It has to be done empirical and numerical research on this, and the topic is therefore provided to other researchers and academics, as it will be too extensive to include in this thesis.

Reducing the corporate tax rate will give more economic sense than reducing the VAT-rate. This is because corporate tax is a single tax on capital only, and hence more distortive, compared to a broader VAT. In the CBIT-case I therefore suggest a reduction in the standard tax rate. As the Norwegian tax system is highly integrated, the tax rate should be reduced both in the personal income tax system as well as in the corporate income tax system.

5.6 Welfare effects

Until now I have examined the tax neutrality of important features in the current Norwegian tax system, in addition to analyzed important components in the ACE and CBIT systems. To recommend which of the two systems that best can replace the current Norwegian system, I will have to assess the welfare effects under each system. To do so I could build my own computable general equilibrium (CGE) model to analyze the implications of ACE and CBIT with regards to welfare. However, I will not develop such a model by two reasons. First, a CGE model is extensive to build and is beyond the scope of this thesis. Second, Radulescu and Stimmelmayr have already developed such a model in 2006, and in addition there exists an applied general equilibrium model developed by de Mooij and Devereux in 2010. Both

models assess employment, capital stock, GDP, consumption and welfare. I therefore introduce their models and results, and use their results to draw a conclusion in the case of a fundamental tax reform in Norway.

5.6.1 Radulescu and Stimmelmayr: Computable general equilibrium model

The CGE model resembles a two-country model, where the home country's economy consists of two sectors and an infinitively lived agent on the household side. The model is calibrated to the German economy. The model is based on the premise that both ACE and CBIT should be implemented on a revenue neutral basis. Simulations in the model are based on adjustment in the VAT-rate instead or in addition to an adjustment of the corporate tax rate. (Radulescu & Stimmelmayr, 2006)

By changing the VAT only, ACE would increase welfare with 0.1 %. The change in welfare is calculated as total wealth divided by GDP. In the CBIT case, welfare decreases with 1.2 % if the VAT-rate is changed in order to maintain revenue neutrality. By changing both the VAT and reduce the tax rate, ACE would decrease welfare by 0.45 %, while CBIT would decrease welfare by 1.1 %. The model also analyzes an ACE scenario where the imputed return is lower than the interest rate on debt, and the reform is financed by an increase in VAT. The welfare effect is +0.3 %. Lastly, Radulescu and Stimmelmayr analyze a CBIT reform where only the tax rate is changed. Now, welfare decreases with 0.6 %. (Radulescu & Stimmelmayr, 2006)

In section 3.2, I recommend the tax rate to decline. I also recommend an ACE system to be accompanied by an increase in VAT. These recommendations are in accordance with Radulescu and Stimmelmayr in the ACE case where both VAT and the tax rate are changed. Under these assumptions, ACE decreases welfare with 0.45 %. My recommendations are also in accordance with the model when CBIT is accompanied by a change in the tax rate only. This decreases welfare with 0.6 %.

Based on my recommendation of a reduced corporate tax rate and on the results of Radulescu and Stimmelmayr, I understand ACE to be the preferred tax reform in terms of welfare.

5.6.2 de Mooij and Devereux: Applied general equilibrium model

de Mooij and Devereux developed an applied general equilibrium model that describes 27 EU countries in addition to Japan and the US in order to simulate the economic implications of corporate tax policies. Among other parameters, the model is used to measure the welfare

effect of policy changes. The welfare effect is expressed in terms of GDP. (de Mooij & Devereux, 2010)

The base case of both ACE and CBIT reforms is an adjustment of lump-sum transfers or alternative taxes. The results of this analysis are that ACE increases welfare by 0.8 % in percent of GDP, while CBIT reduce welfare by 1.2 % in percent of GDP. The main reason for these results is the change in capital (investments). Capital increases by 7.9 % (of GDP) under ACE, but decreases by 12.0 % under CBIT. However, the results become different when tax havens and discrete locations are taken into account. Now welfare will decrease under ACE with 0.3 % and increase by 1.1 % under CBIT. The reasoning behind these results is the following. In order to finance ACE, tax rates are increased and welfare is reduced because of erosion of the corporate tax base due to profit shifting. As CBIT allows for a lowering of the corporate tax rate, a country will attract substantial profits and discrete investments, which will increase the capital stock, and thus increase welfare. When CBIT is combined with lower tax rates, the corporate tax base expands, which in turn raises welfare in a typical European country. Countries with high corporate tax rates, and countries that are sensitive to profit shifting due to a large multinational sector, gain from a CBIT reform when accompanied by lower tax rates. (de Mooij & Devereux, 2010)

Based on my recommendation of a reduced corporate tax rate and on the results of de Mooij and Devereux, I understand CBIT to be the preferred tax reform in terms of welfare.

