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Profit Shifting of Multinationals in Norway

An empirical analysis with a focus on the profitability of Chinese multinationals

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Abstract

Using a sample of 1 343 060 firm level observations with detailed corporate and financial information from Norway in the period 2017 to 2020, we study the profitability differences between domestic controlled companies (DCCs) and multinational companies (MNCs) in Norway, with a special emphasis on Chinese multinational companies (CMNCs) as a represnetative of Asian multinational companies (AMNCs).

Our key findings indicate that MNCs, AMNCs and CMNCs all report significantly lower profitability compared to DCCs, where CMNCs are identified as the most aggressive profit shifters of the three in Norway. Profitability, measured as taxable income to total assets ratio, is approximately 3.6% lower for MNCs compared to DCCs after controlling for leverage effects, tangibility, size, age, time and industry effects. The average change in profitability for AMNCs and CMNCs are 11.3% and 11.8% respectively, all else equal. Our results are significant in pooled all years, independent of the choice of profitability measure. The yearly analyses for AMNCs and CMNCs leaves room for improvement because of the less representative results compared to the pooled regression results and other studies. Comprehensive robustness checks indicate that our conclusions are not significantly effected by multicollinearity, heteroscedasticity, firm size variations, leverage intensity, or sample controls, though minor influences cannot be entirely ruled out. The limitations of our analysis include data coverage, sample restrictions and model selection, which can be improved in further research.

We attribute our findings to the profit shifting activities through transfer pricing in MNCs and find several patterns particularly regarding the behaviors of CMNCs as well as AMNCs in Norway. Previous research has indicated that profit shifting is more aggressive among developing countries. Our findings provide evidence on C MNCs as well as CMNCs operating in Norway, which are more aggressive in profit shifting activities.

Keywords – Multinational companies, Profit shifting, Transfer pricing, Norway, China

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1 Introduction

Research articles on Norwegian private companies have exposed that multinational companies (MNCs) report lower profits than purely domestic companies (DCCs). While there are specific characteristics of MNCs that can account for some of the difference, studies have found that the difference persists or even increases once the characteristics are controlled for[1]. This phenomenon, known as profit shifting, happens when MNCs transfer their profits to affiliates in countries with lower taxes to optimize their capital structure and increase their after-tax profits. Although Norway does not have a particularly high corporate tax rate, the evidence suggests that profits are shifted out of, as opposed to into, Norway.

If we look at Chinese multinational companies (CMNCs), research of Base Erosion and Profit Shifting (BEPS) has gotten relatively little attention. L. Yang (2023) points out that this is primarily because data concerning CMNCs' BEPS activities are scarce. Although China's tax research has progressed in the past decade, compared to the U.S., it's still in the early stages (Tang, 2020). Tang (2020) also emphasized the importance and potential of researching China's tax avoidance due to its distinct institutional features[2] and its status as the world's second-largest economy.

A study of CMNCs by Z. Liu et al. (2019) used firm level data from the Chinese Annual Survey of Manufacturing combined with a directory of outbound foreign direct investment (OFDI) enterprises from 1998 to 2013 to find out what characteristics and channels CMNCs use to shift profits. They found that BEPS is more common among export businesses and that CMNCs mainly shift profits through transfer pricing as opposed to debt shifting. The terms transfer pricing and debt shifting are discussed in detail in Section 2.3. Another study by Zucman (2015) estimated that a minimum of 8% of global wealth is hidden in tax havens, with a significant portion originating from developing and emerging countries. The implication is that developing countries might be more tax aggressive.

Bai and Chu (2017) used the custom export data and FDI information from 2000 to 2010 to identify BEPS of CMNCs through transfer pricing. Specifically, they found that when the tax

[1] This was the case in Langli and Saudagaran (2004), who found that adding controls for leverage and tangibility increased the difference in profit margins between MNCs and DCCs

[2] Such as the political environment, tax policies, business and legal regulations.

rate in the host country is lower than that in China by 1%, the transfer price decreases by 0.002%. Additionally, they found that state-owned CMNCs are more aggressive in profit shifting through transfer pricing. Using multiple databases including the export customs database from 2000 to 2006, the industrial enterprise database and the FDI directory, Bai (2019) found that there were serious tax avoidance problems among CMNCs and that the degree of BEPS by CMNCs is higher than that of developed countries[3]. H. Wang et al. (2020) explored BEPS by examining transfer pricing, focusing especially on affiliate transactions. They used overseas related party transactions data of China's non-financial listed companies from 2003 to 2017. It revealed that the companies who engaged in overseas affiliate transactions had a profit margin decrease of 0.8% compared to those without such transactions. Using the China Stock Market & Accounting Research (CSMAR) Overseas Subsidiaries Database from 1999 to 2019 with a focus on China's overseas subsidiaries, Liao (2022) found that CMNCs are more inclined to set up subsidiaries and shift profits to low-tax countries.

1.1 Objective

In Norway, there are many implications of profit shifting, the most obvious one being the loss of tax revenues for the Norwegian government. Beyond this, it also impacts the businesses themselves and their investors in Norway and all aroudn the world. Becoming MNCs can ultimately be a channel for companies to lower their tax burden and increase their after-tax profit margins. This understanding raises crucial questions of which companies engage in profit shifting, and where they transfer their profits to.

To explore potential differences in profit shifting and tax aggressiveness among MNCs in Norway, we will study CMNCs in Norway from 2017 to 2020, by comparing their profitability with DCCs and other MNCs. The main objective is to determine if CMNCs exhibit higher profitability and hence lower profitability compared to other MNCs, and to identify any indications of profit shifting. Our analysis is divided into two parts. In the first part, we will analyze the differences between all MNC groups and DCCs. Here, the objective is to compare our findings to previous studies based on Norwegian samples, such as those by Langli and Saudagaran (2004) and Bakke et al. (2019), and hence validate that our model is suitable to assess profit shifting. The second part consists of analyzing CMNCs and compare these results to that of all MNCs. Additionally,

[3] A limitation to the study is that the data related to BEPS of CMNCs are somewhat imprecise, for instance because the expenses associated with intellectual property rights are not itemized individually.

we will analyze Asian MNCs (AMNCs), both to compare CMNCs' performance with the broader Asian context and to verify the accuracy of our estimates of CMNCs.

1.2 Choice of research question

China is an appealing topic to study profit shifting among MNCs in Norway for multiple reasons. Firstly, there is a lack of research on this topic, and we have not found any quantitative studies of CMNCs operating in Norway. Our goal is to shed some light on this topic to provide insights into the profitability of CMNCs compared to other MNCs. Secondly, China has become an increasingly important investor in many European countries, including Norway. As one of the world's largest economies with significant investments, understanding the impact of China's investments is crucial. In the following, we have investigated the investment history of China and Norway. This will offer a perspective on their economic relationship and highlight why China is an fitting nation to study in this context.

1.2.1 Norway's IFDI

Figure 1.1 presents an overview of Norway's total Inbound FDI (IFDI) in the past two decades, specified by country[4].

Norway gets investments from all over the world, however, most of the IFDI comes from Sweden, followed by the Netherlands, Denmark, the United Kingdom, the United States, France and Germany. This is not surprising considering their economic relationships, regional proximity and strategic interests in Norway. Figure 1.2 shows the comparison between Norway's IFDI from Asia and from all over the world, and it turns out Asia's investment only takes up a small part. However, as shown in Figure 1.1, China's investment still stands out among Asian countries, which deserves further investigation.

China's OFDI in Norway has been growing over the years, and China has become one of the top 15 countries in terms of investment amount, as shown in Figure 1.3. There have been several notable Chinese investments in Norway, such as Sinochem's acquisition in Atlantis, Bluestar's acquisition in Elkem and ChemChina's acquisition of REC Solar. These investments mainly focus on the energy sector, aligning with the typical motivations of China's OFDI.

[4] We attained Norway's IFDI data at the country level from 2003 to 2022 from Statistics Norway

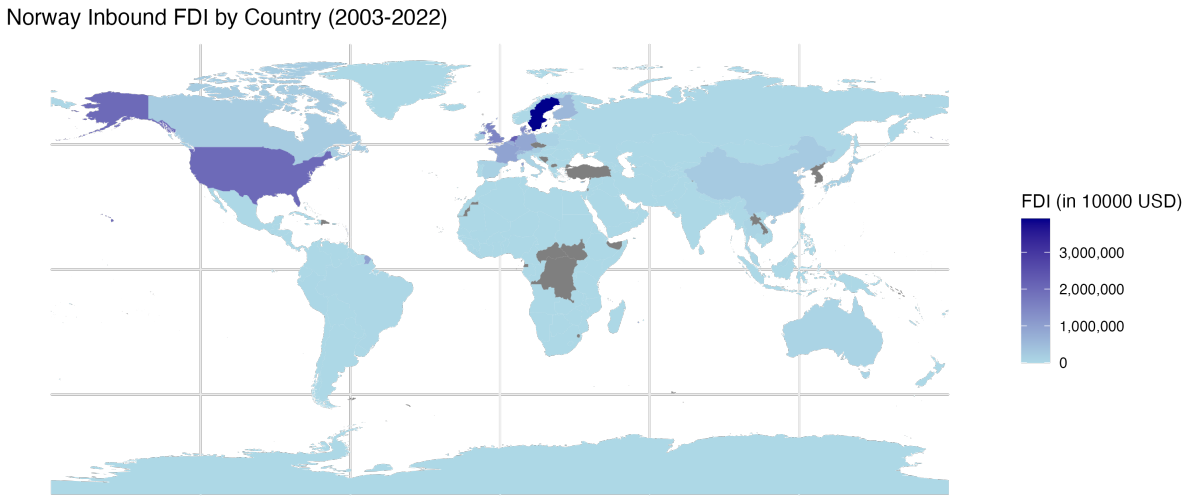

Figure 1.1: Norway IFDI by country (2003-2022)

In 2010, the Chinese human rights activist Liu Xiaobo won the Nobel Peace Prize by the Norwegian Nobel Committee. This led to a diplomatic incident, causing a six-year freeze in bilateral relations. This situation led to a loss of interest for Chinese investors in the Norwegian market, though investments still occurred during this period (Y. Wang and Alon, 2020a). In December 2016, the bilateral relations normalized and economic collaboration and investment between China and Norway have been progressing since then. However, as the global geopolitical situation evolves, concerns about FDI in Norway, particularly regarding sensitive data and privacy, have increased (Gåsemyr and Sverdrup-Thygeson, 2017). An example of this is Huawei's expansion of the 5G network in Norway. Y. Wang and Alon (2020a) investigated failed Chinese investment cases in Norway and identified key factors contributing to these failures, including legal issues, cultural differences, business strategies, organizational structures, and personnel choices. These challenges highlight the complexity and the growing opportunities of exploring China's OFDI in Norway.

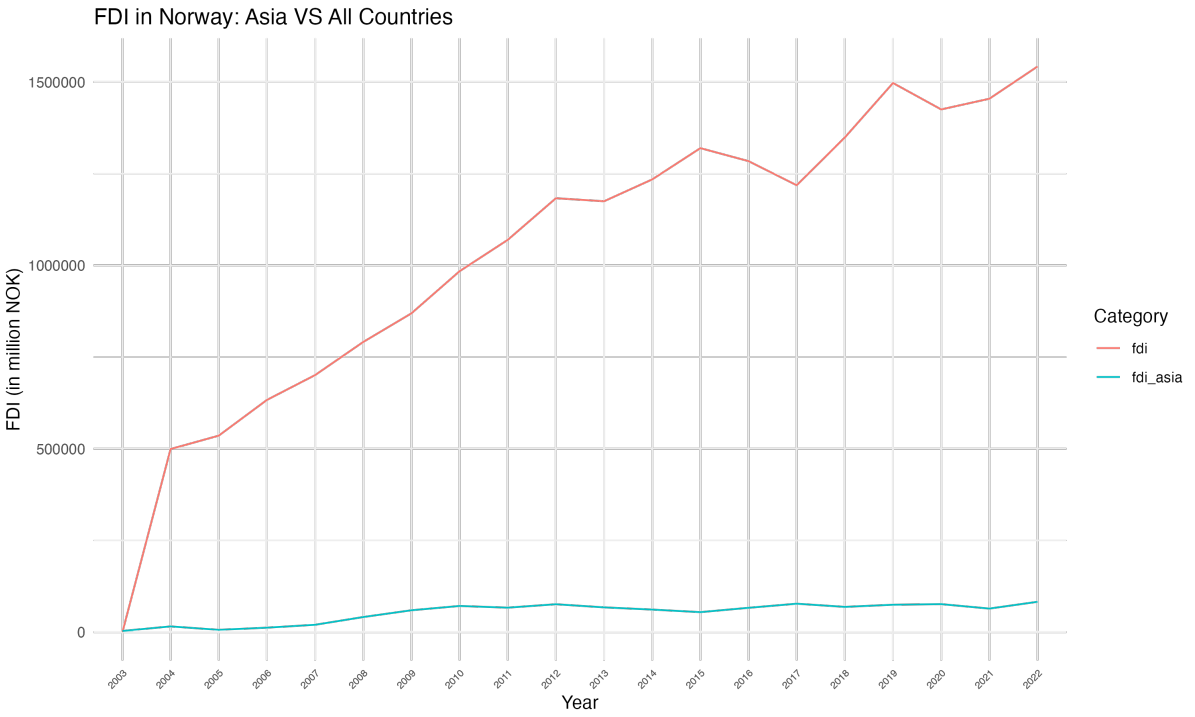

Figure 1.2: Norway's IFDI: Asia VS All

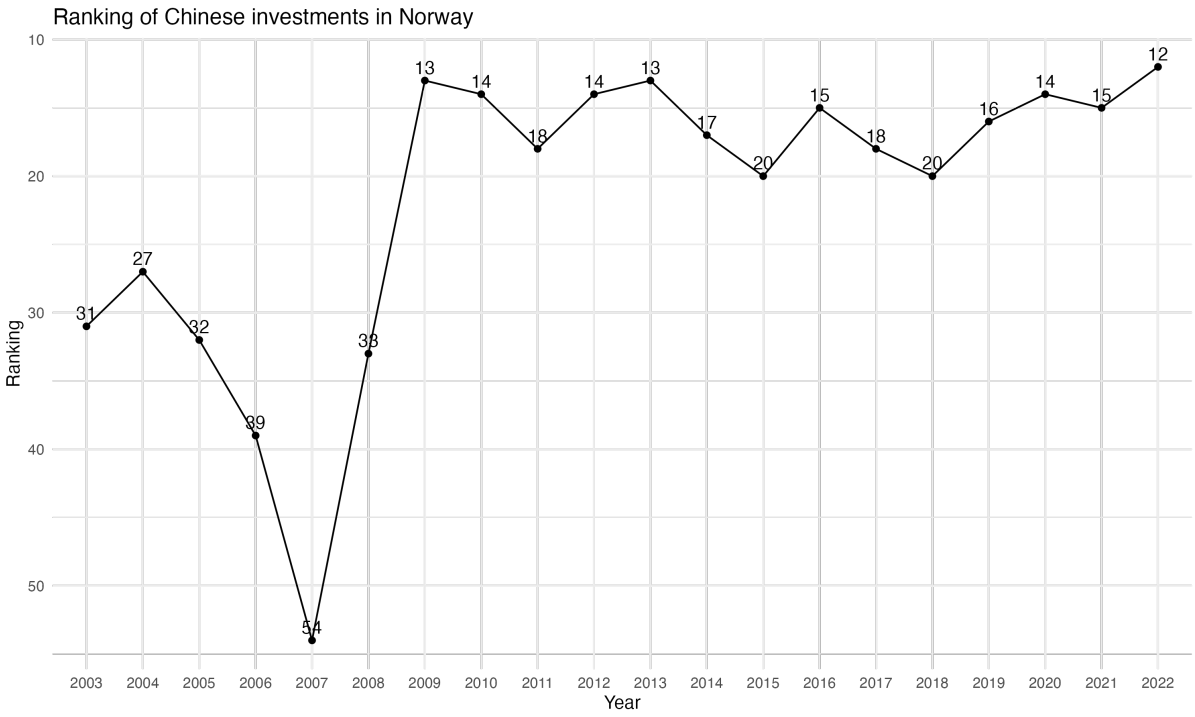

Figure 1.3: Ranking of Norway's IFDI from China (2003-2022)

1.2.2 China's OFDI

China's historic OFDI has been significant and transformative, beginning with the adoption of the Open-Door policy in 1978. This policy set the stage for Chinese companies to start investing overseas. A major step forward was the 1999 "Go Out"[5] policy, which provided Chinese companies with comprehensive guidelines for overseas investment. This included strategies to identify target markets and sectors, conduct due diligence, and ensure compliance with local laws and regulations (H. Wang and Hu, 2017). Since then, China's OFDI has increased almost twenty times during the last 10 years (Wei, 2010). The Belt and Road Initiative (BRI), launched in 2013, further accelerated China's OFDI. It not only encouraged overseas investment but was also accompanied by the implementation of more efficient laws and regulations. China's OFDI is seen as a key channel to support China's rapid economic growth, contributing to its economic prosperity (X. Liu et al., 2002).

