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The Arrangement of Deferred Taxes

Descriptive study on the arrangement of deferred taxes and the influence on wages, employees and investments within chosen subgroups.

Viktoria Pedersen and Kiruththika Panchalingam

Supervisor: Maximilian Todtenhaupt

MSc in Economics and Business Administration, Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Abstract

This master thesis scheds light on the usage of deferred Value-Added tax in Norway while investigating whether the arrangement was effective. To analyse the effectiveness, we choose to look at changes in wages, employment and investments from the three years before COVID-19. The data has been divided into different subgroups; sector, region and EBITDA percentiles, to research the variation within them. We do this by using data from the Norwegian Tax Administration conducting a propensity score matching, before doing a Difference-in-Difference analysis between companies deferring taxed and those that did not.

Firms with deferrals increase with the rate of infection within the regions, but there is a small percentage of firms within each region that choose to defer their taxes. The same is observed for different sectors, more firms within the hardest-hit sectors have an arrangement of tax deferral but in total those firms account for a small percentage in each sector.

Our findings show significant results for wages, and employment increasing by 7.47 and 7.68 percent after deferrals, hence implying effectiveness in non-laid off workers. A further assessment within the subgroups thus shows this significance is based on the most profitable firms in EBIDA, thought there were mostly non-profitable companies applying for deferrals. Implying the arrangement as a last resort.

Acknowledgement

This thesis is written as a part of the Master of Science in Economics and Business Administration at the Norwegian School of Economics and our major in Financial Economics. Following the request of the Norwegian Tax Administration sent to the Norwegian Centre of Taxation (NoCeT), we have assessed the arrangement of deferred payment for taxes and fees.

We would like to express our gratitude to our supervisor Maximilian Todtenhaupt for his guidance and advice through the writing process. In addition, we would like to thank the Norwegian Tax Administration for providing us with data and clarifying the data.

We hope our thesis may be interesting to more people and that we have shed light on a topic that has not been researched to a great extent.

Norwegian School of Economics

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Kiruththika Panchalingam

Viktoria Pedersen

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List of Abbreviations

ASD	Absolute standardised difference
ATC	Average treatment effect on the comparison
ATE	Average treatment effect
ATT	Average treatment effect on the treated
CCC	Cash Conversion Cycle
CCR	Central Coordinating Register
CR	Current Ratio
DR	Debt Ratio
GDP	Gross Domestic Product
LN	Natural Logarithm
LTDs	Private Limited Companies
NACE	Nomenclature of Economic Activities
NN	Nearest Neighbour
NWC	Net Working Capital
OECD	The Organisation for Economic Cooperation and Development
PLCs	Public Limited Companies
PSM	Propensity Score Matching
ROA	Return on Assets
SME	Small and Medium-Sized Enterprise
VAT	Value-Added Tax
WCM	Working Capital Management
WCR	Working Capital Requirement

1. Introduction

In this thesis, we will do a descriptive analysis of which firms got approved for deferral of taxes and fees. By analysing if there are significant differences between those who got approved and those who did not, we can assess if the arrangement of tax deferrals was a good initiative. Our results and conclusion in this thesis can help policy decisions in a future crisis.

1.1 Background

In March 2020, Norway was short notice introduced to severe restrictions and lockdowns due to the COVID-19 pandemic. All non-vital societal functions were shut down or restructured from home for an unlimited period to reduce the amount of physical contact as the virus quickly spread through nations, endangering public health and the global economy. Strong protection incentives for infection control were implemented to reduce illness and death, which heavily affected firms and the economy.

The gross domestic product (GDP) fell 214 billion Norwegian kroner for mainland Norway from February 2020 to November 2021, equivalent to a decrease of 8.6 percentage points compared to the expected GDP curve. Multiple industries were severely affected, the service industry, in particular, being the primary reason for decreasing GDP. This decrease only partly reflects the economic impact of the pandemic as the composition of the GDP changed. The standard production activity was replaced with activity aimed at managing the pandemic, helping industries, firms, and people economically in crisis while reducing outbreaks of covid. Adapting to the pandemic has been critical in limiting its adverse effects, but it has not produced the same value creation and welfare as normal activity (Brasch et al., 2022, p. 4).