5.6.3 Conclusion

In the basic versions of a general equilibrium model, such as Radulescu & Stimmelmayr (2006) and the lump-sum transfer-model by de Mooij & Devereux (2010), ACE is preferred to CBIT in terms of welfare. However, for European countries with high tax rates and a large multinational sector, CBIT is more attractive due to positive implications from a reduction in the corporate tax rate.

Based on my recommendation in section 3.2, both CBIT and ACE will be combined with lower tax rates. Norway is a country with relatively high corporate tax rates and is an open economy with a large multinational sector. Thus, based on the results of de Mooij and Devereux, CBIT emerges as the best alternative of a fundamental tax reform in Norway.

5.7 Chapter conclusion

This chapter analyzes important tax system components under ACE and CBIT. The chapter also includes a discussion on the tax base impact and finishes with a welfare discussion based on two published articles.

I find that ACE decreases cost of capital and thus increases investment. Contrary, CBIT increases cost of capital and decreases investments. With regards to tax-treatment of debt and equity, my analysis shows that ACE is not fully neutral, as the system does not allow the real cost of equity deductible for tax purposes. CBIT does however ensure symmetric treatment, as CBIT disallows both cost of equity and cost of debt deductions. Finally I find that ACE offsets investments distortions made by deprecations. This is not the case with CBIT, as CBIT treats depreciations equally to the current tax system.

ACE and CBIT affect the tax base different. ACE decreases the tax base, and I recommend an ACE reform to be financed by increased value added taxes. CBIT increases the tax base, and I recommend a CBIT reform to be accompanied with a reduction in the standard tax rate only. Based on the welfare-effect discussion, I finally recommend the CBIT system, as published works suggest that CBIT increase welfare in open economies with high tax rates.

6.0 Conclusion and recommendation

This thesis seeks to answer what are the main distortions in the Norwegian tax system and to determine which of the ACE or CBIT systems that best could replace the current system.

In my analysis in chapter 3, I examine distortions in the current Norwegian system. Here I find that the Norwegian tax system discriminates equity, as cost of debt is deductible in a firm's tax account while cost of equity is not. Further, I find that the treatment of depreciations is non-neutral, as there is an inequality between true economic depreciations and depreciations for tax purposes. In chapter 3, I also include an analysis on multinational companies' behavior and its affection on the Norwegian tax base. I show that MNCs shift profits out of Norway, which results in reduced government tax revenues. Thus, I suggest a reduction in the Norwegian tax rate. This is in accordance with the OECD-trend.

The tax-commission's mandate involves an examination of two fundamental tax reforms, the Allowance for Corporate Equity and the Comprehensive Business Income Tax systems. I have examined these systems with regards to investment behavior, tax-treatment of debt and equity and tax-treatment of depreciations. I find that both systems are more neutral, and thus less distortive, than the current Norwegian tax system.

	Current system	**ACE[8]**	**CBIT**
Investment behavior	*Not analyzed*	Increased investments	Decreased investments
Debt and equity	Non-neutral treatment	Non-neutral treatment	Neutral treatment
Depreciations	Non-neutral treatment	Neutral treatment	Non-neutral treatment

Table 2: The table highlights main findings of neutrality properties in the current system, ACE and CBIT.

My findings suggest that the ACE system is more neutral than the current tax system. I find that ACE solves the problem with incorrect depreciations. Moreover ACE will reduce a firm's cost of capital. This will increase investments in Norway and in Norwegian affiliates. However, I find that ACE is not completely neutral regarding tax-treatment of debt and equity. Cost of debt is fully deductible, but as cost of equity is not likely to be fully deductible, equity is still discriminated under an ACE regime. Despite this, ACE is more neutral than the current system, as at least a fraction of equity is tax-deductible.