We obtained data from China's OFDI from 2003 to 2022 from the Chinese National Bureau of Statistics. Figure 1.4 illustrates China's OFDI over the past two decades, detailed by country. In the absence of country-specific data, Figure 1.5 was created to depict China;s OFDI continental distribution.

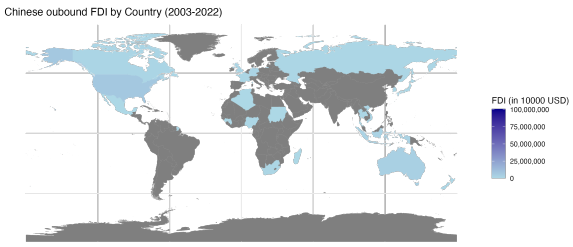

Figure 1.4: China's OFDI by country (2003-2022)

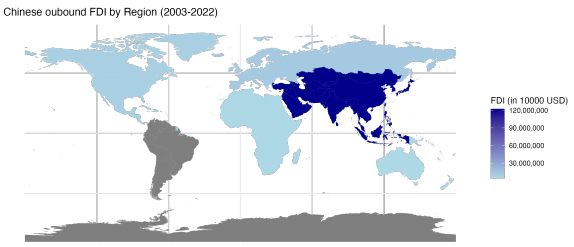

Figure 1.5: China's OFDI by continent (2003-2022)

It reveals that Hong Kong is the primary recipient of China's OFDI, followed by the United States. Chinese investment in Europe has also seen a substantial rise. In 2015, Chinese OFDI in Europe reached a record high of EUR 20 billion (Hanemann and Huotari, 2016). This growth,

[5] Translated from Zou Chu Qu

however, has raised concerns, particularly regarding market access for European companies in China and potential distortions caused by state-owned and state-supported enterprises. In 2007, there was a sharp decline in the global FDI landscape due to anti-globalization. This also affected Chinese investments, marking the first decrease in a decade as the entry thresholds in developed countries rose (CCG Enterprises Globalization Research Group, 2023). The COVID-19 pandemic in 2020 further impacted global FDI flows. Despite these challenges, China's OFDI remained high, with flows reaching approximately US$153.7 billion in 2020, leading the world in terms of OFDI flows (Ministry of Commerce PRC, 2020). The European Union then recognized China as its second-largest trading partner (European Commission, 2021). This underscores China's pivotal role in global investment and trade dynamics.

1.2.3 Drivers of China's OFDI

Various studies have examined the motivations behind China's OFDI. Using panel data from 2003 to 2012 across 176 host countries, Tong et al. (2023) found that China's OFDI primarily is driven by the market size, trade relations, and availability of natural resources in host countries. Cheung and Qian (2009) and Kolstad and Wiig (2012) also found similar results.

Using data of publicly listed Chinese firms from 2006 to 2008, Ramasamy et al. (2012) found that motivations of overseas investment differ based on ownership. State-owned firms tend to invest in countries with abundant natural resources, despite potential political risks, while private firms are more drawn to markets abroad. Additionally, C. H. Yang et al. (2015) found that China's OFDI is attracted to countries with advanced technology, as well as countries with sufficient natural resources and high political instability. Using the overseas investment data of Chinese listed companies from 2007 to 2019, Zhang et al. (2023) found that the digital economy had a growing impact on China's OFDI. The development of the digital economy in host countries, particularly in developed countries, has therefore become an increasingly attractive factor for CMNCs. This trend aligns with the Chinese investments in Norway mentioned in Section 1.2.1 and indicates a potential for increasing investments in the future.

1.3 Thesis structure

The thesis consists of 9 Sections and is structured as follows. Section 2 contains a detailed literature review of profit shifting. We will explore its primary drivers and channels of profit

shifting, and provides an overview of relevant models commonly employed in profit shifting studies. Section 3 presents the data sources used, describe process of data cleaning, and explain the main variables that will be employed in our analysis. Section 4 consists of our methodology to estimate profit shifting, our reflections on the strengths and weaknesses of various regression choices, and our applications of the model. Section 5 presents the descriptive analysis of the variables in our model. Section 6 is the empirical analysis, which is split into two main parts. The first part estimates the profitability differences between MNCs and DCCs. This will serve as an initial test of our model by comparing our results to previous studies. These estimates will also be used as a basis for comparison with the results from the second part. The second part estimates the profitability differences between CMNCs and AMNCs against DCCs. We then compare the results from both parts. Section 7 discusses about the robustness analyses to evaluate the strength of our model and reflects on the important limitations of our research. Based on these discussions, we will also explore potential questions for future research. Lastly, Section 8 serves as the conclusion, summarizing the most important findings of our research.

2 Background

2.1 What is profit shifting

The global economy is increasingly interconnected and profit shifting is central to corporate strategy and international tax policy, which presents both challenges and opportunities for MNCs, governments, and policymakers.

According to Organisation for Economic Co-operation and Development (OECD) (2021), BEPS refers to tax planning strategies used by MNCs that exploit gaps and mismatches in tax rules to artificially shift profits to locations with no or low tax rates with no or little economic activity to avoid paying tax. Although some of these strategies are legal, others strategies are not, such as false documentation and abuse of tax treaties.

Tax Justice Network (2019) has revealed that more than 60% of world trade are intra-firm arm's length trades within MNCs, which will be further discussed in Section 2.3.1. Wier and Reynolds (2018) investigates the link between firm size and profit shifting using tax administrative data of South Africa. They find that around one-third of profit shifting is undertaken by a small number (around 0.001%) of the largest MNCs. Since BEPS has become more and more common, it has raised increasing concerns.

The annual revenue losses for governments are at least 100-240 billion USD, which equals to 4-10% of the global corporate income tax revenue. Clausing (2020) estimated that profit shifting cost the U.S. government 77 to 111 billion USD in corporate tax revenue by 2012. This is detrimental for developing countries because of their heavy reliance on corporate income tax, especially from MNCs. BEPS undermines the fairness and integrity of the tax system, and it is important to engage developing countries in the international tax agenda. BEPS can also distort competition by providing MNCs with an unfair tax advantage over DCCs. When profits are artificially shifted to countries with more favorable tax regimes, MNCs can achieve lower effective tax rates compared to those operate within a single country and are subject to its tax laws. Thus, it can stifle competition and innovation which potentially leads to market distortions. When taxpayers see MNCs legally avoiding income tax, it may also undermine their voluntary compliance. To tackle tax avoidance, OECD and G20 countries are participating

in the implementation of the BEPS Package and the establishment of anti-BEPS international standards. Now, countries have better tools to ensure that profits are taxed where economic activity and value creation occur. The reliability of companies have also increased due to a decrease in disputes over the application of standardized international tax rules.

2.2 Drivers of profit shifting

One of the primary drivers for profit shifting is the differing corporate income tax rates between countries. In 2022, Puerto Rico applied a top corporate tax rate of 37.5%, which was among the highest internationally, comparable to the rates in Colombia and Malta at 35%. On the other end of the spectrum, Barbados offered a rate as low as 5.5%, with Hungary at 9%, Qatar at 10%, and Ireland at 12.5%. Norway's corporate tax rate stood at 22% (Tax Foundation, 2022). MNCs are motivated to shift profits to countries with lower tax rates, especially to tax haven countries, to minimize their overall tax burden.

Another contribution to profit shifting comes from the intricate structures of MNCs. MNCs operations often include multi-tiered subsidiary structures in different countries. The subjective nature of profit and expense allocation allows MNCs to manipulate their results, so profits are taxed where it is most favorable. MNCs can also exploit tax loopholes and discrepancies between different national tax systems. Furthermore, the regulatory framework in parent countries can give opportunities for profit shifting, especially the absence of transfer pricing regulations and tax enforcement of the arm's length principle, which will be further discussed in Section 2.3.1 (Beer and Loeprick, 2015).

2.3 Channels of profit shifting

Generally, we can divide profit shifting into two primary channels: transfer pricing manipulation and debt shifting, similarly to the study of Nicolay et al. (2017). However, there are papers that divide the channels differently. Huizinga and Laeven (2008) divided profit shifting in MNCs into three categories: intra-firm transactions, international allocations of accounting profits through financial structures and re-assigning common expenses. We will stick to the former division. Previous studies have not only investigated these two channels of profit shifting independently but also discovered that they are substitutes. Nicolay et al. (2017) found that the costs of profit

shifting are channel-specific, dependent on the amount shifted through each channel as opposed to the total amount shifted and that the costs are influenced by non-channel-specific costs, which are based on the total profits shifted through both channels.

Tran and Xu (2021) investigated two profit shifting channels of MNCs in Australia using firm level data: intra-group transfer pricing, intra-group debt financing and interest expense loading. They found that debt shifting is a less dominant channel compared to transfer pricing. The same result was found by Heckemeyer and Overesch (2017), who found that at least two thirds of profit shifting transactions happens through transfer pricing. Hopland et al. (2018) examined the flexibility of MNCs to shift profits through transfer pricing or internal debt. Utilizing data on direct transfer payments and the internal debt of Norwegian affiliates, they found that transfer pricing provides flexibility for profit shifting more so than internal debt. Barrios and d'Andria (2020) analyzed profit shifting in MNCs through transfer pricing and financial shifting using worldwide company level data and found that the largest part of profit shifting is done through transfer pricing. Goerdt and Eggert (2022) also found that MNCs treat transfer pricing and debt shifting as cost substitutes with the focus on the application of multiple rules restricting profit shifting activities.

2.3.1 Transfer pricing

Transfer pricing refers to the methods for pricing transactions within and between enterprises under common ownership to reallocate profits. More specifically it can be defined as the monetary value of the goods and services that are traded within the same group across national boundaries (Elliott and Emmanuel, 2000). An example is that when a subsidiary company sells goods to a parent company, the money received from the parent is the transfer price.

MNCs can shift profits from a high-tax affiliate to a low-tax affiliate by artificially increasing or decreasing the prices of goods between them. The arm's length principle states that the price of transactions between two related parties needs to be comparable with prices of transactions between two unrelated parties, which is also called the market price (Riedel and Zinn, 2014). However, as this can be challenging to enforce, it gives MNCs the opportunity to shift profits (Saunders-Scott, 2013). The adoption of the IFRS[6] accounting standards has allowed affiliates a wider range of profit margins under the arm's length principle, thereby increasing MNCs

[6] International Financial Reporting System

flexibility to utilize transfer pricing for profit shifting purposes (De Simone, 2016).

Dawson and Miller (2009) extended upon previous literature and found that MNCs are more motivated to practice abusive transfer pricing for intangibles than tangibles. This is probably because it is more difficult to attach market prices to intangible assets, hence making the price manipulation less noticeable. Dischinger and Riedel (2011) provided supporting evidence for this theory. Using a dataset of European MNCs, they found that an affiliate's level of intangible holdings increases by how much lower the corporate tax rate is compared to other affiliates within an MNC.

Profits can also be shifted using methods as found in Boehm et al. (2012). They discovered that MNCs establish structures to maintain R&D operations in high-tech countries that have robust markets for skilled labor, while also attributing the income associated with those R&D activities to a patent-holding entity in a low tax country. These MNCs also manipulate their patenting choices to further facilitate income shifting to low tax countries.

Using company level data on European MNCs from the database AMADEUS, Lohse and Riedel (2012) found that transfer price documentation rules may reduce income shifting behavior by more than 50%, which can be important to restrict profit shifting activities. The same result was also found by Saunders-Scott (2013). Using the same database, Beer and Loeprick (2015) found that the implementation of mandatory documentation rules limited profit shifting substantially and subsidiaries holding low intangibles are likely to lower their reported profits by 0.76% in response to a marginal increase in the tax rate. Besides, the introduction of mandatory documentation requirements leads to a decrease in profit shifting by 52% after two years.

2.3.2 Debt shifting

Debt shifting refers to the methods used by MNCs to allocate debt within subsidiaries to minimize the overall tax burden and shift profits, typically through intra-group loans or through the financial structure. For example, if a subsidiary in a low-tax country lends money to a related subsidiary in a high-tax country, and the interest payments on this loan are tax-deductible in the high-tax country, profits can be transferred to the country where the interest payment is taxed at a lower rate.

Desai et al. (2004) found that affiliates borrow more from parent companies than external

resources when the corporate tax rate is higher, giving MNCs an advantage over DCCs who have limited access to the global capital markets. Using firm level data of German MNCs from the Deutsche Bundesbank, Møen et al. (2019) found that if there is a 10% increase in the tax rate, MNCs tend to increase their total debt by 7.4%. They also found that the allocation of external and internal debt shifting are independent of each other and equally important.

Schindler and Schjelderup (2012) introduced a theoretical model that enables MNCs to independently determine both leverage and ownership structures in their affiliates, a shift from the traditional assumption of wholly owned affiliates in earlier debt shifting studies. Their findings revealed that MNC affiliates generally exhibit higher internal and overall debt ratios, along with lower borrowing rates of physical capital, compared to similar DCCs. Specifically, partially owned affiliates tend to carry less debt compared to wholly owned ones, resulting in a less tax-efficient financing structure and a higher borrowing rate of capital. Ruf and Schindler (2015) investigated the phenomenon of external and internal debt shifting and discovered that affiliates in high-tax countries exhibit higher debt-to-asset ratios. This trend is attributed to the preference of MNCs to finance these affiliates through internal debt rather than equity.

In response to the use of debt shifting for tax avoidance, many countries have implemented thin capitalization rules. These rules are designed to restrict the amount of debt an affiliate can hold relative to its equity, regardless of whether the debt is internal or represents the total debt. Essentially, thin capitalization rules set a maximum allowable debt-to-equity ratio, where interest on debt exceeding this ratio is not be tax-deductible. Utilizing firm level data of German MNCs from the Deutsche Bundesbank, Buettner et al. (2012) study explored the impact of thin capitalization rules on the capital structures of affiliates. They found that in countries with an average tax rate of 34%, enforcing strict thin capitalization rules resulted in a reduction of internal debt ranging from 12% to 24%. Weichenrieder and Windischbauer (2008) conducted a similar investigation utilizing firm level data of German MNCs from the MiDi database of the Deutsche Bundesbank. Their study, however, found that the implementation of thin capitalization rules did not appear to significantly reduce the real investment of these MNCs. Utilizing country level and firm level data from the US Bureau of Economic Analysis on US MNCs, the study by Blouin et al. (2014) examined the effectiveness and diversity of thin capitalization regimes across countries. These regimes differ internationally, but all served as effective tools with significant overall impacts on firms, especially the capital structures. Specifically, thin capitalization rules

lead to a reduction in the internal leverage ratio of affiliates of U.S. MNCs by an average of 6.3%.

2.4 Models to estimate profit shifting

2.4.1 The Direct and Indirect method

It is possible to use a direct or indirect method to calculate profit shifting from transfer pricing. The direct method looks at the prices of goods and services within a company and compares it to the prices of the market. Although a direct approach is a good estimation method because it directly proves different prices of goods within a company, it is not easily done in practice as price data can be hard to obtain.

An alternative method, that is often used to estimate transfer pricing because it does not need price data, is the indirect method. This method often compares the profits of DCCs to MNCs, while controlling for unobservable differences in characteristics that can explain the difference (Balsvik et al., 2009). The method essentially tries to control for any other factors that can explain the profitability difference aside from profit shifting. If there is still a difference in observed profits, then we can attribute it to profit shifting activities. This method has been criticized as it cannot directly prove that the difference in profit is caused by transfer pricing. While this is true, studies have found an increase in profit differences when there is a lack of control over the companies transfer prices (Balsvik et al., 2009).

In the following, we will look at previous studies that estimate profit shifting, both internationally and on Norwegian data. We will focus on the indirect method, as we lack price data for our analysis, and studies focusing on the direct method will therefore be omitted [7] We will go through the papers in the order they were published and specify which model they use in their estimation as well as their key findings.

2.4.2 Grubert, Goodspeed and Swenson

The work of Grubert et al. (1993) is important for many of our included papers. They investigated why US MNCs have a lower taxable income compared to American DCCs. By analyzing their

[7] See Hopland et al. (2018) for a study using the direct method

differences in profitability, defined as taxable income over total assets, they found that they could explain about 50% of the difference with other factors than transfer pricing. After controlling for factors such as differences in cost of capital, start-up cost, debt-to-asset ratios amongst others Grubert et al., 1993, they concluded that transfer pricing led to a 35% reduction of taxable income Bakke et al., 2019. They conclude that they have found indirect evidence that income shifting contribute to the low rate of return of foreign firms Grubert et al., 1993. Their paper was influential, as Langli and Saudagaran (2004), Balsvik et al. (2009) and Bakke et al. (2019) all based their papers on their approach.