The Norwegian government introduced several fiscal policies to remedy the consequences of the restrictions and is estimated to have dampened the decrease of the GDP by 0.6 percentage points in 2020 and 0.8 percentage points in 2021 (Brasch et al., 2022, p. 5). These policies included the compensation scheme (“Kompensasjonsordningen”), salary subsidies to reengage laid-off employees (“Lønnstøtteordningen”), and the arrangement of deferred taxes and duties (“Utsettelsesordningen”). They were implemented to contribute to financial security for the unemployed and laid-off workers, as well as reduce the extent of closures of

businesses and workplaces by increasing liquidity (Regjeringen, 2020b, p. 94). In the revised national budget 2021, Norwegian authorities stated that financial measures were needed to remedy the pandemic's consequences in the best way possible while targeting the most affected groups without being misused. Insufficient structured measures could lead to unnecessary use of public funds and postpone inevitable bankruptcies (Finansdepartementet, 2021, pp. 78, 95). Long-term deferrals could mean substantially lower tax revenues and the state losing priority in the event of bankruptcy. There has been no control of the arrangement to see whether the deferral conditions are met or whether the scheme has fulfilled its purpose.

1.2 Research Question

Following the request of the Norwegian Tax Administration, we will assess the arrangement of deferred payment for taxes and fees. We will investigate whether the deferred payment of taxes and fees during COVID-19 has worked as intended by relieving firms in financial distress during the pandemic or if firms have used the scheme without necessity. We do this by analysing companies' wages, number of employees and investments and how they differ from companies deferring taxes. The study will attempt to answer the following research question:

"Did the arrangement of deferred payment for taxes and fees have a significant positive effect on wages, employees and investments, and this way helping to relieve firms in financial distress during COVID-19?"

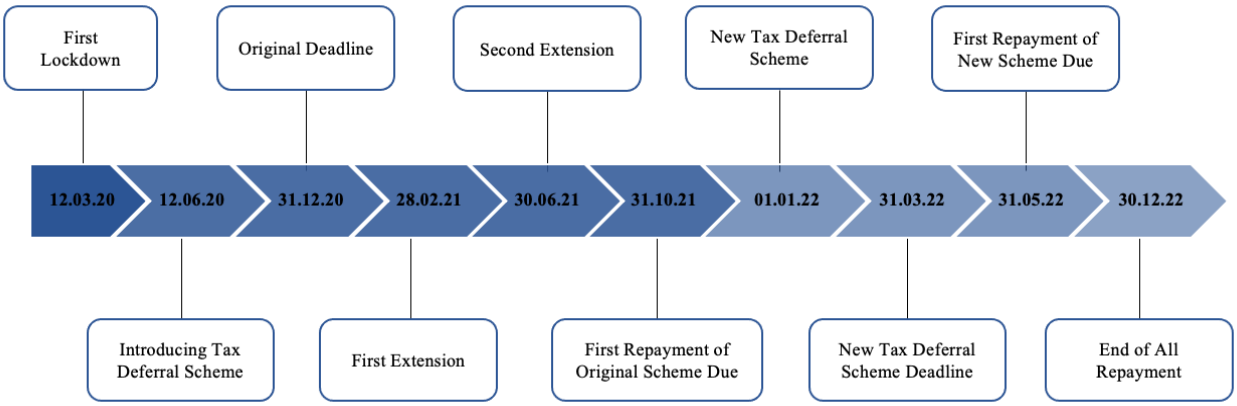
1.3 Deferment of Taxes and Fees

The arrangement of deferred taxes was implemented to help companies in financial distress rapidly. Companies that could document a loss of income or an increase in costs to some extent due to the pandemic were eligible for the arrangement. There was no requirement for documentation, but it had to be submitted on demand (The Norwegian Tax Administration, 2021a). Another requirement was no outstanding tax and duty claims before 29th February 2020, and tax documents must have been submitted (Brunstad, 2020). The taxes and duties up for deferral are advance tax, Value-Added Tax (VAT), employer's tax and finance tax on

wages (Forskrift om utsettelse av skatteinnbetalinger mv. for å avhjelpe konsekvensene av Covid-19-utbruddet, 2020, § 6). Deferral of VAT amounts to just under 80 percent, while deferral of employer's tax accounts for just over 10 percent of the overall deferrals (Finansdepartementet, 2021, p. 95). We will mainly focus on the deferral of VAT in further analysis and discussions, and this will be used synonymously with deferred payment of taxes and arrangement of tax deferral.