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[8] The results are based on the ACE scenario where only a fraction of cost of equity (α) is tax deductible.

CBIT ensures symmetric tax-treatment of debt and equity, as neither cost of equity nor debt is tax deductible. However, I find that CBIT does not ensure correct depreciations. Moreover, CBIT decreases investments, as the cost of capital is raised.

When the tax rate-decline and the tax base-impact are taken into consideration, the picture becomes more perplex. The Norwegian government requested the tax-commission's proposal to be approximately revenue neutral. The tax base is already pressured by my suggestion of a reduced tax rate. Implementing the ACE system would pressure the tax base further. Both reducing the tax rate and implementing ACE would require either a large increase in the value added taxes or a tightening of central government transfers. As Norway is characterized as an ambitious welfare state, tightening of government transfers seems less likely, leaving a relative large increase in the VAT as the only option. Implementing ACE without reducing the tax-rate would not be beneficial, as a high tax rate will maintain MNCs' motivation for profit shifting.

As a suggested decline in the tax rate will reduce the Norwegian tax revenues, implementing CBIT is a better fit. Ceteris paribus, CBIT will increase tax revenues. This allows for a decline in the tax rate and still securing a revenue-neutral impact.

The tax-commission is to consider the possibility of protecting corporate taxation by treating debt and equity equally in order to reduce problems related to MNCs' tax strategies. I find that CBIT does treat debt and equity equally, while ACE does not. This is thus an argument in favor of CBIT. As CBIT removes the possibility of deducting cost of debt, the possibility of thin capitalization strategies from MNCs will be offset. Under an ACE system debt shifting will still be possible. However, none of the tax systems prevent profit shifting with regards to the tax rate. This suggests for a decline in the tax rate, which is best accompanied by a CBIT system.

Based on the welfare-discussion, I understand CBIT to increase welfare, and ACE to reduce welfare, in an open economy with a large multinational sector and high tax rates. The CBIT system will ensure equal tax-treatment between debt and equity, and impose greater leeway in the financial policy. This is in accordance with my recommendation of a reduction in the tax rate to cope with profit shifting problems incurred by MNCs. The CBIT system will increase the cost of capital and thus decrease investments, but as the tax rate is reduced, this effect will be accommodated. As a conclusion I recommend an implementation of the CBIT system.

7.0 Proposals for future research

A limitation of my thesis is that I do not analyze the quantitative effect by implementing either CBIT or ACE. Before implementing either of the fundamental tax reforms in Norway it is beneficial and necessary to make a quantitative analysis. In such an analysis the researcher should calculate the tax base impact under both systems. How much will the tax revenues increase under CBIT and how much will they decrease under ACE? This analysis should be conducted under different assumptions. If either CBIT or ACE should be implemented, the government has to decide the transitional provisions. Under ACE the government has to decide if both old and new equity is accounted for in the ACE allowance, or only new equity. The tax base impact is larger under ACE if old equity is included. Under CBIT the government has to decide if both old and new debt should be included. The tax base impact is different if only new debt is included, compared to if both old debt and new debt are included. The quantitate analysis should take into account these different situations.

de Mooij and Devereux (2010) made a welfare model on ACE and CBIT in European countries. A specified welfare model on ACE and CBIT in Norway would also be beneficial before determining if any of the systems should be implemented. Such a model should consider the welfare impact by reducing the tax revenues under ACE, and in addition increase investments. In the CBIT case, the model should analyze the welfare effect by an increased tax base, and less investments. The model should thus measure the effect on investments. Such a model should also consider the welfare impact under both ACE and CBIT when the tax rate is changed.

After my analysis on debt shifting and transfer pricing I argue that a real tax competition model would be a better tool if the purpose was to examine a change in the tax rate. An eager reader of this thesis is thus urged to develop a real tax competition model that allows trading additional real investments against losses in tax revenues.

Bibliography

Balsvik, R., Møen, J., Jensen, S., & Tropina, J. (2009). *Kunnskapsstatus for hva økonomisk forskning har avdekket om flernasjonale selskapers internprising i Norge.* Regjeringen. Regjeringen.

Bond, S. (2000). Levelling Up or Levelling Down? Some Reflections on the ACE and CBIT Proposals, and the Future of the Corporate Tax Base. *Taxing Capital Income in the European Union* .