2.4.3 Langli and Saudagaran

Langli and Saudagaran (2004) compare the profitability of Norwegian companies (DCCs) and MNCs in the retail, wholesale and industry sectors between 1993 and 1996. They were unsure whether the difference in profit would be negative or positive for MNCs, as the Norwegian corporate tax rate was quite modest at 28%. In other words, profits might just as easily get shifted into Norway as out of Norway as the incentive to shift profits into a country comes from a relatively lower effective tax-rate and low non-tax related costs compared to other countries.

They defined profits as taxable income by sales, and controlled for factors such as leverage, tangibility, age and size. To test for differences, they used least squares (OLS) regressions for each year in addition to a pooled least squares (POLS) regression for all years with White's t-tests. To account for industry and firm fixed effects, they included dummy variables for the sectors retail and industry as well as for each year in their regression. They gradually introduced controls in different regressions to analyze the effect of the control on the profitability difference.

Their analysis is referred as a quasi-experiment by Balsvik et al. (2009), where MNCs are the treatment group and DCCs are the control group. Where the treatment is having the option to shift profits to reduce the total tax payment. On the other hand, the control group does not have this option. By dividing into two periods, before treatment and after treatment, it is possible to regress a difference-in-difference estimate of MNCs as below (Balsvik et al., 2009).

$$\hat{\beta}_{DiD} = \Delta\overline{\Pi}^{T} - \Delta\overline{\Pi}^{C}$$

The change in profitability of the control group can be explained by factors other than profit

shifting, and will not get accounted for in the estimate $\hat{\beta}_{DiD}$. The estimate will only account for changes in profits for the treatment group that exceeds that of the control group, namely the difference in differences between the groups and over time (Balsvik et al., 2009).

Their POLS analysis for all years found that the difference in profitability of foreign compared to Norwegian owned companies were -2.57% and statistically significant. Their result supports the indication that profits are shifted out of Norway.

2.4.4 Balsvik et al.

Balsvik et al. (2009) is one of the largest studies performed on Norwegian firm data (Morgenroth, 2021). In the first part of their paper, they replicate Langli and Saudagaran (2004) analysis and made adjustments to expand and improve it. They could only partly replicate their results, mainly because they use different methods to categorize foreign ownership [8]. However, even when switching to use the same categorization method, they were still unable to get the exact same results. The analysis found a difference in profitability of 1.56%, constituting a 41% decrease from Langli and Saudagaran (2004) estimate. Despite these differences, both results agreed on a qualitative level, as the estimates was negative and significant for both papers (Balsvik et al., 2009).

Following the replication, they expanded the analysis to all industries in the private sector and to the years 1993-2009 to get more observations and a longer panel. They included industry dummies for all NACE3 code categories as defined by Mjøs and Selle (2022) to account for more detailed industry fixed effects and used within-transformation to account for firm-fixed effects. Additionally, they added a cluster structure to the coefficients error term to account for serial correlation between observations. They also classified domestic owned multinationals (DMNCs), who also had opportunities to profit shift through their subsidiaries in foreign countries. These companies would then be classified as MNCs rather than domestic, as was done previously. This distinction can be important, because if the DMNCs shift profits and are categorized as domestic, they will pull down the average profits of the domestic group. Hence, the impact of profit shifting would be underestimated.

Their fixed effect analysis found that changing from being domestic to multinational is associated

[8] Balsvik et al. (2009) use data from Statistic Norway, while Langli and Saudagaran (2004) use data from Dun & Bradstreet. We will use a similar method as Langli and Saudagaran (2004) to categorize ownership

with a 1.64% decrease in profit margin. They also estimated that between 26-37%[9] of tax revenue from the Norwegian affiliates of foreign MNCs are lost due to profit shifting.

2.4.5 Bakke et al.

Bakke et al. (2019) investigates the difference in profitability between MNCs and DCCs in Norway. They use a 20-year long panel of firm-level data from the governmental Register of Company Accounts in Brønnøysund and data containing information of the companies Foreign Direct Investment to find ultimate ownership and classify the companies ownership. Similarly to Balsvik et al. (2009), they also included DMNCs.

To investigate profit shifting, Bakke et al. (2019) only looked at companies that changed their multinational status during the period, which allowed them to see variations in profits for the same company over time, before and after changing their status. They controlled for leverage, tangibility, firm size and age. They controlled for fixed effects by including industry and time effects, an interaction term between industry and time, as well as by using within transformation.

They found that the profitability decreases as domestic companies become multinational, and that profitability increase when multinational companies become domestic. They estimate the change in profitability to be around 24%, all else equal.

[9] Numbers are using FE and OLS regression estimates, respectively

3 Data and Processing

3.1 Data sources

Our approach is closely related to the work of Bakke et al. (2019) and Balsvik et al. (2009). They use company level data from the governmental Register of Company Accounts in Brønnøysund as their main data set. This data set contains company and financial information about Norwegian companies. To identify if a company is multinational, they use Foreign Direct Investment data from multiple sources, including the Norwegian Tax administration and Statistics Norway. Dharmapala (2014) emphasized that using firm-level data greatly enhances the credibility of estimates of BEPS compared to country-level data. He found that the estimated magnitude of BEPS is typically much smaller than that in earlier studies.

In our analysis, we use unconsolidated firm level data from Regnskapsdatabasen - Norwegian Corporate Accounts from the Centre for Applied Research at NHH (SNF). Regnskapsdatabasen is a comprehensive database of active and inactive Norwegian companies that contains two main data sets: one with the corporate information and another one with the financial information. Corporate information includes company characteristics variables, such as legal form, industry, ownership and employee information. Ownership, labeled as "parent company", is our main variable from this data set. If the company is owned by another company, they will be seen as a subsidiary and a parent company, respectively. Information about the subsidiaries, and the nationalities and names of the parent companies are available in this data set. The information provides a straightforward method to categorize companies, eliminating the need to access additional data sources. Financial information includes accounting variables shown in the financial statements as well as variables generated by the authors of the database. The data set contains information from 1992 to 2020. However, our analysis only consists of the four most recent years available, which currently is 2017 to 2020. This decision was driven by two factors. The main reason is that analyzing a longer data set would demand data processing capabilities beyond what our current computer setup can handle. Secondly, with an aim to concentrate on more recent trends, we decided to focus on the latest available data.

From 2017 to 2020, the data contains 1 394 965 observations for legal entities[10] and 1 398

[10] Corporate information

878 for corporate groups[11]. We constructed our data set by combining these two data sets by the unique organizational identification number of each company issued by the Brønnøysund Register Centre. Only companies with financial data are included in our data set, totaling at 1 398 878 observations.

3.2 Data cleaning

To obtain our final sample for analysis, we had to modify the initial data set. Table 3.1 gives an overview of our data cleaning process. The first modification was to standardize the country codes. This step was necessary because the data contained different country codes for the same country. We used the three-letter country codes as specified in ISO 3166-1, which was published by International Organization for Standardization (2020). During this process we encountered that many of the parent companies had missing and invalid country code values, which made it challenging to conclude on the ownership status of the companies over time. Before addressing this issue, the total amount of NA values in the data set was 3 914 out of 1 398 878 observations.

To address the missing and invalid values in the country code variables, we redefined them as NA values. The number of NA values increased substantially by doing this, as we ended up with 885 271 NA values out of 1 398 878 observations. The next steps were to reduce the number of NA values as much as possible by assigning country codes to the observations without sacrificing the quality of our analysis. To do this, we implemented a set of applicable rules that would replace the NA values with appropriate values.

Table 3.1: Data Cleaning

Steps	#NA values	#Total obs	% of NA values
merged data set	3 914	1 398 878	0.2798
NA and invalid values in parent company			
Invalid country codes	885 271	1 398 878	63.2844
Rule 1	884 807	1 398 878	63.2512
Rule 2	11 493	1 398 878	0.8216
Rule 3	6 312	1 398 878	0.4512
Rule 4	2 718	1 398 878	0.1943
Remove NAs	0	1 396 160	0.0000
Trim profitability (full sample)		1 343 060	

The first rule is that if all country codes of a subsidiary's parent identification number is NA for

[11] Financial information

all years, then the subsidiary should be classified as Norwegian for all years. The assumption is that a Norwegian subsidiary without a parent is Norwegian, which is quite reasonable. This step reduced the amount of NA values by 464, now totaling 884 807.

The second rule is building on the assumption made in the first rule, namely that missing parent information indicates that the company is Norwegian. For subsidiaries whose parent company's country code changed from NA to Norwegian, we re-classified these subsidiaries as Norwegian for all years. This was applicable to many of the NA values, reducing the total NA values to 11 493.

The third rule states that if a subsidiary's parent company's country code initially is NA but changes to a non-NA country code in subsequent years, we treat the subsidiary as Norwegian for those initial years with NA values. This step reduced NA values to 6 312 observations.

The fourth and last rule were applicable for subsidiaries whose parent company was owned by the same country, only divided by a few NA values. These intermittent NA values are then reassigned to the same country that surrounds those NA values. This final step reduced the NA values to 2 718 observations.

These rules removed a total of 882 553 NA values from the data set, leaving us with only 2 718 NA values. The remainder of the observations with NA values are excluded from the sample, as we are not able to classify the observations with missing country code values. There are 1 396 160 observations left in our data set.

To trim our data set further, we decided to remove some outliers in the values of profitability given that extreme values or outliers can significantly skew the results of regression analysis. By setting the range of profitability to the 5th to 95th quantile, we focused on the central 90% of the profitability values, which hopefully eliminates some of the companies that are the least representative in our data set.

This approach differs from Bakke et al. (2019), as we did not implement any further restrictions to our sample. This is because of the limited number of observations concerning AMNCs, especially CMNCs, in our data set. Implementing further restrictions based on financial data, as they did, would result in the significant loss of observations of these MNCs. Such a reduction in data points would hinder our ability to conduct comprehensive analysis with reliable results.

Therefore, we opted to not include such restrictions. Ultimately, the final sample for our analysis included 1,343,060 observations.

We adjusted all financial figures for inflation using the annual average Consumer Price Index (CPI) data from 2017 to 2020 obtained from Statistics Norway. To achieve this, we normalized the financial data to the 2017 CPI value. Notably, all the financial figures are in 1000 NOK [12].

Additionally, we segment the full sample into individual data sets for each year. This allows for a more detailed year-by-year analysis, providing insights into annual variations and trends. Table 3.2 shows specific details of all the data sets. Our sample is dominated by DCCs, and among MNCs, the observations of AMNCs and CMNCs increase over time, which align with the trend of Norway's IFDI as mentioned in Section 1.2.1.

Table 3.2: Sample statistics

	2017	2018	2019	2020	Pooled
Sample size	317 702	329 341	342 445	353 572	1 343 060
DCC	309 460	320 731	332 136	345 657	1 307 984
MNC	8 242	8 610	10 309	7 915	35 076
AMNC	73	84	278	248	683
CMNC	15	16	46	43	120
# firms	317 702	329 341	342 445	353 572	414 911
# DCC	309 460	320 731	332 136	345 657	402 136
# MNC	8 242	8 610	10 309	7 915	12 775
# AMNC	73	84	278	248	341
# CMNC	15	16	46	43	58

3.3 Variables

3.3.1 Dependent variable: Profitability

Profitability for each firm, *i*, in each year, *t*, is measured as taxable income in percentage of total assets, which is identical to the one employed by Bakke et al. (2019). We chose total assets in the denominator because of the conceptual expectation mentioned by Grubert et al. (1993), that it is the rate of return that should be equalized across investments, as opposed to the income to sales ratio. Income to sales is, however, used by both Langli and Saudagaran (2004) and Balsvik et al. (2009) because there are less valuation problems associated with sales since it is not a book

[12] This is true for all figures and tables containing monetary values

value on the balance sheet that might differ from the true market value[13]. Our model is robust[14] to changes in the profitability measure[15]. The specific method for calculating profitability is detailed as follows.

$$\Pi_{i,t} = \frac{TI_{i,t}}{TA_{i,t}}$$

$$TI_{i,t} = NBIT_{i,t} + \frac{(DTL_{i,t-1} - DTL_{i,t} + DTA_{i,t} - DTA_{i,t-1})}{ETR_{i,t}}$$

To calculate taxable income, we started with the annual profit before tax, adjusting it for the yearly change in deferred tax and deferred tax assets. This adjustment involves dividing the net change in deferred tax by the effective tax rate. We utilize the effective tax rate that is included in the financial data for the companies. Companies with a zero pre-tax result were also omitted from our analysis. To manage extreme values in the effective tax rate, we did the same measures as Morgenroth (2021), who replicated Bakke et al. (2019) as a part of her master thesis. First, we adjusted all values higher than 60% to 60%, and those lower than 10% to 10%. Then, for companies with a non-positive pre-tax result, we replaced their effective tax rate with the median effective tax rate from all available data. Companies with null or infinite profitability values were also excluded.

3.3.2 Independent variables

To categorize the independent variables, or ownership of companies, our approach differs from Bakke et al. (2019) in a notable way. Instead of classifying MNCs based on information on FDI, we leverage the variable labeled as "parent company" in our data set as mentioned in Section 3.1. This method is similar to what Langli and Saudagaran (2004) did to categorize ownership. In our sample, we adopted a specific criterion to distinguish MNCs from Norwegian companies. Only subsidiaries that are directly owned by a foreign parent company are classified as MNCs. In contrast, all other entities are considered Norwegian companies. To facilitate this classification, we developed multiple independent dummy variables. Each of which represents a different MNC, allowing for further differentiation between MNCs.

[13] Grubert et al. (1993) mentions that the companies investment patterns and M&A activities affect whether the booked values are adjusted to market values.

[14] At the least at the 10% level

[15] See Section 7.1.2.1

3.3.2.1 MNC dummy

This variable captures the effect of multinationality. The dummy variable for MNCs equals 1 when the subsidiary is owned by a foreign company, and 0 otherwise, which represents all Norwegian DCCs. There are 37 931 observations of MNCs in our sample.

3.3.2.2 AMNC dummy

The dummy variable for AMNCs equals 1 when the subsidiary is owned by an Asian company, and 0 otherwise. The dummy variable for non-Asian owned MNCs equals 1 when the subsidiary is owned by a non-Asian foreign company, and 0 otherwise. The countries considered as part of Asia in our sample include China, Hong Kong, Taiwan, India, Singapore, Japan, South Korea, Malaysia, Iran, Bahrain, Israel, Qatar, Thailand, United Arab Emirates, Turkey, Saudi Arabia, Philippines, Vietnam, Georgia, Macau, Indonesia, Kuwait, Cambodia, Laos, Nepal, Pakistan, Iraq, Oman, and Sri Lanka. Our sample contains 683 observations of subsidiaries that are owned by AMNCs.

3.3.2.3 CMNC dummy

The dummy variable for CMNCs equals 1 when the subsidiary is owned by a Chinese company, and 0 otherwise. The dummy variable for non-Chinese owned MNCs equals 1 when the subsidiary is owned by a non-Chinese foreign company, and 0 otherwise. All the companies classified as Chinese are located in China, Hong Kong, and Taiwan. Our sample contains 120 observations of subsidiaries that are owned by CMNCs.

3.3.3 Control variables

We also need to control for potential differences between MNCs and DCCs that are not due to profit shifting and transfer pricing. These effects are firm characteristics that might also have a correlation with the profitability measure. By controlling for these effects, we are more likely to isolate the effect of MNC status on profitability. To do this, we implemented the following procedures, similar to Bakke et al. (2019).

3.3.3.1 Leverage effects: debt ratios

To account for leverage effects we included long-term interest-bearing debt, as well as short term interest bearing and interest free debt, all as shares of total assets. Long-term interest-bearing debt to total assets measures the proportion of a company's assets that are financed through long-term debt. Short-term interested-bearing debt to total assets measures the extent to which a company relies on short-term borrowing to finance its asset. Short-term interest-free debt to total assets provides insight into the portion of a company's assets that are financed by short-term obligations that do not incur interest.

While Langli and Saudagaran (2004) only included one control variable for leverage, Bakke et al. (2019) split the controls into three parts. Splitting the effect can give us insights on different type of leverage's effect on profitability. We expect a negative estimate for interest bearing debt since the interest payments are tax deductible, which can reduce company's taxable income. We also control for debt shifting by controlling for interest bearing debt (Bakke et al., 2019). The possible implications of including this control is discussed in Section 5.1.2. The short-term interest-free on the other hand does not have an expected effect.