This deferment scheme was launched on 12th June 2020. It was possible to apply for the arrangement until 31st December 2020, but the deadline was extended to 28th February and finally to 30th June 2021. In addition, a new arrangement of deferred taxes and fees was introduced on 25th January 2022, with the option to postpone claims due from 1st January to 31st March 2022. The first repayment of the original arrangement was due on 31st October 2021, while the first repayment of the new arrangement was due on 31st May 2022. All claims from the original and new arrangement must be paid in instalments by 30th December 2022 (The Norwegian Tax Administration, 2021a). The scheme has consisted of a late payment interest of 6 percent in the period 10th June to 31st December 2020 and in the period 15th January to 31st March 2022. Apart from this, a late payment interest of 8.5 percent accrues during the instalment period (Forskrift om utsettelse av skatteinnbetalinger mv. for å avhjelpe konsekvensene av Covid-19-utbruddet, 2020, § 7; The Norwegian Tax Administration, 2022a). As of 30th April 2021, the claims of deferred taxes and fees added to approximately NOK 5.5 billion, of which VAT claims amounted to NOK 4.3 billion (Finansdepartementet, 2021, p. 96). This thesis will solely focus on the first arrangement introduced in June 2020, which will be discussed in more detail in chapter 3.

***Figure 1.1**: Timeline of the arrangement of deferred taxes and duties.*



Several organisations have criticised the arrangement, including the Confederation of Norwegian Enterprise ("NHO"), Virke and the director of Regnskap Norge, Rune Aale-Hansen. The criticism stems from the scheme's late payment interest of 6 percent up to 8.5 percent when the policy rate has been close to zero (Hovland, 2021; Solli, 2022). Aale-Hansen has expressed a strong desire for an interest exemption for companies, as many already have tight liquidity. The previous finance minister Jan Tore Sanner justified the high-interest rate by stating that they did not want companies to place a lower priority on paying taxes and duties (Hovland, 2021). Trygve Slagsvold Vedum, the current finance minister, lowered the interest rate in January 2022 after several inquiries from small, concerned businesses. He emphasised that they did not want to reduce it further to prevent the arrangement from becoming profitable (Solli, 2022).

The deferment of taxes can be a helpful tool for viable companies to survive the crisis. Still, it could also help some non-viable firms stay alive as the Norwegian Government does not force collection. Prolonging deferrals can impact tax revenue as the state loses priority in the event of bankruptcy (Finansdepartementet, 2021). A status report published by the Norwegian Tax Administration on 31st August 2022 reported that approximately 1,000 agreements were out of the scheme. This resulted in about 600 agreements being fully paid off without default, and just over 400 agreements ended due to default (The Norwegian Tax Administration, 2022c). Division director Cecilie Solum from the Norwegian Tax Administration stated that "most likely, a possible increase in bankruptcies will first happen in the autumn. It can take some time from the time default has occurred until one enters a possible bankruptcy process" (The Norwegian Tax Administration, 2022b).

1.4 Structure of the Thesis

The thesis introduces COVID-19, the arrangement of deferred payment of taxes and duties, and our research question. Chapter 2 overviews relevant and accessible literature on tax deferrals on a general basis and during COVID-19. Further, in chapter 3, we thoroughly review our data and treatment, analyse it and present the descriptive statistics. The quality of data and sources of error are also studied in this chapter. Chapter 4 presents our empirical methodology and how it is statistically executed, while chapter 5 shows the output and analyses these results. Chapter 6 discusses our thesis and validity and suggests further research on deferred payment of taxes and duties. The paper is finalised in chapter 7, which includes our conclusion.

2. Literature

This section presents relevant literature covering support schemes and policies adhering to tax incentives, focusing on tax deferrals used in the COVID-19 crisis. Including other countries' fiscal stimulus and execution of support policies and how this support has been effectively reaching its targeted firms. Measures for infection prevention control have been more or less present since March 2020 and until the first quarter of 2022 (Regjeringen, 2022b). Studies have been published on the effects of the different measures, and more peer-reviewed literature has become available. Still, there is limited research on the impact of the specific arrangement of deferred taxes. We will contribute to the literature by looking into which firms deferred taxes and the significance and effect the deferral has had on wages, employees and investments.