Buettner, T., Overesh, M., Schreiber, U., & Wamser, G. (2008). *The impact on thin-capitalization rules on multinationals' financing and investment decisions.* Deutsche Bundesbank. Frankfurt: Deutsche Bundesbank.

Center for European Economic Research. (2009). *Effective tax levels using the Devereux/Griffith methodology.* EU Commission. Brussels: EU Commission.

Centre for tax policy and administration. (2007). *Fundamental reform of corporate income tax.* Centre for tax policy and administration, Committee on fiscal affairs. CTPA.

Christiansen, V. (2006). *A brief introduction to tax distortions and optimum tax theory.* Lecture note, Universitet i Oslo, Department of Economics, Oslo.

Colmant, B., & Hübner, G. (2007). *Notional interest deduction and financial policy.*

de Mooij, R. A., & Devereux, M. P. (2010). *An applied analysis of the ACE and CBIT reforms in the EU.* Int Tax Public Finance, Oxford university centre for business taxation. Oxford: Springer.

De Mooij, R. (2011). *Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions.* IMF. IMF.

Denk, O. (2012, April). Tax Reform in Norway: A focus in Capital Taxation. *OECD Economics Deparatment Working Papers* (950), p. 40.

Denk, O. (2012). *Tax Reform in Norway: A Focus on Capital Taxation.* OECD, OECD Economics Department. OECD Publishing.

Devereux, M. P., & Fuest, C. (2009). *Corporate Income Tax Coordination in the European Union.* Oxford University , Centre for Busniess Taxation. Oxford.

European Commisison. (2011, March). *European corporate tax base: Making business easier and cheaper*. (A. Šemeta, Producer) Retrieved January 28, 2013, from http://ec.europa.eu/commission_2010-2014/semeta/headlines/news/2011/03/20110316_en.htm

Fjærli, E., & Alstadsæter, A. (2008). *Netrual Taxation of Shareholder Income? The response of Small and Medium Sized Corporations to a Tax Reform.* Statistics Norway. Oslo: Statistics Norway.

Gammie, M. (1991). *Equity for companies: A corporation tax for the 1990s.* The institute for Fiscal Studies. London: The Institute for Fiscal Studies.

Griffith, R., Hines, J., & Sørensen, P. B. (2008). *International Capital Taxation.* The Institute of Fiscal Studies. Oxford: Oxford University Press.

Haufler, A., Klemm, A., & Schjelderup, G. (2007). Redistribute taxation, multinational enterprises, and economic integration. *European Journal of Political Economy* .

Jacobsen, M. R., & Schjelderup, G. (2012). *Kapitalbeskatning i en åpen økonomi.* Working Paper, Bergen.

Keuschnigg, C. (2011). *The design og capital income taxation: Reflections on the Mirrlees Review.* Universitat St.Gallen, Department of Economics. St.Gallen: University of St.Gallen.

Klemm, A. (2006). *Allowance for Corporate Equity in practice.* IMF. IMF.

Møen, J., Schindler, D., Schjelderup, G., & Tropina, J. (2011). *International Debt Shifting: Do Multinationals Shift Internal or External Debt?* CESifo. CESifo.

Ministry of Finance. (2013, March 15). *Government.no.* (M. o. Finance, Ed.) Retrieved January 4, 2014, from Mandate of the Tax Commission: http://www.regjeringen.no/en/archive/Stoltenbergs-2nd-Government/Ministry-of-Finance/Nyheter-og-pressemeldinger/pressemeldinger/2013/nytt-offentlig-skatteutvalg/mandate-of-the-tax-commission.html?id=717833

Ministry of Finance. (2010). *Tax Exemption for Companies' Income from Shares.* Ministry of Finance, Oslo.

Ministry of Finance. (2010). *The Corporate Tax System and Taxation of Capital Income.* Ministry of Finance, Oslo.

Nerudová, D. (2011). *Common Consolidated Corporate Tax Base: sharing the tax base under formulary apportionment .* Working Paper, Mendel University, Department of Accounting and Taxation, Czech Republic.

OECD. (2011). *Challenges in designing competitive tax systems.* OECD. Paris: OECD Publishing.

OECD. (2012). *Consumption tax trends 2012.* OECD. OECD Publishing.