3.3.3.2 Tangibility: fixed assets ratio

Next, we controlled for tangibility by including the fixed assets to total assets ratio, which measures the proportion of a company's total assets that are fixed or in other ways tangible. There are two different effects within tangibility that can affect profitability through taxable income. Firms with high tangibility are considered stable firms and therefore have better access to investment opportunities by getting loans using their assets as collateral. Increased leverage would then increase the taxable income through their investments. However, there is an opposing effect of depreciation, which would increase with the increasing investment amount. As depreciation lowers taxable income, the effect becomes more ambiguous (Bakke et al., 2019).

3.3.3.3 Size

To control for differences in profitability due to size differences, we include sales up to the fourth power, scaled down by factors of 10^{10}, 10^{15}, 10^{22} and 10^{30}. All the different scaling factors of sales are used to better handle of extremely large sales figures. On the one hand, we expect larger firms to be more engaged in profit shifting activities, because the cost of profit shifting is

lower compared to the benefit of shifting profits (Wier and Reynolds, 2018). They also have more resources for tax-planning activities. Therefore, one might expect the control variables to get more negative with size increases. On the other hand, big firms might also have economies of scale or competitive advantages that increase their taxable income and hence profits (Langli and Saudagaran, 2004). Therefore, we can not be sure of the size effects on profitability.

3.3.3.4 Age

We controlled for the age of each company by subtracting the year of establishment from the reporting year. Subsequently, the companies are classified into three distinct age groups according to their calculated age: 0 to 5 years, 6 to 10 years, and those 11 years and older. To represent these groups, we created two dummy variables: one for companies aged 0 to 5 years, and another for companies aged 6 to 10 years. These dummy variables equal to 1 if the company falls within the respective age range, and 0 otherwise. Companies that are over 11 years old serve as the reference group. By doing this, we control for start-up and maturation effects (Langli and Saudagaran, 2004). Start-up effects could for instance be lower profits due to lack of capital, experience and customers, while maturing effects could be associated with higher profits due to more experience, customers and capital. On the other hand, older firms might participate more in profit shifting activities, which would lower the profits (Morgenroth, 2021). Positive estimates indicate that lower ages are associated with higher profits, and vice versa.

3.3.3.5 Industry effects

We control for industry effects the same way as Balsvik et al. (2009) and Bakke et al. (2019), using NACE3 industry codes to categorize the industries into dummies. By controlling for different industries, we capture the effects of shocks in profits due to industry specific incidents. Macroeconomic shocks can affect the profits of industries in different ways. Some shocks are completely industry specific, for instance a tax on specific goods or services in an industry. Industry shocks that have an impact on profits will therefore be controlled for in our model.

3.3.3.6 Time effects

Similar to how industry effects are handled, time effects are managed by incorporating dummy variables for each year. The dummies will capture effects that affect all companies and industries

the same, but that varies in time. Examples of this is changes in inflation, interest rates, exchange rates and tax rates (Morgenroth, 2021).

4 Methodology

4.1 Model specification

Our model specification is:

$$\Pi_{it} = \beta_0 + \beta_1 MNC_{it} + X_{it}\gamma + \lambda_t + \alpha_i + \epsilon_{it}$$

We used the same notation as Bakke et al. (2019). The profitability of company *i* in year *t*, Π_{it}, is dependent on several factors. Excluding other controls, the OLS estimate of β_1 will capture only our variable of interest, which is the average difference in profitability between MNCs and DCCs. The control variables are captured in $X_{i,t}$, and residuals include λ_t, α_i and $\epsilon_{i,t}$. λ_t captures year effects, α_i captures individual fixed effects, and $\epsilon_{i,t}$ is the idiosyncratic error term.

4.2 Regression choices

4.2.1 POLS

POLS is a method that treats panel data as a cross-section, assuming all observations are independent from each other. A key assumption of POLS is that the error terms are homoscedastic not autocorrelated. This implies that the error variances remain consistent across all observations and that they are not correlated with each other. However, given that panel data tracks the same companies over time, there is an expectation of inter-year dependencies within the same company. Balsvik et al. (2009) solved this issue by introducing robust standard errors, which will be valid under heteroscedasticity. Additionally, by adding a clustering structure, where the error terms are clustered at the firm level, the model permits serial correlation within each cluster and allows for variations in variance, as detailed in Morgenroth (2021).

Another assumption of POLS is that the error terms are uncorrelated with independent variables. This is an important assumption, because if it does not hold, there is endogeneity in the model and the estimates will be biased and inconsistent. POLS will have an issue because some of the correlations in the error terms could be from firm fixed effects. Because the error terms are not observable, it is difficult to tell if this assumption holds. It is not unlikely that there are a

correlations between the error terms and MNC status. According to Balsvik et al. (2009), it is probable that foreign companies have better technology and quality of leadership, meaning a positive correlation between α_i and $MNC_{i,t}$. The positive correlation leads to an underestimation of profit shifting. Bakke et al. (2019) controlled for this by imposing two restrictions. (1), to only include companies that changed their MNC status during the period, and (2), to exclude 3 years before and 3 years after the year that the company changed status. The first restriction secures that there are only comparable firms left in the analysis, and the second ensures that no temporary shocks will affect the result of the analysis. The shocks could lower profitability due to high investment costs of buying a Norwegian subsidiary, which could, if included, overestimate profit shifting. Similarly, if a positive profit shock increases the probability of a foreign owned company to buy an affiliate, profit shifting would be underestimated. Focusing on long differences will also remove errors related to lags in the data (Bakke et al., 2019).

4.2.2 FE

A solution to accounting for firm fixed effects without relying soley on dummy variables is to use a fixed effect (FE) model, commonly referred to as a within transformation. Fixed effects regression estimates the difference between the observation of a variable at time *t* for company *i* and the average of that variable for the same company i, thereby eliminating individual fixed effects from the regression. This method can be illustrated through the application of our model specification as below. The notation is the same as in Morgenroth (2021).

$$\Pi_{i,t} - \overline{\Pi} = (\beta_0 - \overline{\beta_0}) + \beta(MNC_{i,t} - \overline{MNC}) + \gamma(X_{i,t} - \overline{X}) + (\lambda_t - \overline{\lambda}) + (\alpha_i - \overline{\alpha}) + (\varepsilon_{i,t} - \overline{\varepsilon})$$

$$\Pi_{i,t} - \overline{\Pi} = \beta(MNC_{i,t} - \overline{MNC}) + \gamma(X_{i,t} - \overline{X}) + (\lambda_t - \overline{\lambda}) + (\varepsilon_{i,t} - \overline{\varepsilon})$$

As we can see, the α_i is no longer included in the model after the within-transformation. This method is used by Bakke et al. (2019) and Morgenroth (2021). Both of their samples only contains companies that change their MNC status during the time period. By doing this, the fixed effects model eliminates firm fixed effects, but leaves the effect of variations in MNC status that changes throughout time.

4.3 Our approach

Our approach will be similar to that used by Langli and Saudagaran (2004), Balsvik et al. (2009) and Bakke et al. (2019). One of the main reasons for this choice is our reliance on the same data source from Brønnøysundregisteret, which provides comprehensive firm-level data. This access enables us to utilize similar variables in our analysis.

Our model adopts the foreign ownership estimation method used by Langli and Saudagaran (2004), ensuring that our approach is comparable to their analysis. This method was chosen for multiple reasons. First, it was more convenient to use the ownership information available in the same database as our other data sources. Second, Bakke et al. (2019) used data from 1993 to 2012, limited by the availability of ownership information. By employing this source for ownership data, we can analyze a more recent period, from 2017 to 2020. As a result, the first part of our paper can be seen as an updated version of the study of Langli and Saudagaran (2004), using newer data. Additionally, we have incorporated some of the adjustments made to the analysis of Langli and Saudagaran (2004) by Balsvik et al. (2009) and Bakke et al. (2019).

Our sample consists not only of the companies who change their MNC status during the period, but also purely domestic and foreign companies. There are in total 3 195 companies (11 751 observations) that have changed MNC status, 402 136 DCCs (1 301 960 observations) and 9 580 foreign companies (29 349 observations). Because of potential endogeneity problems with POLS, FE has been used as an alternative that is better fitting for panel structures. However, employing a FE regression would result in the removal of much of our observations concerning the relationship between MNC status and profitability. This is because the MNC dummy remains constant over time for many companies, and is therefore considered a firm fixed effect that would be removed from an FE regression. Thus, we stick to our POLS regression to estimate profit shifting through transfer pricing.

While we won't account for firm fixed effects, we will account for some of the fixed effects using factor variables. In most regressions, we have included an industry factor and a time factor. These factor variables account for industry fixed effects and time fixed effects. To help with inference, we have employed robust standard errors analysis clustered at the firm level that will adjust for serial correlation and heteroscedasticity in the residuals. Through this method, the unobserved heterogeneity in POLS should be better addressed. Additionally, we have performed

yearly regressions, similarly to Langli and Saudagaran (2004), to identify potential structural changes over time.

In the next Section, we will take a first look at important variables through descriptive statistics, including financial and model metrics, and then focus on the profitability measure. Profitability will be analyzed in two ways. First, we will divide profitability into percentiles, and look at the average values for all MNC groups. Then, we will analyze the average profitability trends for the time period of interest.

5 Descriptive Statistics

5.1 Full sample

Table 5.1 presents descriptive statistics for the main variables in our analysis in Section 6, as well as for the variables we use in Section 7.

Table 5.1: Descriptive Statistics

	Total	MNC	AMNC	CMNC	DCC
Taxable income	3723.37 (258888.46)	29187.69 (657475.11)	23200.26 (954525.06)	-1452.70 (22062.89)	3040.50 (239187.89)
Total assets	117248.66 (11547975.87)	1688694.94 (61736283.34)	536771.97 (4307186.36)	216167.07 (856519.85)	75107.43 (5887095.68)
Total income	21933.79 (834644.89)	176013.03 (1815837.91)	260580.32 (3262541.97)	19234.70 (44191.87)	17801.88 (791353.29)
Sales	18400.04 (748113.73)	138569.02 (1288297.94)	249437.45 (3113281.30)	19121.79 (44186.46)	15177.49 (727858.66)
Operating profits	2431.34 (217776.82)	28660.50 (677582.18)	35312.14 (942957.68)	244.87 (2382.52)	1727.96 (190703.67)
EBITDA	3543.94 (281144.80)	41338.45 (910987.88)	45762.79 (1013054.44)	596.77 (3243.12)	2530.41 (242627.46)
Debt ratio1	0.63 (32.98)	0.68 (19.53)	0.45 (3.20)	0.21 (0.40)	0.63 (33.26)
Debt ratio2	0.09 (14.83)	0.27 (10.33)	0.17 (1.20)	0.37 (2.58)	0.08 (14.93)
Debt ratio3	0.63 (15.61)	0.80 (10.74)	1.36 (11.92)	0.80 (4.14)	0.63 (15.72)
Fixed asset ratio	0.40 (0.44)	0.26 (0.55)	0.36 (0.40)	0.28 (0.38)	0.41 (0.44)
Age	11.54 (12.92)	12.90 (13.58)	9.81 (10.42)	8.95 (8.90)	11.50 (12.90)
ETR	0.14 (0.08)	0.15 (0.10)	0.13 (0.08)	0.13 (0.08)	0.14 (0.08)

Absolute values are in 1000 NOK. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

5.1.1 Financial metrics

The total sample average taxable income is around 3.7 million NOK with a standard deviation of 259. The median taxable income is, however, only at 48 000 NOK. If we compare the minimum and maximum taxable income, they have a spread of about 263 billion NOK, where minimum is

-136 billion NOK and maximum is 127 billion NOK. As we can see, there are a lot of differences among the companies in our sample. Therefore, it is important to use profit margins as opposed to absolute numbers and to control for the size differences (Balsvik et al., 2009). MNCs have the highest average taxable income at 29 million NOK. Seen in isolation this is somewhat surprising, as MNCs that shift profits might want to reduce their taxable income. However, when looking at the remaining accounting variables, we see that MNCs report higher numbers of all variables, confirming that they are in fact larger companies in general. Therefore, these differences make sense. We noted that CMNCs stand out with an average taxable income of -1.5 million NOK. This is in contrast to other MNCs in general as well as within AMNCs. One possible explanation could be the existence of extreme values, which significantly influence the average. For instance, the median value of taxable income among CMNCs is -7 000 NOK. An representative case is REC Solar Holdings AS, owned by Bluestar Elkem Investment Co. Limited. In 2018, it reported a taxable income of -236.8 million NOK. This single extreme value could have a substantial impact on the overall average for all CMNCs.

5.1.2 Model metrics

The three debt ratios reflect the companies' leverage and show varying degrees of debt financing across the groups. As mentioned in 2.3.2 and 3.3.3.1, we need to be aware of the possibility of companies using leverage to manage their tax liabilities and maximize profits. Therefore, we investigate the different debt ratios in more detail. In Section 7.1.1.4, we perform our analysis without the debt controls. Removing the debt controls had little to no impact on our estimates. The main reason for this is possibly as Heckemeyer and Overesch (2017) found, that the dominant profit shifting channels are transfer pricing and licensing, and not debt shifting. Bakke et al. (2019) also found insignificant changes to their estimates when removing the debt controls from their regressions.

Debt ratio1 and Debt ratio 2 shows the proportion of a company's total assets that are financed through long-term and long-term interest-bearing debt, respectively. If companies use debt shifting to reduce their tax burden, they might have a high fraction of interest-bearing debt in the country they are shifting profits out of, as this debt is tax-deductible. MNCs have a higher ratio for both short-term and long-term leverage metrics than DCCs, while AMNCs and CMNCs have higher ratios only for the short-term leverage metric. Unlike the first two ratios, the debt

ratio 3 metric[16] uses interest-free debt as the leverage variable. A high ratio can be favorable as there is no interest on these loans. However, this also means that the company needs more liquidity to pay off these loans quickly.

The fixed asset ratio is the proportion of fixed assets to total assets. A high fixed asset ratio means that the company is more capital-intensive. If a company shifts profits through transfer pricing, they can use inflate or deflate values of its asset in different subsidiaries in order to optimize their tax burden. They might also manipulate depreciation for this purpose. However, such effects will only be captured in the control variable, as we have no method to differentiate it from other tangibility effects. We see that MNCs, AMNCs and CMNCs have a lower fixed asset ratio compared to DCCs.

Lastly, the average age of the companies varies slightly, where CMNCs are the youngest. The effective tax rates are consistent across groups, with a range of 13-15%.

5.2 Profitability

5.2.1 Profitability percentiles

Table 5.2 presents descriptive statistics of different percentiles of the profitability variable for the different groups.

Table 5.2: Descriptive statistics for profitability

	Total	MNC	AMNC	CMNC	DCC
Panel A: Profitability					
Mean	0.03	-0.00	-0.10	-0.09	0.04
SE	0.40	0.45	0.47	0.42	0.40
Panel B: Percentiles for profitability					
10% percentile	-0.24	-0.36	-0.51	-0.47	-0.24
25% percentile	-0.03	-0.05	-0.15	-0.11	-0.03
50% percentile	0.02	0.02	-0.00	-0.01	0.02
75% percentile	0.16	0.15	0.07	0.05	0.16
90% percentile	0.38	0.35	0.26	0.20	0.38
Panel C: Observations					
% of obs. with positive profitability	59.67	59.46	41.14	40.83	59.67
Observations	1 343 060	35 076	683	120	1 307 984

[16] Debt ratio 3 refers to short-term interest-free debt over total assets

In Panel A, we see the averages of the profitability metric which we defined in Section 3.3.1. It gives us a picture that is easier to compare across company sizes. DCCs have the highest profitability of 4%, compared to -0%, -10% and -9% for MNCs, AMNCs and CMNCs, respectively. Reporting profits close to zero is a technique used by MNCs in order to pay less taxes in the country they are shifting profits from (Hopland et al., 2018). Lower average profitability is an interesting finding that we will expand on later in this Section [17]. The statistics for DCCs and MNCs are compatible with what is found in other studies. Balsvik et al. (2009) had a profitability sample mean of 8.7%, where the DCCs had a higher average of 8.8% and MNCs had a lower average of 7.1%. The higher profitability averages they report is explained by their trimming procedures that excludes many of the smaller firms in our sample. The standard deviations are relatively consistent across group, although AMNCs and MNCs have slightly higher standard errors. This means that there is greater variability in profitability within AMNCs and MNCs compared to the other groups.