2.1 Usage of Tax Deferral as Fiscal Stimulus

A report on tax policy reforms from The Organisation for Economic Cooperation and Development (OECD) presents tax measures introduced in response to the COVID-19 crisis from 66 countries. These countries are from all continents, and deferral of taxes has been the most common tax incentive to enhance businesses' cash flows during the COVID-19 crisis among the questioned. Seventy-five percent of the countries had to some extent, deferred their taxes for either corporate income tax, other business taxes or VAT, whereby 65% answered that these were the latter. Implementation of the arrangement substantially differed from countries when undergoing who was applicable for these deferrals and their payback schemes (OECD, 2021, pp. 36–37). Slovenia and the United Kingdom offered flexibility for partial deferral and negotiation of a flexible payment plan, while others as Japan and Tunisia, deferred the payments automatically by one year. Brazil, Korea and New Zealand exclusively targeted small and medium-sized enterprises (SMEs). At the same time, Italy enhanced deferrals for severally affected industries such as tourism, transport, entertainment and education in addition to firms with significant drops in turnover. Some countries' interest rate on deferrals has been as low as 0, while Belgium granted a discount for paying back the deferrals early. Most countries have thus implemented a reduction in interest that generally applies to late payments (OECD, 2021, p. 51).

2.2 Tax Incentives Effectiveness

The Department of the Treasury (1984, p. 126) released a report which stated, “the value of tax deferral is greater, the longer the deferral and the higher the taxpayer’s marginal tax rate”. According to Christopher H. Hanna (2009, pp. 223–224), the time value of money indicates that given unchanged tax rates, taxpayers gain from the deferral. He explains this as “the taxpayer can invest the immediate tax savings so that when he repays the offsetting increase in taxes in a later year, he will still have some amount of the invested taxes left over”. In the article, Hanna analyses Fortune 500 companies and other publicly held companies, and evaluates the real value of tax deferral. Tax deferral is considered to be a temporary difference between taxable and pre-tax financial income, which will reverse in a later year. Even with the time value of money benefit, tax deferral benefits are only minor when assessed through an accounting analysis (Hanna, 2009, pp. 205, 224).

How does tax policy fit with other support schemes responding to COVID-19? Sadiq and Krever (2021) address this question in their paper, looking at the effectiveness of tax policy for countries on five continents with similar tax regimes, analysing tax policies as asset write-offs, tax losses and VAT rates, including deferred taxes, finding that the latter is more helpful for the most profitable businesses. The ones least affected by the downturn have the more significant benefit of deferrals and, in the long run, could increase their market share. In the short run, it is beneficial to boost firm liquidity, but it could cause problems in the payback phase. If businesses face a backlog of tax liabilities simultaneously, they should undertake new investments and rehire workers, which could slacken the economy's recovery (Devereux et al., 2020).

Tarkom (2022) used the cash conversion cycle (CCC) and working capital requirement (WCR)[1] to estimate the effect COVID-19 had on working capital management (WCM). Longer time for firms to reap their investment increases the CCC and WCR, making firms need more days to convert resources to cash holdings in need of further acquisitions. COVID-19 exposure was significant, with an increase in both CCC and WCR at a 5 percent level showing inefficient WCM due to the pandemic. In addition, tax deferrals and increases in

[1] WCR calculated as (receivables + inventories – payables) as a percentage of sales.

investment tax credits were analysed in their effect on the WCM, indicating that these policies moderated the negative impact of WCM during the pandemic.

Tchinda and Dejardin (2021) direct the question of effectiveness toward the business owners and their business prospects, surveying 85,000 self-employed and SME owners in Belgium. The research finds that assessing delayed tax payments, both social security taxes and federal tax payments, is positively significant with owners' evaluation of the business prospect concerning activity and profit. Owners giving higher scores answering these prospects are more likely to positively appreciate tax and fiscal policy measures. Although, the ones with positive or very positive employment prospects show no significant effect of appreciation concerning this measure.

Vito and Gómez (2020) paper addresses which fiscal measures are more effective in alleviating cash crunch, studying deferred taxes within six months and bridge loans. They stress-test three liquidity ratios; cash burn rate, cash flow from operation to current liabilities and cash flow from operations to total debt for over 14,000 firms in over 26 countries. The paper measures both short- and long-term liquidity risk for firms looking at a decrease in sales of 50 (moderate risk) and 75 percent (high risk). It finds that deferring taxes would prevent 14 (27) firms from becoming illiquid within a crisis, while bridge loans would help 717 (1,367) firms in a moderate risk (high risk) scenario. Thus, it would be more cost-effective to choose bridge loans.