OECD. (2003, February 20). *Glossary of Statistical Terms*. (OECD, Producer) Retrieved February 10, 2014, from http://stats.oecd.org/glossary/detail.asp?ID=2757

OECD. (2013). *OECD*. (OECD, Editor) Retrieved januar 18, 2013, from http://www.oecd.org/ctp/taxpolicyanalysis/revenuestatisticscountrynotefornorway.htm

OECD. (2013). *OECD iLibrary.* Retrieved April 9, 2014, from http://www.oecd-ilibrary.org/sites/factbook-2013-en/11/06/01/index.html?itemId=/content/chapter/factbook-2013-93-en

OECD. (2013). *OECD Tax*. Retrieved April 10, 2014, from OECD About BEPS: http://www.oecd.org/tax/beps-about.htm

OECD. (2014). *OECD Tax Policies.* Retrieved April 9, 2013, from www.oecd.org/ctp/tax-policy/Definitions.docx

OECD. (2014). *Taxes on Corporate Income*. Retrieved from http://www.oecd-ilibrary.org/taxation/taxes-on-corporate-income_20758510-table5

OECD. (1995). *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations.* OECD Council. OECD.

Oxford University. (2014). Oxford References. Online: Oxford University Press.

Panteghini, P., Parisi, M. L., & Pighette, F. (2012). *Italy's ACE Tax and its Effect on a Firm's Leverage.* CESifo. Brescia: CESifo.

Pindyck, R., & Rubinfeld, D. (2012). *Microeconomics* (Vol. 8). Pearson .

Princen, S. (2012). *Taxes do Affect Corporate Financing Decisions: The Case of Belgian ACE.* CESifo. Louvain-la-Neuve: CESifo.

Radulescu, D. M., & Stimmelmayr, M. (2006). *ACE vs. CBIT: Which is better for Investment and Welfare?* Ifo Institute. Munich: Ifo Institute.

Regjeringen. (2003). *Regjeringen*. Retrieved February 7, 2014, from Skatteutvalget NOU:2003: http://www.regjeringen.no/nb/dep/fin/dok/nouer/2003/nou-2003-9/11/3/2.html?id=381938

Regjeringen. (2013). Regjeringen varsler veksttiltak for næringslivet. *Press Conference.* Oslo.

Ruf, M., & Schindler, D. (2012). *Debt shifting and thin-capitalization rules - German experience and Alternative approaches.* Norwegian Tax Authority.

Sandmo, A. (1999, Januar 15). NOU 1999:7 Flatere skatt. (Finansdepartementet, Ed.) *Vedlegg 1* , pp. 279-299.

Sandmo, A. (1989). Om nøytralitet i bedrifts- og kapitalbeskatningen. *NOU 1989:14 , 14.*

Sørensen, P. (2010). *Swedish Tax Policy: Recent Trends and Future Challenges.* Report to the Expert Group on Public Economics, Ministry of Finance. Stockholm: Ministry if Finance.

Schindler, D., & Schjelderup, G. (2012). Debt shifting and ownership structure. (Elsevier, Ed.) *European Economic Review , 56*, 635-647.

Schindler, D., & Schjelderup, G. (Performers). (2013, January). *Taxes and Business Strategies.* NHH, Bergen, Norway.

Schjelderup, G. (2013). Form og substans: flernasjonale selskaper og skatteplanlegging. *Samfunnsøkonomen , 1.*

Schjelderup, G. (2013). *Multinationals and Transfer Pricing.* Bergen, Norway: Norwegian School of Economics and Norwegian Center for Taxation (NoCeT).

Schjelderup, G. (2012, september 1). Noen sentrale sammenhenger i person- og bedriftsbeskatningen. *Forelesningsnotat FIE432* .

Shyam-Sunder, L., & Myers, S. (1994). Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics* , 219-244.

Skatteetaten. (2006). *Skatteetaten*. (Skatteetaten, Producer) Retrieved januar 18, 2013, from http://www.skatteetaten.no/no/Person/Aksjer-og-verdipapirer/Om-de-nye-reglene-for-beskatning-av-aksjeutbytte-og-aksjegevinst/Aksjonarmodellen/

Skatteetaten. (2013, januar). *Skatteetaten*. (Skatteetaten, Editor) Retrieved januar 18, 2013, from http://www.skatteetaten.no/no/Tabeller-og-satser/

The Norwegian Ministry of Finance. (2013). *regjeringen.no*. Retrieved Mars 25, 2013, from Finansdepartementet - skattesatser 2013: http://www.regjeringen.no/nb/dep/fin/tema/skatter_og_avgifter/skattesatser-2013.html?id=704216

Torvik, O. (Performer). (2013, mars 7). *Guest Lecture: The arm's length principle.* NHH, Bergen.