Panel B shows the averages for the distribution of profitability at different percentiles. Based on Panel A, we would expect the different MNC groups to have lower profitability compared to DCCs for most percentiles, which is also the case. The 50th percentile, or median, represents the middle value in our sample. Over half of the total sample has a profitability exceeding 2%, while it is lower for AMNCs and CMNCs with values of approximately -0% and -1%, respectively. If we look at both ends of the distribution, we see that at least 10% of AMNCs and CMNCs experience significantly higher negative profitability with respective figures of -51% and -47%, compared to DCCs at -24%. At the 90th percentile, DCCs again show higher profitability compared to all other categories at 38%, with MNCs at 35%, AMNCs at 25% and CMNCs at 20%.

Panel C reveals the proportion of observations with positive profitability. At first glance, the difference of 59.67% for DCCs compared to 59.46% for MNCs might not seem substantial. However, within MNCs the difference from DCCs is bigger. CMNCs have the lowest percentage at 40.83% with a difference of 18.8% compared to DCCs, equaling a reduction of 31.6%. AMNCs follows closely at 41.14% with positive profits.

The numbers of observations for each group indicate that our sample predominantly consists of DCCs. We have over one million DCC observations, which functions as a solid control group.

[17] see Figure 5.1

As previously mentioned, because the CMNC group only contains 120 observations, further restricting the sample would decrease the sample size to an extent where an analysis would be difficult to interpret. To support the strength of our analysis, we have included the broader group of 683 observations for our Asia sample, which we use as comparison and a reality check. The general MNC sample contains about 35 000 observations, which is a good sample size for the four years we are studying, especially considering that Langli and Saudagaran (2004) had about 1000 observations of MNCs for each year in their analysis.

5.2.2 Average profitability trends

To get an overview of the average profitability trends for the different groups, we have generated Figure 5.1. Similarly to Bakke et al. (2019), our analysis revealed that DCCs maintain a consistently higher average profitability compared to all MNC groups, which remains positive for the whole period. In contrast, the average profitability for MNCs hovers around zero, which is a common phenomenon in profit shifting literature[18]. The average profitability for AMNCs and CMNCs is significantly negative, with CMNCs averaging at almost -15% in 2019. The overall negative values could indicate the presence of tax avoidance strategies within these groups, which is further discussed in the following Section 6.

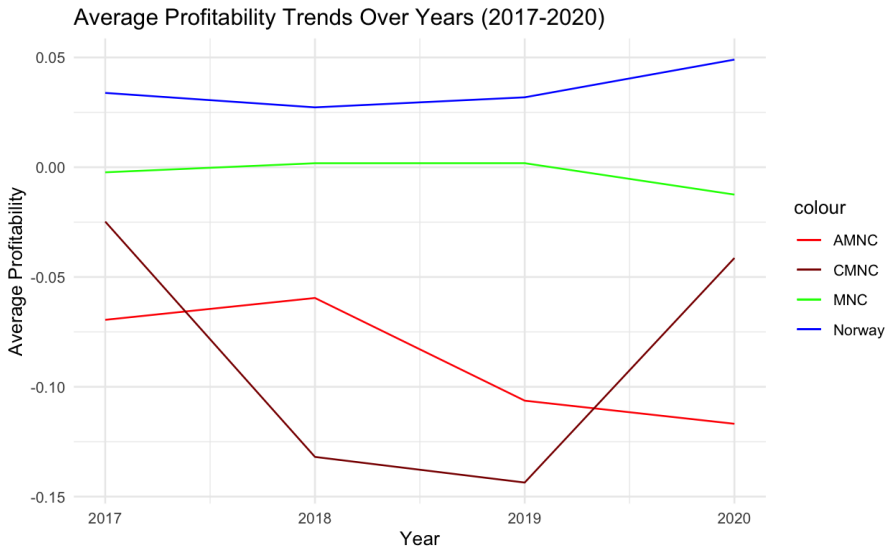

Figure 5.1: Average profitability trends over years (2017-2020)

[18] Grubert et al. (1993) and Bilicka (2019) mentions proftis around 0 as well as taxable income around 0 for MNCs

6 Empirical Analysis

In this Section, we will analyze the profitability difference of the three MNC groups we have previously discussed. First, we will analyze the MNC group, both using POLS and OLS regressions for each year. Then, we will analyze AMNCs followed by CMNCs in a similar manner. Lastly, we will compare the results and summarize our findings.

6.1 MNCs

6.1.1 Pooled regression results

Table 6.1 shows the main regression results. Column (A) is the simplest specification having only the MNC dummy. The estimate for the MNC dummy comes out as negative and significant at the 1% level. It suggests that being an MNC is associated with a decrease in profitability by approximately 3.8 percentage points, all else equal. The estimate is slightly larger than the raw difference (3.54%) reported in Table 5.2. It is noticeable that the R-squared value (0.0002) is very low, suggesting that MNC status alone does not explain much of the variability in profitability. Thus, we included controls variables described in Section 3.3.3 step by step to try to improve the interpretability of our model, which is shown from Column (B) to (F).

Column (B) is the regression of the MNC dummy including time and industry fixed effects. Introducing the fixed effects variables have lowered the profitability estimate to 2.6%. This is expected, since we removed noise from time and industry effects from the estimate. Variables for each year show that compared to 2017, the profits of 2018 and 2019 were lower, while it was highest for 2020. This result is a little surprising because the pandemic in 2020 should drag profitability down. The estimates for the years 2018 and 2020 were significant, while it was insignificant for 2019. This remains true for the rest of the regression results. Time and industry fixed effects are included in all the remaining regressions.

Column (C) includes the debt ratios mentioned in Section 3.3.3.1. The long-term and short-term interest-bearing debt ratios are both negative as suspected. The same negative estimates can be seen in the results from Langli and Saudagaran (2004) and Bakke et al. (2019) . However, the magnitude of our estimates differ a lot from theirs, probably due to the different measures of debt ratios. Langli and Saudagaran (2004) employed a different way of calculating interest-

Table 6.1: Regression results on MNCs

	Dependent variable: profitability					
	(A)	(B)	(C)	(D)	(E)	(F)
MNC	-0.038^{***}	-0.026^{***}	-0.026^{***}	-0.030^{***}	-0.032^{***}	-0.036^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
debt ratio1			-0.0002^{***}	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}
			(0.00001)	(0.00001)	(0.00001)	(0.00001)
debt ratio2			-0.001^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
			(0.0001)	(0.0001)	(0.0001)	(0.0002)
debt ratio3			-0.001^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
			(0.00002)	(0.00002)	(0.00002)	(0.00002)
fixed asset ratio				-0.057^{***}	-0.057^{***}	-0.059^{***}
				(0.001)	(0.001)	(0.004)
sales/10^{10}					244.585^{***}	203.879^{***}
					(15.519)	(13.429)
sales^2/10^{15}					-0.393^{***}	-0.323^{***}
					(0.037)	(0.047)
sales^3/10^{22}					0.017^{***}	0.014^{***}
					(0.002)	(0.002)
sales^4/10^{30}					-0.002^{***}	-0.002^{***}
					(0.0003)	(0.0003)
age(0-5)						-0.056^{***}
						(0.001)
age(6-10)						-0.015^{***}
						(0.001)
year2018		-0.006^{***}	-0.006^{***}	-0.007^{***}	-0.007^{***}	-0.007^{***}
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
year2019		-0.0004	-0.0005	-0.0002	-0.0002	-0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
year2020		0.015^{***}	0.015^{***}	0.014^{***}	0.014^{***}	0.013^{***}
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
factor(industry)		Yes	Yes	Yes	Yes	Yes
Constant	0.036^{***}	0.008	0.008	0.029^{***}	0.029^{***}	0.055^{***}
	(0.0003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	1,343,060	1,230,311	1,230,311	1,230,311	1,230,311	1,230,311
R^2	0.0002	0.022	0.024	0.027	0.027	0.031
Adjusted R^2	0.0002	0.022	0.024	0.027	0.027	0.031
RSE	0.400	0.385	0.385	0.384	0.384	0.384
F Statistic	310.161	310.755	321.241	364.285	352.108	399.683

*p<0.1; **p<0.05; ***p<0.01. Robust standard errors clustered at the firm level in parentheses. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets. All F statistics are significant at the 1% level

bearing debt using short-term interest bearing debt plus long-term liabilities minus deferred taxes, resulting in the estimate at -14%. In our results, increased interest-bearing leverage is associated with a lower profitability of 0.02% for long-term debt and 0.1% for both short-term interest bearing and interest-free debt. This difference is not concerning because as previously mentioned, the debt ratios do not have a big impact on our model [19]. All the debt estimates remain significant and consistent in the remaining regressions.

Column (D) includes the tangibility variable. The fixed to total asset ratio is associated with a reduction in profitability of 5.7%. We find that this negative result sustains and increases as we added all the controls. The result is quite similar to Bakke et al. (2019), who found the effect to be about -6.6%. The result is however opposite to the findings of Langli and Saudagaran (2004), who found the positive effect at 9.1% with similar controls. In other words, it differs between the studies in which of the two effects are the strongest. In their case, it seems that the depreciation effect is the strongest, thereby reducing the profitability measure.

Column (E) includes the size control variables. We see that the signs of the size controls fluctuate between positive and negative for different firm sizes. For smaller firms, increasing sales has on average a positive effect on profitability. For the next size control, this relationship turns negative. Then, for the third one, the sign turns positive. Lastly, for the biggest firms, it turns negative. These interchanging signs are also seen in Bakke et al. (2019), while in Langli and Saudagaran (2004) all estimates were negative. It is worth mentioning that Langli and Saudagaran (2004) uses a different method to calculate their size variables, which could explain this difference. In Balsvik et al. (2009), the POLS estimate is negative for all sizes, but when a FE regression is employed, all the estimates of size variables turned positive. Based on the difference between the studies, POLS regressions seem to be more likely to generate negative signs to size than FE. This could be because some of the firm fixed effects lowers the profits, which would be captured in the size variable with POLS. There could also be some real size effects are lost if this variation does not change over time with FE. However, as both Bakke et al. (2019) and us get similar results when using FE and POLS, respectively, we suspect that there is not a huge difference in the model choice for this parameter.

Lastly, Column (F) includes all the control variables as described in 3.3.3, including the age dummies. The reference group is firms with age over 11 years. Compared to the reference group,

[19] See Section 7.1.1.4

younger firms are associated with a lower profitability. The difference is the most significant for the smallest firms aging 0 to 5 years with an estimate of -5.6%, while it for firms aging 6 to 11 years is at -1.5%. Therefore, it looks like increasing age has a positive association on profitability. The same trend can be seen in the results from Langli and Saudagaran (2004) as well. This makes sense as start-up firms often have lower profits, and that mature companies can achieve economies of scale and gain competitive advantages to increase profits.

6.1.2 Yearly regression results

In addition to pooled regressions, we include regression results for each year in Table 6.2. It is noteworthy that the MNC estimate is negative and significant at the 1% level for all the yearly regressions. The estimate is the most negative in 2020, with -6.5% compared to -3.5%, -2.3% and -2.7% in 2017, 2018 and 2019 respectively. Thus, MNCs operating in Norway have a lower profitability compared with DCCs, which indicates profit shifting activities.

The leverage ratios are significant and negative for all years, as expected. The same is true for the tangibility ratio, with a growth in the estimate from 2018 to 2020. The size control estimates kept their pattern of alternating signs from the pooled regression, and the estimates became larger year by year. Since we have already taken inflation into account, it means that firm size measured in sales decrease profitability relatively more as time goes on. The growth in the estimates is also larger for larger firm sizes. Taking the estimate from 2020 and dividing it on the estimate from 2017 gives a growth over 4 years at: Sales = 140%, Sales^2 = 332%, Sales^3= 509% and Sales^4 = 710%. Both age estimates are negative and significant for all years, indicating that older firms have relatively higher profitability for each year. The youngest firms, aging 0 to 5 years, although having the highest negative estimates as expected, also has a decrease in the estimate's magnitude for each year.

Table 6.2: Yearly regression results on MNCs

	Dependent variable: profitability				
	(A)2017	(B)2018	(C)2019	(D)2020	(E)Pooled all-year
MNC	-0.035^{***}	-0.023^{***}	-0.027^{***}	-0.065^{***}	-0.036^{***}
	(0.004)	(0.004)	(0.004)	(0.005)	(0.003)
debt ratio1	-0.0002^{***}	-0.0002^{***}	-0.0004^{***}	-0.0001^{***}	-0.0002^{***}
	(0.00003)	(0.00003)	(0.00003)	(0.00002)	(0.00001)
debt ratio2	-0.0005^{***}	-0.002^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0002)
debt ratio3	-0.0005^{***}	-0.001^{***}	-0.002^{***}	-0.002^{***}	-0.001^{***}
	(0.00003)	(0.00004)	(0.0001)	(0.0001)	(0.00002)
fixed asset ratio	-0.061^{***}	-0.042^{***}	-0.060^{***}	-0.075^{***}	-0.059^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
sales/10^{10}	297.983^{***}	338.655^{***}	305.969^{***}	417.200^{***}	203.879^{***}
	(38.295)	(40.824)	(41.282)	(52.894)	(13.429)
sales^2/10^{15}	-0.790^{***}	-0.971^{***}	-0.998^{***}	-2.262^{***}	-0.323^{***}
	(0.140)	(0.159)	(0.186)	(0.376)	(0.047)
sales^3/10^{22}	0.055^{***}	0.058^{***}	0.075^{***}	0.280^{***}	0.014^{***}
	(0.011)	(0.010)	(0.016)	(0.053)	(0.002)
sales^4/10^{30}	-0.010^{***}	-0.009^{***}	-0.014^{***}	-0.071^{***}	-0.002^{***}
	(0.002)	(0.002)	(0.003)	(0.014)	(0.0003)
age(0-5)	-0.064^{***}	-0.058^{***}	-0.056^{***}	-0.047^{***}	-0.056^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
age(6-10)	-0.019^{***}	-0.011^{***}	-0.014^{***}	-0.015^{***}	-0.015^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
year2018					-0.007^{***}
					(0.001)
year2019					-0.001
					(0.001)
year2020					0.013^{***}
					(0.001)
factor(industry)	Yes	Yes	Yes	Yes	Yes
Constant	0.056^{***}	0.046^{***}	0.046^{***}	0.078^{***}	0.055^{***}
	(0.011)	(0.011)	(0.010)	(0.010)	(0.005)
Observations	294,644	304,971	310,029	320,667	1,230,311
R^2	0.034	0.030	0.033	0.034	0.031
Adjusted R^2	0.034	0.030	0.032	0.034	0.031
RSE	0.381	0.388	0.385	0.380	0.384
F Statistic	106.859^{***}	98.098^{***}	107.476^{***}	118.230^{***}	399.683^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

6.1.3 Summary

In summary, we can conclude that from 2017 to 2020, MNCs reported a lower profitability at 3.6% compared to DCCs, which is measured as taxable income to total assets ratio. The results are significant for both pooled and yearly regressions at the 1% level. We also found the following profitability effects for the control variables. First, we found that profitability increases with age maturation, similarly to Langli and Saudagaran (2004). It also decreases with both tangibility and leverage ratios. Lastly, the results were alternated for size controls, meaning that there was no clear positive or negative effects for increasing size, similarly to the results from Bakke et al. (2019).

As for the model, the more control variables are included, the higher the explanatory power of the model is. From column (A) to (F), the R-squared value was increased by 155 times from 0.02% to 3.1% by adding control variables. However, the R-squared values of similar regressions are 7.6% and 10.5% in the study of Bakke et al. (2019) and Langli and Saudagaran (2004) respectively. This is because of the restrictions they included in their samples and the different choices they made in the model. Our results are acceptable but also reflect the limitation in our model, which is further discussed in Section 7.2.3. It is also noteworthy that the MNC estimate increases with each control we add, indicating that not controlling for such differences can underestimate profit shifting. The model, exhibited in column (F), is employed throughout our analysis for each MNC group.

6.2 AMNCs

As shown in Table 6.3, the pooled regression results show that AMNCs are associated with a much larger decrease in profitability of 11.8%, compared with MNCs that are not owned by an Asian country with a decrease in profitability of 3.4%. For AMNCs, our model still exhibits the same explanatory power as its for MNCs at around 3.1%.