2.3 Contribution to Existing Literature

The presented literature shows the limited contribution to research on the effectiveness of deferred tax arrangements. The papers differ in the types of companies assessed and what liquidity targets are used to measure the efficacy. References of the agreement shed light on how it has worked and assist researchers and policymakers in gaining multiple perspectives on the agreement. Although, as stated in chapter 2.1, the arrangement, infection prevention control and support policies have substantially differed across countries and are factors needed to be considered.

None of the papers addresses the types of companies that deferred their taxes or how these companies performed in the subsequent years before COVID-19. We want to contribute to the existing literature by giving a more descriptive analysis of the Norwegian arrangement. We do this by analysing which firms got deferrals across different industries, regions and how profitable they were. In addition, we focus on the effect of tax deferral on wages, employees and investments, which has not been done earlier. Focusing on firms' characteristics, one can better understand whether the arrangement was an excellent incentive to stimulate the economy.

3. Data

3.1 Data Access and Treatment

The Norwegian Tax Administration provides the data used in this thesis through the Norwegian Centre of Taxation. We find that five of the datasets are of use for this thesis. It contains detailed information from, among other things, the Central Coordinating Register (CCR), Income Statement 2 ("Næringsoppgaven") and enterprises with agreements on deferred taxes and duties. It is worth noticing that all organisation numbers are deidentified and replaced with random numbers, and all company names are removed. Our thesis will only focus on businesses obliged to pay VAT in Norway. A few enterprises and services are excepted by the VAT Act, such as health and social services, teaching, cultural, and financial services (Altinn, 2022). At the same time, several enterprises are exempt from VAT, where they pay 0% VAT for selected parts of their revenue (The Norwegian Tax Administration, n.d.-b).

Our initial sample consists of 2,684,213 observations with 321,558 unique firms. The initial sample is an overview of enterprises from the CCR. It contains yearly information on municipality numbers, codes of Nomenclature of Economic Activities (NACE-codes), types of businesses and deidentified organisation numbers. We merge the datasets with our initial selection to have a representative sample in our research. According to the Norwegian Tax Administration, "limited liability companies and other enterprises which keep accounts to the Account Act of IFRS, should submit Income Statement 2 electronically as part of the tax return or company tax return" (The Norwegian Tax Administration, n.d.-a). This dataset contains yearly information and gives detailed figures from the company's balance sheet and income statement. As these two datasets are the only two which contain yearly information, we now discard all years before 2017. The choice to limit ourselves to the years 2017-2020 is justified by the fact that we want a typical year, which will be an average from 2017-2019, where it is not characterised by significant events in the world economy that have too great an impact. This removes 1,476,001 observations and no unique firms.

Further, data with an overview of which enterprises have received deferment on their taxes and duties are merged with the dataset we have. From this merge, there are 997 observations

which do not match the randomised organisation numbers from the initial sample. As a result, these observations are removed as we do not have enough data on these observations to include them in our sample. This does not reduce our selection as the observations not matched are added and then removed.

Ministry of Local Government and Modernisation adopted new municipal and regional numbers that entered into force on 1st January 2020, which will be used in further analysis (Regjeringen, 2020a). We find that several enterprises are missing municipal and regional numbers. These are dropped, so it will be possible to analyse enterprises with data on all variables we want to use. This reduces our dataset by 31,804 observations and 8,739 unique firms. The last merge is done with a dataset with an overview of different types of status for the enterprises, such as bankruptcy and foreclosure. We remove the observations that do not match our current dataset based on the randomised organisation numbers. This removes 1,670 observations. As before, these 1,670 observations do not reduce our dataset as these are added and then removed because of a mismatch. The dataset consists of 1,176,408 observations and 312,819 unique firms after matching for further analysis.

Table 3.1: *Selection steps in the dataset.*

Description	**Number of observations**	**Number of unique firms**
Total sample after merging of datasets	1,176,408	312,819
All enterprises, excluding LTDs and PLCs.	(61,060)	(15,676)
NACE-code=0 and NACE-code=.	(11,609)	(1,654)
Bankrupt firms before 2020	(122,387)	(30,732)
Companies with change in status and lack of accounting information	(180,597)	(35,914)
NACE-codes 64-66	(8,401)	(1,908)
NACE-codes 85-88	(13,295)	(3,529)
NACE-codes 35-39 and 84	(7,389)	(1,986)
NACE-code 6	(202)	(51)
Balancing the dataset to include data on 2017-2020 for all firms	(121,416)	(58,856)
The total sample used in further analysis	650,052	162,513

Note: The table gives an overview of each selection step and the number of observations and unique firms, either the total left or removed. Numbers in parentheses represent removed values.