United States Government Accountability Office. (2013). *Corporate Income Tax: Effective tax rates can differ significantly from the statutory rate.* Government Accountability Office. Washington: GAO.

Appendices

Appendix 1: Model specific notations – Neutrality properties

π^V	Pre-tax profits	
π^t	Taxable profits	
r	Cost of total capital	
r_D	Cost of debt	
r_E	Cost of equity	
$F(K)$	Total revenues	
K	Total capital	$K = D + E$
D	Debt capital	
E	Equity capital	
t	Tax rate	
δ	Depreciation costs	
α	Fraction deductible cost of capital	
θ	Fraction deductible depreciation costs	

Appendix 2: Model specific notations – Thin capitalization

$F(K_i)$	Total revenues	
K_i	Total capital	$K_i = D_i^E + D_i^I + E$
r	Cost of capital	
$C^E(b_i^E)$	Cost function of external debt	
$C^I(b_i^I)$	Cost function of internal debt	
b_i^E	External debt-to-asset ratio	D_i^E/K_i
b_i^I	Internal debt-to-asset ratio	D_i^I/K_i
D_i^E	External debt	
D_i^I	Internal debt	
t_i	Tax rate	

Appendix 3: Cost functions and calculations in relation to thin capitalization

The use of internal debt incurs costs, such as tax engineering expenses, in order to avoid tax regulations associated with thin-capitalization rules and CFC-rules. The cost function of internal debt is given by

$$C^I(b_i^I) = \frac{\eta}{2} \cdot (b_i^I)^2 K_i$$

In this function η is a positive constant and b_i^I represents the internal debt-to-asset ratio in affiliate i. K_i equals total capital.

Too much use of external debt can lead to excessive borrowing and risk of bankruptcy. External debt is moreover beneficial since it disciplines the management. There is thus an optimal debt-to-asset ratio, defined as b^*. The cost function of external debt is given by

$$C^E(b_i^E) = \frac{\mu}{2}(b_i^E - b^*)^2 K_i$$

In this function μ is a positive constant, b_i^E represents the external debt-to-asset ratio in affiliate i and b^* is the optimal debt-to-asset ratio in absence of taxation.

In order to compute the total leverage of the MNC the model needs the first order conditions of both cost functions.

The FOC of external debt equals

$$C^{E'}(b_i^E) = \mu(b_i^E - b^*)K_i$$

The FOC of internal debt equals

$$C^{I'}(b_i^I) = \eta b_i^I K_i$$

By inserting the first order conditions from the cost functions into the first order conditions from the maximization problem for tax-efficient financial structure (found in sub-section 3.2.1), I can find external and internal leverage.

External leverage:

$$t_i r K_i - (1 - t_i)C^{E'}(b_i^E) = 0$$

$$t_i r K_i - (1 - t_i)\mu(b_i^E - b^*)K_i = 0$$

$$\mu(b_i^E - b^*) = \frac{rt_i}{1 - t_i}$$

$$\mu b_i^E = \frac{rt_i}{1 - t_i} + \mu b^*$$

$$b_i^E = \frac{r}{\mu} \cdot \frac{t_i}{1 - t_i} + b^*$$

Internal leverage:

$$(t_i - \lambda)rK_i - (1 - t_i)C^{I'}(b_i^I) = 0$$

$$(t_i - \lambda)rK_i - (1 - t_i)\eta b_i^I K_i = 0$$

$$\eta b_i^I = \frac{(t_i - \lambda)r}{1 - t_i}$$

$$b_i^I = \frac{r}{\eta} \cdot \frac{t_i - \lambda}{1 - t_i}$$

Adding together external and internal leverage equal total leverage

$$b_i = b_i^E + b_i^I = b^* + \frac{r}{\mu} \cdot \frac{t_i}{1 - t_i} + \frac{r}{\eta} \cdot \frac{t_i - \lambda}{1 - t_i}$$