Table 6.3: Yearly regression results on AMNCs

	Dependent variable: profitability				
	(A)2017	(B)2018	(C)2019	(D)2020	(E)Pooled all-year
AMNC	-0.080^{*}	-0.052	-0.130^{***}	-0.137^{***}	-0.118^{***}
	(0.045)	(0.043)	(0.025)	(0.026)	(0.015)
Non-Asian MNC	-0.035^{***}	-0.023^{***}	-0.024^{***}	-0.063^{***}	-0.034^{***}
	(0.004)	(0.004)	(0.004)	(0.005)	(0.002)
debt ratio1	-0.0002^{***}	-0.0002^{***}	-0.0004^{***}	-0.0001^{***}	-0.0002^{***}
	(0.00003)	(0.00003)	(0.00003)	(0.00002)	(0.00001)
debt ratio2	-0.0005^{***}	-0.002^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
debt ratio3	-0.0005^{***}	-0.001^{***}	-0.002^{***}	-0.002^{***}	-0.001^{***}
	(0.00003)	(0.00004)	(0.00001)	(0.0001)	(0.00002)
fixed asset ratio	-0.061^{***}	-0.042^{***}	-0.060^{***}	-0.075^{***}	-0.059^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
sales/10^{10}	297.324^{***}	338.791^{***}	305.875^{***}	415.812^{***}	203.917^{***}
	(38.301)	(40.824)	(41.281)	(52.895)	(15.498)
sales^2/10^{15}	-0.784^{***}	-0.971^{***}	-0.995^{***}	-2.255^{***}	-0.322^{***}
	(0.140)	(0.159)	(0.186)	(0.376)	(0.037)
sales^3/10^{22}	0.055^{***}	0.058^{***}	0.075^{***}	0.279^{***}	0.014^{***}
	(0.011)	(0.010)	(0.016)	(0.053)	(0.002)
sales^4/10^{30}	-0.010^{***}	-0.009^{***}	-0.014^{***}	-0.071^{***}	-0.002^{***}
	(0.002)	(0.002)	(0.003)	(0.014)	(0.0003)
age(0-5)	-0.064^{***}	-0.058^{***}	-0.056^{***}	-0.047^{***}	-0.056^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
age(6-10)	-0.019^{***}	-0.011^{***}	-0.014^{***}	-0.015^{***}	-0.015^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
year2018					-0.007^{***}
					(0.001)
year2019					-0.001
					(0.001)
year2020					0.013^{***}
					(0.001)
factor(industry)	Yes	Yes	Yes	Yes	Yes
Constant	0.056^{***}	0.046^{***}	0.046^{***}	0.078^{***}	0.055^{***}
	(0.011)	(0.011)	(0.010)	(0.010)	(0.005)
Observations	294,644	304,971	310,029	320,667	1,230,311
R^2	0.034	0.030	0.033	0.034	0.031
Adjusted R^2	0.034	0.030	0.032	0.034	0.031
RSE	0.381	0.388	0.385	0.380	0.384
F Statistic	105.779^{***}	97.102^{***}	106.570^{***}	117.097^{***}	396.020^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

The results of yearly regressions display a different picture, which is shown in column (A) to (D). In 2017, the estimate of AMNC is significant at the 10% level, while in 2018, the estimate is not significant. In 2019 and 2020, the estimates are significant at the 1% level. This partly aligns with the observations from Figure 5.1, where the highest average profitability of AMNCs is in 2018. The average profits in 2019 is lower than that in 2017, which is consistent with the results in Table 6.3. The estimates get more precise with time, which we can see by the decreasing standard errors. Lower standard errors can be from an increase in sample size[20]or a decrease in the variability of profitability.

The pooled result indicates that AMNCs have substantially lower profitability compared to DCCs and MNCs owned by non-Asian countries. It is more challenging to make a conclusion based on the yearly regression results. A possible explanation for why the results varied in significance for each year is the small number of AMNC observations for 2017 and 2018, which is described in Table 3.2. 2017 and 2018 had 73 and 84, respectively, while there are 278 and 248 AMNC observations in 2019 and 2020. If this is the case, a solution could be to elongate the time frame and thus get enough observations to find significance for a larger pooled sample, which is further discussed in Section 7.2.1. Therefore, we are a little cautious to conclude that our result is significant. Additional research would be helpful in ensuring the validity of our result. We can also see that non-Asian MNCs have significant and negative estimates for all years. The pooled estimate for non-Asian MNCs is at 3.4%, which is close to the pooled estimate at 3.6% for MNCs in Table 6.2. This implies that AMNCs tend to report even lower profitability compared with MNCs.

Looking at the control variables in column (A) to (E), we can see that many of them do not differ from the MNC regression. The leverage variables are almost identical, apart from small variations in 2019. The same is true for the tangibility control. All controls have the same signs as previous regressions, and there are no surprising results found except from the AMNC estimates. Column (E) included time effects, showing yet again that year 2020 was associated with higher profitability than 2017, and the estimation of year 2018 and 2019 are lower than that of 2017.

[20] We can see that the sample size increases from around 295 thousand to 321 thousand from 2017 to 2020

6.3 CMNCs

As shown in Table 6.4, the pooled regression results show that our model explains the same amount of variation as previous regressions, at 3.1%. In column (E), the CMNC estimate of 11.3% is significant at the 1% level, which closer to the AMNC estimate of 11.8% than to the MNC estimate of 3.6%. This makes sense, as CMNCs are a part of AMNCs, and account for about 17.6% of AMNCs in Norway, as presented in Table 5.2. We can also see that non-Chinese MNCs have significant and negative estimates for all years. The pooled estimate for non-Chinese MNCs is at 3.5%, falling into the range between MNCs at 3.4% and non-Asian MNCs at 3.6%.

The results of yearly regressions are shown in column (A) to (D). Similarly to results for AMNCs in Table 6.3, some of the CMNC estimates are not significant. In 2017, the estimate is not significant, in 2018 and 2020 the estimate is significant at the 10% level, and in 2019 the estimate is significant at the 5% level. This aligns with the figures in Figure 5.1, where the profitability of CMNCs are the lowest in 2019. The varying degree of significance for each year makes us wonder how much the outcome of the pooled regression result would change if we studied a longer time-period. Thus, it is difficult to come to a conclusion only based on yearly regression. On the other hand, the control variables display a similar trend over time to previous regressions, both pooled and yearly. All controls are significant, while the estimation for year 2019 still remain insignificant in the pooled regression.

Table 6.4: Yearly regression results on CMNCs

	Dependent variable:profitability				
	(A)2017	(B)2018	(C)2019	(D)2020	(E) Pooled all-year
CMNC	−0.053	−0.168*	−0.117**	−0.110*	−0.113***
	(0.098)	(0.097)	(0.059)	(0.061)	(0.036)
Non-Chinese MNC	−0.035***	−0.023***	−0.027***	−0.065***	−0.035***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.002)
debt ratio1	−0.0002***	−0.0002***	−0.0004***	−0.0001***	−0.0002***
	(0.00003)	(0.00003)	(0.00003)	(0.00002)	(0.00001)
debt ratio2	−0.0005***	−0.002***	−0.001***	−0.001***	−0.001***
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
debt ratio3	−0.0005***	−0.001***	−0.002***	−0.002***	−0.001***
	(0.00003)	(0.00004)	(0.0001)	(0.0001)	(0.00002)
fixed asset ratio	−0.061***	−0.042***	−0.060***	−0.075***	−0.059***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
sales/10^{10}	297.963***	338.435***	305.677***	416.987***	203.755***
	(38.296)	(40.824)	(41.282)	(52.895)	(15.498)
sales^2/10^{15}	−0.790***	−0.970***	−0.997***	−2.261***	−0.323***
	(0.140)	(0.159)	(0.186)	(0.376)	(0.037)
sales^3/10^{22}	0.055***	0.058***	0.075***	0.280***	0.014***
	(0.011)	(0.010)	(0.016)	(0.053)	(0.002)
sales^4/10^{30}	−0.010***	−0.009***	−0.014***	−0.071***	−0.002***
	(0.002)	(0.002)	(0.003)	(0.014)	(0.0003)
age(0-5)	−0.064***	−0.058***	−0.056***	−0.047***	−0.056***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
age(6-10)	−0.019***	−0.011***	−0.014***	−0.015***	−0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
year2018					−0.007***
					(0.001)
year2019					−0.001
					(0.001)
year2020					0.013***
					(0.001)
factor(industry)	Yes	Yes	Yes	Yes	Yes
Constant	0.056***	0.046***	0.046***	0.078***	0.055***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.005)
Observations	294,644	304,971	310,029	320,667	1,230,311
R^2	0.034	0.030	0.033	0.034	0.031
Adjusted R^2	0.034	0.030	0.032	0.034	0.031
RSE	0.381	0.388	0.385	0.380	0.384
F Statistic	105.769***	97.120***	106.403***	117.016***	395.773***

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

6.4 Comparison

To gain a better understanding of CMNCs, we conducted several comparisons across all MNC groups. Table 6.5 demonstrates the pooled regression results across all MNC groups. The estimates of profitability is the highest for MNCs at -3.6%, followed by CMNC at -11.3% and AMNC at -11.8%, all compared to DCCs. It is clear that all control variables are very similar or identical for each regression, indicating that they capture the same effects in all regressions.

Figure 6.1 displays the trend of yearly estimates of profitability for MNCs, AMNCs and CMNCs. Although all estimates are negative, we can see that the profitability of MNCs, in blue line, is the least negative among all MNC groups for all years. This means that MNCs are more profitable than AMNCs and CMNCs. MNCs have a downwards trend since 2018, indicating a higher difference compared to DCCs over time. The estimates of AMNCs, in red line, and the estimates of CMNCs, in green line, crossed each other two times during the four years. The biggest difference is seen in 2018. This is because the negative estimation for CMNCs increased from -5.33% in 2017 to -16.8% in 2018, and the negative estimation for AMNCs decreased from -3.5% in 2017 to -2.29% in 2018. The substantial drop in estimation happened in 2018 for CMNCs, which represents the estimate that changed the most among these four years. This is because of some extreme taxable income in CMNCs as discussed in Section 5.1.1. In general, the estimates of AMNCs and CMNCs fluctuates a lot compared to MNCs. This is because of the difference in the amount of observations as shown in Table 5.2. Although the volatility is larger for AMNCs and CMNCs than MNCs, we can see that there is a negative trend for AMNCs from 2018 to 2020, while there is no obvious trend for CMNCs.

Overall, the credibility of the CMNC estimate is enhanced by the fact that our model aligns qualitatively with previous studies when applied to the MNC group. This means that we can rely on the model to give credible results. Moreover, the application of our model to the AMNC group also shows reliable results. Therefore, the CMNC estimate in our model appears to be reasonable in comparison to AMNCs. To investigate this further, we have included robustness analyses in Section 7.

Table 6.5: Regression results on MNCs, AMNCs and CMNCs

	Dependent variable: profitability		
	(A)MNC	(B)AMNC	(C)CMNC
MNC	-0.036^{***}		
	(0.003)		
AMNC		-0.118^{***}	
		(0.015)	
Non-Asian MNC		-0.034^{***}	
		(0.002)	
CMNC			-0.113^{***}
			(0.036)
Non-Chinese MNC			-0.035^{***}
			(0.002)
debt ratio1	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}
	(0.00001)	(0.00001)	(0.00001)
debt ratio2	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0002d)	(0.0001)	(0.0001)
debt ratio3	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.00002)	(0.00002)	(0.00002)
fixed asset ratio	-0.059^{***}	-0.059^{***}	-0.059^{***}
	(0.004)	(0.001)	(0.001)
sales/10^{10}	203.879^{***}	203.917^{***}	203.755^{***}
	(13.429)	(15.498)	(15.498)
sales^2/10^{15}	-0.323^{***}	-0.322^{***}	-0.323^{***}
	(0.047)	(0.037)	(0.037)
sales^3/10^{22}	0.014^{***}	0.014^{***}	0.014^{***}
	(0.002)	(0.002)	(0.002)
sales^4/10^{30}	-0.002^{***}	-0.002^{***}	-0.002^{***}
	(0.0003)	(0.0003)	(0.0003)
age(0-5)	-0.056^{***}	-0.056^{***}	-0.056^{***}
	(0.001)	(0.001)	(0.001)
age(6-10)	-0.015^{***}	-0.015^{***}	-0.015^{***}
	(0.001)	(0.001)	(0.001)
year2018	-0.007^{***}	-0.007^{***}	-0.007^{***}
	(0.001)	(0.001)	(0.001)
year2019	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
year2020	0.013^{***}	0.013^{***}	0.013^{***}
	(0.001)	(0.001)	(0.001)
factor(industry)	Yes	Yes	Yes
Constant	0.055^{***}	0.055^{***}	0.055^{***}
	(0.005)	(0.005)	(0.005)
Observations	1,230,311	1,230,311	1,230,311
R^2	0.031	0.031	0.031
Adjusted R^2	0.031	0.031	0.031
RSE	0.384	0.384	0.384
F Statistic	399.683^{***}	396.020^{***}	395.773^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

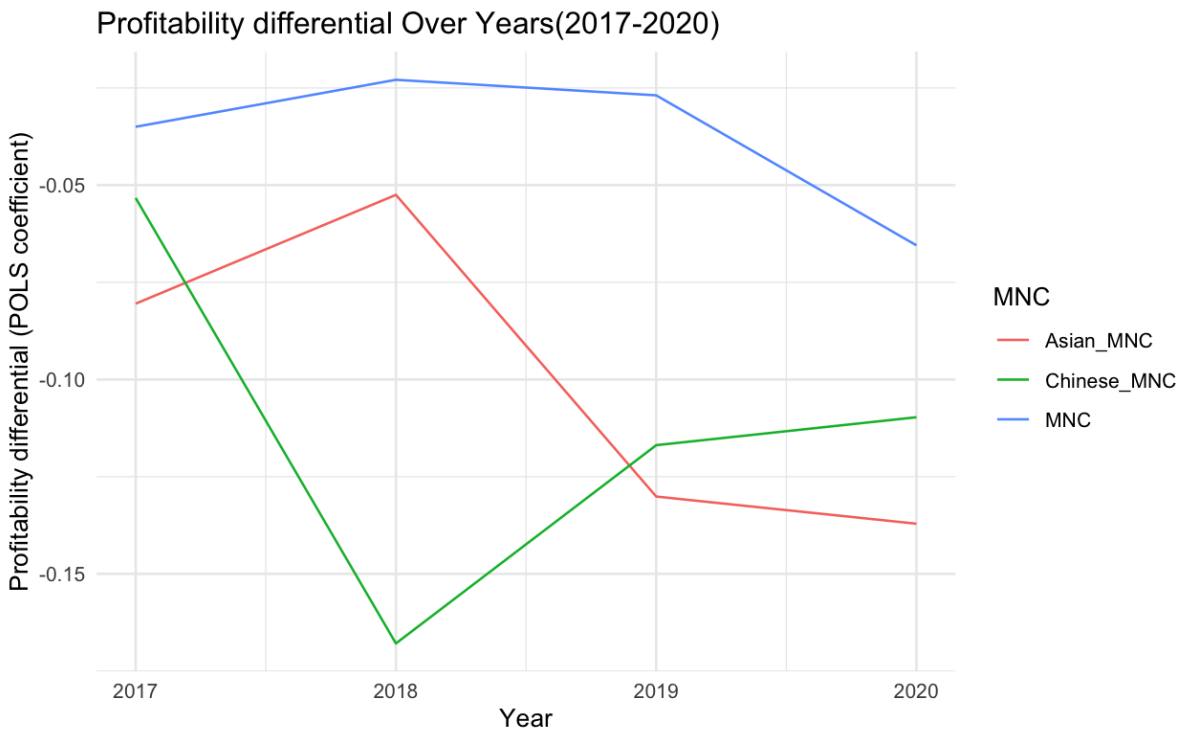

Figure 6.1: Profitability differentials over years (2017-2020)

6.5 Summary

In summary, our pooled regression results show that MNCs report a lower profitability than DCCs, which is estimated to be at 3.6%. AMNCs report the lowest average profitability at 11.8%. The estimation for CMNCs is similar to AMNCs at 11.3%, indicating that CMNCs behave alike to other AMNCs. This result could be an indication that CMNCs, as well as AMNCs, are more aggressive in tax avoidance than other MNCs. Our findings not only aligns with the assumption that developing countries are more prone to aggressive profit shifting activities from Zucman (2015) in Section 2, but also supplement the research in CMNCs as mentioned by L. Yang (2023) and Tang (2020) in Section 1. Our yearly regressions are conducted to explore the possibility of structural changes, such as changes in economic policy, technological advancements and other external factors, and the potential influence of serial correlation, which concerns the possibility of error terms being correlated across all years in the pooled sample (Langli and Saudagaran, 2004). For AMNCs and CMNCs, the results leaves room for improvement as they are not as representative as the findings from Bai (2019) and Langli and Saudagaran (2004) across all years. It highlights an important limitation of lack of observations in our analysis, which is further discussed in Section 7.2.1.

6.6 FE regressions

Although FE regressions remove a large amount of observations as described in Section 4.2.2, we still performed them to investigate the impact of including more fixed effects. For MNC, AMNC and CMNC estimates, none are statistically significant. We see that the R-squared value is only 0.9% and that the adjusted R-squared value is -42.8%. These results indicate that our model does not explain the variation of profitability very well. There are many reasons contributing to this.

First of all, we have kept all observations of companies that stay in the same MNC status for the whole period. In FE regressions, the variation comes from the observations of firms that does not change MNC status will be removed. Because these observations are considered as a fixed effect in the model. Secondly, we have not restricted our model in a way available for performing an FE analysis. By this, we mean that we have not include sample restrictions in line with Bakke et al. (2019), for instance only including companies with mean total assets above 1 million and companies with only positive sales[21]. These restrictions would enable us to look at more comparable firms, which gets more important when we look at fewer observations like the FE model requires. This is further discussed in Section 7.2.2. The FE analysis is therefore not being used as a part of our analysis on the profitability differences of MNCs, AMNCs and CMNCs in Norway from 2017 to 2020.

[21] For a detailed descriptions of these restrictions, see Bakke et al. (2019) page 13

Table 6.6: FE regression results

	Dependent variable:profitability		
	(A) MNC	(B) AMNC	(C) CMNC
MNC	−0.0003		
	(0.006)		
AMNC		0.006	
		(0.024)	
Non-Asian MNC		−0.001	
		(0.007)	
CMNC			0.006
			(0.059)
Non-Chinese MNC			−0.0003
			(0.006)
debt ratio1	−0.0001***	−0.0001***	−0.0001***
	(0.00002)	(0.00002)	(0.00002)
debt ratio2	−0.001***	−0.001***	−0.001***
	(0.0001)	(0.0001)	(0.0001)
debt ratio3	−0.001***	−0.001***	−0.001***
	(0.0001)	(0.0001)	(0.0001)
sales/10^{10}	524.885***	524.926***	524.886***
	(50.398)	(50.398)	(50.398)
sales^2/10^{15}	−0.725***	−0.725***	−0.725***
	(0.089)	(0.089)	(0.089)
sales^3/10^{22}	0.031***	0.031***	0.031***
	(0.005)	(0.005)	(0.005)
sales^4/10^{30}	−0.004***	−0.004***	−0.004***
	(0.001)	(0.001)	(0.001)
fixed asset ratio	−0.138***	−0.138***	−0.138***
	(0.002)	(0.002)	(0.002)
age(0-5)	−0.0004	−0.0004	−0.0004
	(0.003)	(0.003)	(0.003)
age(6-10)	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)
factor(year)	Yes	Yes	Yes
factor(industry)	Yes	Yes	Yes
factor(orgnr)	Yes	Yes	Yes
Observations	1,230,311	1,230,311	1,230,311
R^2	0.009	0.009	0.009
Adjusted R^2	−0.428	−0.428	−0.428
F Statistic	82.625***	81.766***	81.765***

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

7 Discussion

In this section, we will discuss the reliability of our findings through robustness analyses and consider the limitations of our thesis. We will start with presenting our robustness analyses, where we will investigate our regression model, focusing on potential issues arising from multicollinearity, heteroscedasticity, size quintiles and debt ratios. Moreover, we will examine our profitability measure by employing different quantile restrictions and alternative measures. Following this, we will address the limitations of our thesis from the aspects of data, restrictions, and our model, and suggest improvements for future research.

7.1 Robustness analyses

To see if our results are reliable and precise, we perform several robustness analyses including applying robust standard errors, utilizing different quantiles for trimming the extreme values in profitability, and utilizing different profitability measures. As mentioned previously, Balsvik et al. (2009) adjusted for the bigger standard errors in small firms by estimating robust standard errors in their regression, as well as by performing multiple regressions for different quantiles. By doing this, the samples will be more homogeneous and therefore better suited for comparisons.

7.1.1 Main regression model

7.1.1.1 Multicollinearity

Table 7.1 shows the correlation matrix, which contains all the independent variables included in our regression model. The matrix shows the correlation between independent variables which helps ensure model's robustness by checking for multicollinearity between them. Multicollinearity occurs when two or more predictors in a model are correlated and provide redundant information. Creating a correlation matrix is important as it can help us uncover multicollinearity, which can lead to unreliable and unstable regression estimates.

Almost all variables in the matrix shows little to no correlation between each other, implying that the variables are independent. The MNC dummy has the highest correlation with the fixed assets ratio of -0.06, which is still incredibly low. This means there are almost no tendencies for MNCs to have a lower proportion of fixed assets compared to DCCs. The highest correlation (-0.37)

in the matrix are between the age variables, age 0 to 5 and age 6 to 11, which is expected as they are mutually exclusive categories. Two of the debt variables, the long-term and short-term interest-bearing debts, have a correlation of 0.16. The correlation is reasonable as a firm with high leverage might utilize more of both long-term and short-term interest-bearing debts. The matrix is reassuring, suggesting no multicollinearity amongst the independent variables in our model. This independence contributes to the robustness, interpretability, and predictive power of our model.

Table 7.1: Correlation Matrix

	MNC	DR1	DR2	DR3	FAR	sales	Age1	Age2	year	industry
MNC	1.00	0.00	0.01	0.00	-0.06	0.03	-0.03	0.03	-0.01	-0.04
DR1	0.00	1.00	0.16	0.04	-0.00	-0.00	-0.01	0.00	0.00	0.00
DR2	0.01	0.16	1.00	0.03	-0.01	-0.00	-0.00	0.00	-0.00	-0.00
DR3	0.00	0.04	0.03	1.00	-0.02	-0.00	-0.00	0.00	-0.00	-0.00
FAR	-0.06	-0.00	-0.01	-0.02	1.00	-0.00	-0.06	0.00	-0.00	0.02
sales	0.03	-0.00	-0.00	-0.00	-0.00	1.00	-0.01	-0.00	-0.00	-0.02
Age1	-0.03	-0.01	-0.00	-0.00	-0.06	-0.01	1.00	-0.37	-0.02	-0.01
Age2	0.03	0.00	0.00	0.00	0.00	-0.00	-0.37	1.00	0.03	0.00
year	-0.01	0.00	-0.00	-0.00	-0.00	-0.00	-0.02	0.03	1.00	0.01
industry	-0.04	0.00	-0.00	-0.00	0.02	-0.02	-0.01	0.00	0.01	1.00

DR1 refers to long-term interest bearing debt over total assets. DR2 refers to short-term interest-bearing debt over total assets. DR3 refers to short-term interest-free debt over total assets. FAR refers to fixed assets over total assets. Age1 refers to age(0-5). Age2 refers to age(6-10).

7.1.1.2 Heteroscedasticity

As mentioned in Section 4.2, heteroscedasticity is a common issue with regression models, and can lead to both biased and inconsistent results. One of the measures we implemented to combat the issue was to incorporate robust standard errors to the firm level. We used four different robust errors, ranging from HC0 to HC3[22]. HC0 is the basic form of robust standard errors developed by White (1980). It corrects for heteroscedasticity without an assumption of a specific pattern or structure. HC1 adds a degrees-of-freedom adjustment to the HC0 estimate. HC2 has additional adjustments for leverage values, which can potentially be influential data points in the regression estimates. Lastly, HC3 is an advancement of HC2 which handles high-leverage points more effectively.

[22] HC stands for Heteroscedasticity-Consistent.

Table 7.2: Robust standard errors

	Dependent variable: Profitability			
	(A)HC0	(B)HC1	(C)HC2	(D)HC3
MNC	-0.036^{***}	-0.036^{***}	-0.036^{***}	-0.036^{***}
	(0.003)	(0.003)	(0.003)	(0.003)
debt ratio1	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}	-0.0002^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
debt ratio2	-0.001^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0002)	(0.0002)	(0.0002)	(0.0003)
debt ratio3	-0.001^{***}	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
fixed asset ratio	-0.059^{***}	-0.059^{***}	-0.059^{***}	-0.059^{***}
	(0.004)	(0.004)	(0.004)	(0.004)
sales/10^{10}	203.879^{***}	203.879^{***}	203.879^{***}	203.879^{***}
	(13.429)	(13.430)	(15.643)	(31.075)
sales^2/10^{15}	-0.323^{***}	-0.323^{***}	-0.323^{***}	-0.323^{**}
	(0.047)	(0.047)	(0.061)	(0.150)
sales^3/10^{22}	0.014^{***}	0.014^{***}	0.014^{***}	0.014
	(0.002)	(0.002)	(0.004)	(0.011)
sales^4/10^{30}	-0.002^{***}	-0.002^{***}	-0.002^{***}	-0.002
	(0.0003)	(0.0003)	(0.001)	(0.002)
age(0-5)	-0.056^{***}	-0.056^{***}	-0.056^{***}	-0.056^{***}
	(0.001)	(0.001)	(0.001)	(0.001)
age(6-10)	-0.015^{***}	-0.015^{***}	-0.015^{***}	-0.015^{***}
	(0.001)	(0.001)	(0.001)	(0.001)
year2018	-0.007^{***}	-0.007^{***}	-0.007^{***}	-0.007^{***}
	(0.001)	(0.001)	(0.001)	(0.001)
year2019	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
year2020	0.013^{***}	0.013^{***}	0.013^{***}	0.013^{***}
	(0.001)	(0.001)	(0.001)	(0.001)
factor(industry)	-0.137	-0.137	-0.137	-0.137
	(0.087)	(0.087)	(0.101)	(0.117)
Constant	0.055^{***}	0.055^{***}	0.055^{***}	0.055^{***}
	(0.005)	(0.005)	(0.005)	(0.005)

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

Table 7.2 shows that the negative estimates for the MNC dummy are significant at the 1% level for all HC tests. Our estimates are therefore more reliable. The results improve our statistical inference and support our finding that MNCs are associated with lower profitability in our sample. Most variables stay statistically significant with the robust standard errors for all HC

tests. However, HC3 removes significance of the size estimates for the largest firm sizes. A potential reason for this could be because of its adjustments to high-leverage data points. We will not discuss other potential reasons for this further.

This analysis increased the likeliness that we can accurately assess the statistical significance of the estimates in our analysis. In our main regression model, all tables employ robust standard errors at the firm level, where we use HC0.

7.1.1.3 Size quintiles

We examin the firm size heterogeneity similarly to Bakke et al. (2019), by dividing our sample into different size quintiles based on sales to understand how firm size influences profitability [23]. This analysis is especially important because our sample does not impose any restrictions on sales values and it can ensure our result is not effected by extra noises from negative sales. Table 7.3 consistently showed that all size categories demonstrated a significant negative correlation between being an MNC and profitability, suggesting a robust pattern across different firm sizes.

Our sample predominantly consists of the smallest firms as shown in column (A). Column (A) also has the highest estimate value (-5.68%). This is surprising as small firms often have less resources, therefore the costs associated with profit shifting is relatively higher. However, smaller firms don't have the same costs associated with hiding profit shifting activities. These costs increase with firm size (Bakke et al., 2019), which could explain our findings. Besides, it is possible that this finding is a result of our model's poor explanatory power with the lowest R-squared value at close to 0.04 for the smallest companies. Our model is the least effective at accounting for key controls in this size group, yet it is the biggest group we have. This is a significant limitation of our model. Excluding firms within 0-20% size quintile from the sample increases the explanatory power of our model to 12.5% [24] for all MNC groups, similar to that of Bakke et al. (2019) with 12.8% and Langli and Saudagaran (2004) with 10.5%. See Appendices A for the full regression table.

[23] The size quintiles are based on sales numbers, as done in Langli and Saudagaran (2004)
[24] Adjusted R-squared is 12.4%

Table 7.3: Regressions by size quintiles for MNCs. FE

	(A)	(B)	(C)	(D)	(E)
Size quintiles	0-20%	20-40%	40-60%	60-80%	80-100%
MNC	-0.0568***	-0.0541***	-0.0485***	-0.0476***	-0.0327***
R-squared	0.03995	0.1581	0.1581	0.1259	0.1333
Observations	1 151 384	79 214	44 848	35 528	32 086
Obs of MNCs	21 931	2 557	2 335	2 965	5 288
Obs of AMNCs	482	32	41	39	89
Obs of CMNCs	88	6	10	5	11
# firms	372 872	35 229	20 722	15 004	10 877
# MNCs	9 335	1 381	1 182	1 331	1 751
# AMNCs	275	24	24	25	41
# CMNCs	47	4	5	4	6

*p<0.1; **p<0.05; ***p<0.01. Robust standard errors clustered on the firm level in parenthesis. All control variables are included but not reported.

From column (B) to (E), generally, the magnitude of the estimate decreases as firm size increases. In column (E), which are the largest firms, MNCs are associated with the lowest reduction in profitability of -3.27%. One possible explanation for this can be that larger firms face more stringent profit shifting regulations and are required to provide more extensive disclosures, limiting their ability to manipulate profits. Notably, as firms grow larger, the number of firms naturally declines. This aligns with the general trend of fewer large firms in the market. Conversely, the proportion of MNCs increases with firm size, indicating that larger companies are more likely to engage in multinational activities and become an MNC. Regarding the explanatory power, our model is the best fit for firms in the 20-40% and 40-60% size quintiles. Our findings suggest that the medium sized firms are more aggressive in profit shifting than larger firms. This is similar to Bakke et al. (2019), who found medium sized companies to be the most aggressive, while Bilicka (2019) found it to be the largest firms.

7.1.1.4 Debt ratios

As mentioned in Section 2.3.2 and Section 3.3.3.1, we need to be aware of the possibility that companies utilize leverage to manage their tax liabilities and maximize profits. Therefore, we investigated different debt ratios more thoroughly.

Table 7.4 shows the comparisons of our regressions with and without the leverage controls for MNCs, AMNCs and CMNCs respectively. We can see that the estimates vary very little,

indicating that including these controls does not exclude important sources of profit shifting from our model.

Table 7.4: Regression results with and without debt ratios

	Dependent variable:profitability					
	(A) MNC	(B) MNC	(C) AMNC	(D) AMNC	(E) CMNC	(F) CMNC
MNC	−0.036***	−0.036***				
	(0.002)	(0.002)				
debt ratio1		−0.0002***		−0.0002***		−0.0002***
		(0.00001)		(0.00001)		(0.00001)
debt ratio2		−0.001***		−0.001***		−0.001***
		(0.0001)		(0.0001)		(0.0001)
debt ratio3		−0.001***		−0.001***		−0.001***
		(0.00002)		(0.00002)		(0.00002)
AMNC			−0.118***	−0.118***		
			(0.015)	(0.015)		
Non-Asian MNC			−0.034***	−0.034***		
			(0.002)	(0.002)		
CMNC					−0.114***	−0.113***
					(0.036)	(0.036)
Non-Chinese MNC					−0.036***	−0.035***
					(0.002)	(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
year2018	−0.007***	−0.007***	−0.007***	−0.007***	−0.007***	−0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
year2019	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
year2020	0.013***	0.013***	0.013***	0.013***	0.013***	0.013***
factor(industry)	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.054***	0.055***	0.054***	0.055***	0.054***	0.055***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	1,230,311	1,230,311	1,230,311	1,230,311	1,230,311	1,230,311
R^2	0.030	0.031	0.030	0.031	0.030	0.031
Adjusted R^2	0.030	0.031	0.030	0.031	0.030	0.031
RSE	0.384	0.384	0.384	0.384	0.384	0.384
F Statistic	390.644***	399.683***	386.964***	396.020***	386.706***	395.773***

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

7.1.2 Profitability

7.1.2.1 Different quantiles

As described in Sections 3.3.1, we exclude the bottom and top 5% of profitability values to avoid the effect of extreme values in our sample. The results of AMNCs and CMNCs are in Appendices B. Table 7.5 compares our model specification in column (A) to a stricter restriction, only including the 25th-75th quantiles of profitability in column (B). We see that the MNC estimate remains significant at the 1% level, but that the magnitude is reduced from 3.6% to 0.9%, which is a reduction of 2.7 points or 75%. This in an indication that profit shifting is less aggressive amongst firms that have an average profitability compared to those on each end of the spectrum. This result is not surprising, as a lot of the MNCs have profitability closer to 0, which would be excluded in this smaller range. The R-squared value also increases, probably because our model is better at controlling for variability in profits of average firms.

Table 7.5: Regression results on different profitability quantiles for MNCs

	Dependent variable: profitability	
	(A)	(B)
	5th-95th quantile	25th-75th quantile
MNC	-0.036^{***}	-0.009^{***}
	(0.002)	(0.001)
debt ratio1	-0.0002^{***}	-0.00004^{***}
	(0.00001)	(0.00001)
debt ratio2	-0.001^{***}	-0.0003^{***}
	(0.0001)	(0.0001)
debt ratio3	-0.001^{***}	-0.0001^{***}
	(0.00002)	(0.00001)
fixed asset ratio	-0.059^{***}	-0.041^{***}
	(0.001)	(0.0004)
sales/10^{10}	203.879^{***}	82.894^{***}
	(15.498)	(5.693)
sales^2/10^{15}	-0.323^{***}	-0.130^{***}
	(0.037)	(0.013)
sales^3/10^{22}	0.014^{***}	0.006^{***}
	(0.002)	(0.001)
sales^4/10^{30}	-0.002^{***}	-0.001^{***}
	(0.0003)	(0.0001)
age(0-5)	-0.056^{***}	-0.019^{***}
	(0.001)	(0.0003)
age(6-10)	-0.015^{***}	-0.005^{***}
	(0.001)	(0.0004)
year2018	-0.007^{***}	-0.005^{***}
	(0.001)	(0.0004)
year2019	-0.001	-0.001^{**}
	(0.001)	(0.0004)
year2020	0.013^{***}	0.005^{***}
	(0.001)	(0.0004)
factor(industry)	-0.137	-0.187^{***}
	(0.192)	(0.069)
Constant	0.055^{***}	0.068^{***}
	(0.005)	(0.002)
Observations	1,230,311	1,040,365
R^2	0.031	0.040
Adjusted R^2	0.031	0.040
RSE	0.384	0.138
F Statistic	399.683^{***}	434.738^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

7.1.2.2 Different profitability measures

Profitability can be measured in multiple ways, and it is not immediately clear what method is the most suitable for our analysis. Previous literature has used different profitability measures, for instance Langli and Saudagaran (2004) used taxable income by sales ratio, while Grubert et al. (1993) used the taxable income to asset ratio. Table 7.6 presents a robustness test where we explore four alternative profitability measures for MNCs, AMNCs, CMNCs. Columns (A), (B), and (C) all use taxable income as the numerator in the calculations. Columns (A), (D) and (E) all utilize total assets as the denominator for the respective profitability measures [25].

Table 7.6: Different profitability measures

	(A) Baseline	(B) TI/Sales	(C) TI/TOTI	(D) OP/TA	(E) EBITDA/TA
MNC	-0.0357***	-0.0399***	-0.0374***	-0.0169***	-0.0202***
	(0.0022)	(0.0051)	(0.0043)	(0.0019)	(0.0019)
R-squared	0.0315	0.0254	0.0279	0.0281	0.0286
AMNC	-0.1176***	-0.1441***	-0.1122***	-0.0900***	-0.0892***
	(0.0154)	(0.0397)	(0.0329)	(0.0135)	(0.0134)
R-squared	0.0315	0.0254	0.0279	0.0282	0.0286
CMNC	-0.1133**	-0.2378*	-0.2438**	-0.0878**	-0.0949**
	(0.0363)	(0.0936)	(0.0795)	(0.0319)	(0.0317)
R-squared	0.0315	0.0254	0.0279	0.0281	0.0286
Obs	1 343 060	737 741	954 979	1 343 119	1 343 048
Obs of MNCs	35 076	25 284	27 204	35 091	35 078
Obs of AMNCs	683	384	429	685	685
Obs of CMNCs	120	66	70	120	120
# firms	414 911	249 914	309 665	414 698	414 674
# MNCs	12 775	9 110	9 817	12 772	12 773
# AMNCS	341	188	214	341	342
# CMNCs	58	30	32	58	58

*p<0.1; **p<0.05; ***p<0.01. TI refers to taxable income. TOTI refers to total income. OP refers to operating profits. TA refers to total assets.

Column (A), our baseline, uses taxable income as a percentage of total assets as the profitability measure, and is comprehensively explained in Sections 3.3.1. The baseline has the highest R-squared value (0.0315) for all MNC groups. It is also the method that includes the majority observations, ensuring the best representation for all MNC groups in our analysis.

Grubert et al. (1993) argued that sales can be a good proxy for the market value of assets, as total

[25] Column (C) (D) (E) are the same as in Bakke et al. (2019)

assets can have valuation issues in their book values. Column (B) therefore uses taxable income as a percentage of sales as the profitability measure. The estimate increases in magnitude and stays significant at about -4%, -14% and -24% for MNCs, AMNCs and CMNCs. This aligns with our findings in Table 5.1, where sales metrics are lower on average compared to total assets and total income. Consequently, the profitability ratio is expected to be higher. A limitation is that we lose around half of the observations due to lacking information on sales metrics in the data. Lack of observations leads to the highest standard deviation and the lowest R-squared value (0.0254) across all MNC groups among all the measures. For CMNCs, the result is an estimate that is significant only at the 10% level. Due to these drawbacks, this measure proves to be less suitable for our analysis.

Column (C) uses taxable income as a percentage of total income as the profitability measure. Table 5.1 shows that total income has slightly higher average values compared to sales. Compared to our baseline, the estimates magnitude is higher for MNCs and CMNCs, but lower for AMNCs. Although the R-squared values indicate a higher explanatory power compared to the sales measure, it is still lower than our baseline. Similar to column (B), we lost a considerable portion of the observations using this measure. Therefore, while this measure provides some insights, its average performance and observation loss make it less robust than our baseline.

Column (D) uses operating profits as a percentage of total assets as the profitability measure. This measure yields the lowest estimates for all MNC groups among all the measures. An advantage of this measure is that it decreases standard errors compared to our baseline, making the estimates more precise. Additionally, it includes about the same number of observations as baseline. However, it's important to note that the R-squared value (0.0281), while acceptable, does not surpass that of our baseline.

Lastly, Column (E) uses earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of total assets as the profitability measure. Compared to operating profits, EBITDA naturally has a higher average value. EBITDA is often used over operating profits to avoid comparing firms with different depreciation and amortization strategies. The measure has the lowest standard errors of all five measures, as well as the highest R-squared value (0.0286) of the other three alternative measures. Although the magnitude of estimates decreases from baseline, this measure retains a quantity of observations similar to that of our baseline.

In conclusion, all profitability measures show negative and significant results for all MNC groups, indicating a robust model to changes in the profitability measure. The results of CMNCs vary the most, which changes from the significance at the 5% to the 10% level. One possible reason could be the lack of observations, leading to a less representative sample. Therefore, our baseline appears to be the most suitable measure for our sample.

7.2 Limitations

7.2.1 Data

One limitation is the duration of our sample period. As discussed in Section 3.1, our current capabilities only allow us to manage and analyze data from 2017 to 2020. However, this could potentially be extended to cover the period from 1992 to 2020, using the same data sources. By doing so, we could include a greater number of observations, particularly additional observations of CMNCs, which would lead to a more representative analysis.

7.2.2 Restrictions on the sample

Another limitation is the lack of restrictions to our sample. Defining restrictions that would narrow our sample into companies that are better-defined for comparison would increase the accuracy of our model and generate more reliable results. The reason we chose not to have restrictions is that it would reduce too many observations of AMNCs and CMNCs. A possible solution could be to include a longer period of data, which would give us the flexibility to exclude certain observations. However, as mentioned in Section 7.2.1, this exceeds our capability. Therefore, the best option was to exclude these restrictions. For further analyses, it would be interesting to see the result of including more years with restrictions as in Bakke et al. (2019). It would be especially interesting to see the effect on the R-squared value and the yearly regressions results for the AMNC and CMNC estimates.

7.2.3 Model

The models used for our regressions were only able to account for about 3% of the variation in profitability. Ideally we would also include interaction factor variables between industries and years. These factor variables would capture the time effects that does not affect each industries

equally. As Morgenroth (2021) pointed out, fluctuations in exchange rates impacts an exporting company differently compared to a business that operates solely domestically. By excluding such factors, we do not account for these instances, which could impact the accuracy of our model. The reason we still exclude these variables is because of capacity issues. Therefore, the model has potential for improvement in this area, and should be considered for further research.

8 Conclusion

Previous studies on profit shifting through transfer pricing mainly focused on large economies, especially U.S. and Germany (Møen et al., 2019, Blouin et al., 2014, Weichenrieder and Windischbauer, 2008). Studies related to profit shifting in MNCs in Norway mainly focus on the differences between MNCs and DCCs (Bakke et al., 2019, Langli and Saudagaran, 2004). As for profit shifting of CMNCs in Norway, there are only qualitative studies (Y. Wang and Alon, 2020b). We conducted a quantitative analysis to estimate the differences in profitability between DCCs and MNCs, with a special focus on CMNCs and AMNCs. We controlled for observable and unobservable firm characteristics including leverage effects, tangibility, size, age, time effects and industry effects. Our sample consists of 1 343 060 observations of DCCs and MNCs including 683 of AMNCs and 120 of CMNCs in Norway from 2017 to 2020. If we had employed the same restrictions as Bakke et al., 2019 and Langli and Saudagaran, 2004 our sample would have been reduced by about 53%.

Our analysis provides new empirical evidence on profitability, measured as taxable income over total assets, between DCCs and MNCs including AMNCs and CMNCs in Norway. In the transfer pricing literature[26], the finding of a negative profitability has been attributed to transfer pricing behavior among MNCs. Our results show that estimates of profitability for MNCs, AMNCs, and CMNCs are negative and highly significant. The only exception is for yearly analysis for AMNCs and CMNCs where the profitability is negative but not as significant as that of all MNCs. Thus, with this exception, we find that MNCs report consistently lower profitability at 3.6% than DCCs. At a more detailed level, there is a decrease in profitability of 11.3% when DCCs become CMNCs, and a further reduction of 11.8% when DDCs become AMNCs. Our results suggest that CMNCs are the most aggressive profit shifters and should be considered for closer scrutiny. One possibility could be to include a sample covering a longer period, in addition to our current threshold of four years.

To check the robustness of our conclusion, we have performed several tests which show that it is unlikely that our conclusion is attributable to multicollinearity, heteroscedasticity, differences in firm sizes, leverage effects, or improper controls for our sample. Nor is the conclusion dependent on whether profitability is measured as taxable income over total assets, sales or total income,

[26] see Section 2.3.1

or operating profits or EBITDA over total assets. There are several limitations in our analysis, including data coverage, sample restrictions and model choice, which can be further improved in future research.

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Appendices

A Size quintiles

As discussed in Section 7.1.1.3, we excluded observations that fell within the 0-20% size quintile and conducted the regressions across all MNC groups. The results are presented in Table A.1. The CMNC estimate is significant at the 10% level, while both the MNC and the AMNC estimates are significant at the 1% level. The R-squared have increased for all regressions (A) to (C) to 12.5%, with an adjusted R-squared of 12.4%. Excluding the smallest company sizes increases the models explanatory power.

B Different profitability quantiles

Table B.1 shows the different quantiles for profitability for AMNCs and CMNCs. Reducing the profitability values does not affect the significance of the estimates, but it loweres the magnitude from -11.8% to -4% for AMNCs and from -11.3% to -6.9% for CMNCs.

Table A.1: Regression results without 0-20% size quintile

	Dependent variable:profitability		
	(A) MNC	(B) AMNC	(C) CMNC
MNC	-0.040^{***}		
	(0.002)		
AMNC		-0.113^{***}	
		(0.016)	
Non-Asian MNC		-0.039^{***}	
		(0.002)	
CMNC			-0.067^{*}
			(0.039)
Non-Chinese MNC			-0.040^{***}
			(0.002)
debt ratio1	-0.002^{***}	-0.002^{***}	-0.002^{***}
	(0.0002)	(0.0002)	(0.0002)
debt ratio2	-0.236^{***}	-0.236^{***}	-0.236^{***}
	(0.003)	(0.003)	(0.003)
debt ratio3	-0.145^{***}	-0.145^{***}	-0.145^{***}
	(0.002)	(0.002)	(0.002)
fixed asset ratio	-0.229^{***}	-0.229^{***}	-0.229^{***}
	(0.002)	(0.002)	(0.002)
sales/10^{10}	57.612^{***}	57.840^{***}	57.581^{***}
	(9.281)	(9.280)	(9.281)
sales^2/10^{15}	-0.081^{***}	-0.080^{***}	-0.081^{***}
	(0.021)	(0.021)	(0.021)
sales^3/10^{22}	0.003^{***}	0.003^{***}	0.003^{***}
	(0.001)	(0.001)	(0.001)
sales^4/10^{30}	-0.0004^{**}	-0.0004^{**}	-0.0004^{**}
	(0.0002)	(0.0002)	(0.0002)
age(0-5)	0.007^{***}	0.007^{***}	0.007^{***}
	(0.001)	(0.001)	(0.001)
age(6-10)	0.008^{***}	0.008^{***}	0.008^{***}
	(0.001)	(0.001)	(0.001)
year2018	-0.002	-0.002	-0.002
	(0.001)	(0.001)	(0.001)
year2019	-0.003^{**}	-0.003^{*}	-0.003^{*}
	(0.001)	(0.001)	(0.001)
year2020	0.020^{***}	0.020^{***}	0.020^{***}
	(0.001)	(0.001)	(0.001)
factor(industry)	Yes	Yes	Yes
Constant	0.216^{***}	0.216^{***}	0.216^{***}
	(0.006)	(0.006)	(0.006)
Observations	185,010	185,010	185,010
R^2	0.125	0.125	0.125
Adjusted R^2	0.124	0.125	0.124
RSE	0.222	0.222	0.222
F Statistic	266.685^{***}	264.257^{***}	264.022^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to long-term interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.

Table B.1: Regression results on different profitability quantiles for AMNCs and CMNCs

	Dependent variable: Profitability			
	(A)AMNC (5-95)	(B)AMNC (25-75)	(C)CMNC (5-95)	(D)CMNC (25-75)
AMNC	-0.118^{***}	-0.040^{***}		
	(0.015)	(0.006)		
CMNC			-0.113^{***}	-0.069^{***}
			(0.036)	(0.014)
Non-Asian MNC	-0.034^{***}	-0.009^{***}		
	(0.002)	(0.001)		
Non-Chinese MNC			-0.035^{***}	-0.009^{***}
			(0.002)	(0.001)
debt ratio1	-0.0002^{***}	-0.00004^{***}	-0.0002^{***}	-0.00004^{***}
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
debt ratio2	-0.001^{***}	-0.0003^{***}	-0.001^{***}	-0.0003^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
debt ratio3	-0.001^{***}	-0.0001^{***}	-0.001^{***}	-0.0001^{***}
	(0.00002)	(0.00001)	(0.00002)	(0.00001)
fixed asset ratio	-0.059^{***}	-0.041^{***}	-0.059^{***}	-0.041^{***}
	(0.001)	(0.0004)	(0.001)	(0.0004)
sales/10^{10}	203.917^{***}	82.799^{***}	203.755^{***}	82.799^{***}
	(15.498)	(5.693)	(15.498)	(5.693)
sales^2/10^{15}	-0.322^{***}	-0.129^{***}	-0.323^{***}	-0.129^{***}
	(0.037)	(0.013)	(0.037)	(0.013)
sales^3/10^{22}	0.014^{***}	0.006^{***}	0.014^{***}	0.006^{***}
	(0.002)	(0.001)	(0.002)	(0.001)
sales^4/10^{30}	-0.002^{***}	-0.001^{***}	-0.002^{***}	-0.001^{***}
	(0.0003)	(0.0001)	(0.0003)	(0.0001)
age(0-5)	-0.056^{***}	-0.019^{***}	-0.056^{***}	-0.019^{***}
	(0.001)	(0.0003)	(0.001)	(0.0003)
age(6-10)	-0.015^{***}	-0.005^{***}	-0.015^{***}	-0.005^{***}
	(0.001)	(0.0004)	(0.001)	(0.0004)
year2018	-0.007^{***}	-0.005^{***}	-0.007^{***}	-0.005^{***}
	(0.001)	(0.0004)	(0.001)	(0.0004)
year2019	-0.001	-0.001^{**}	-0.001	-0.001^{**}
	(0.001)	(0.0004)	(0.001)	(0.0004)
year2020	0.013^{***}	0.005^{***}	0.013^{***}	0.005^{***}
	(0.001)	(0.0004)	(0.001)	(0.0004)
factor(industry)	Yes	Yes	Yes	Yes
Constant	0.055^{***}	0.068^{***}	0.055^{***}	0.068^{***}
	(0.005)	(0.002)	(0.005)	(0.002)
Observations	1,230,311	1,040,365	1,230,311	1,040,365
R^2	0.031	0.040	0.031	0.040
Adjusted R^2	0.031	0.040	0.031	0.040
RSE	0.384	0.138	0.384	0.138
F Statistic	396.020^{***}	430.609^{***}	395.773^{***}	430.689^{***}

*p<0.1; **p<0.05; ***p<0.01. Debt ratio1 refers to interest-bearing debt over total assets. Debt ratio2 refers to short-term interest-bearing debt over total assets. Debt ratio3 refers to short-term interest-free debt over total assets.