In our thesis, we will focus on companies registered as private limited companies (LTDs)[2] and public limited companies (PLCs)[3]. Other enterprises are therefore removed from the dataset, which removes 61,060 observations and 15,676 unique enterprises. Variables such as NACE-codes, regions and EBITDA will be necessary for further analysis. We, therefore, remove NACE-codes where there are lacking observations, or the observation equals "0". This removes 11,609 observations and 1,654 unique firms. When assessing which observations we want to remove from Income Statement 2, we also have to take bankruptcies in 2020 into consideration. Enterprises which went bankrupt in this period could have had agreements of tax deferral. These firms have been preserved because they can contribute to demonstrating the effects of tax deferral. We remove firms that went bankrupt before 2020, eliminating 122,387[4] observations and 30,732 unique firms. We also remove companies that have been dissolved, either forcibly or compulsory, and firms lacking financial data on relevant accounting figures such as operating profit and wages. These are particularly important for further analysis and are removed if they lack accounting information and in the event of a change in the company's status. This removes 180,597 observations and 35,914 unique firms.

Using the overview of Standard Industrial Classification 2007 by Statistics Norway (2009), we exclude firms exempted from the VAT Act (Altinn, 2022). All financial and insurance activities are removed, which includes two-digit NACE-codes 64-66. This removes 8,401 observations and 1,908 unique firms. NACE-codes 85 and 86-88 associated with education and health and social services are also removed, eliminating another 13,295 observations and 3,529 unique firms. Industries such as electricity, gas steam and air conditioning (NACE-code 35), water supply, sewerage, waste management and remediation activities (NACE-codes 36-39) and public administration, defence and social security (NACE-code 84) differ from the other industries listed. These sectors are vital for infrastructure and society to function and essential to ensure national independence and safety. This removes 7,389 observations and 1,986 unique firms. Of these observations, six unique firms had an arrangement of tax deferral. All six firms had NACE-code 38 and are firms working with the collection, treatment, disposal and recycling of waste.

[2] Aksjeselskap (AS).
[3] Allmennaksjeselskap (ASA).
[4] Of this: bankruptcies: 106,820, foreclosure (probate): 3,887, foreclosure (Bankruptcy Act): 32 and foreclosure due to lack of accounting: 11,648.

At last, we remove all firms with NACE-code 6. These are firms extracting crude oil and natural gas. 2020 was characterised by low oil and gas prices that affected the liquidity and financing opportunities of the petroleum companies. Temporary rules were therefore introduced in the Petroleum Tax Act in June 2020 (The Norwegian Tax Administration, 2021b). None of these firms has arrangements for deferred taxes, which we believe is because of the Petroleum Tax Act and the changes enforced. These firms are thus not a relevant industry for further analysis. This removes 202 observations and 51 unique firms.

To ensure that we have data for all four years for each company, the dataset is balanced before we proceed with processing the dataset. This way, we ensure that the dataset for our period from 2017-2020 includes established organisations, not start-ups or organisations lacking data because of changed status. Also, when balancing our dataset, our sample is reduced by 58,856 unique firms and 121,416 observations. The dataset is balanced and consists of 650,052 observations and 162,513 unique firms.

3.2 Quality and Sources of Error within the Dataset

As this thesis only uses data administered by the Norwegian Tax Administration, this is credible and should be of good quality. The data has been used by students before us and has undergone some changes earlier. The data for which firms applied and got approved for the new tax deferral arrangement is not provided.

When using this dataset, we find an error in one of the datasets containing information on previous and current region names and numbers. Troms has region numbers 19 and 21 as the previous region number and only changes to region number 54 when the previous region number equals 19. We have taken these errors into account and transformed them in our dataset for both the region's name and number to replace Troms with Troms og Finnmark and 21 with 54. This changes 38 observations for both region name and number. The data of regions also mismatch for some firms over the four years. This may be because of a change in the location of the business. This is of minor frequency in our sample, and we, therefore, do not make any changes to the dataset, see table A.1 for an overview of the distribution.

We have found that our dataset consists of firms which belong to one industry at the start of our period, and later there is a change within the firm's business and NACE-codes changes. This type of change will give an unbalanced number of establishments in the various industries and will not be constant over time. To correct the dataset being misinterpreted, we are changing NACE-codes to reflect the industry they belong to in 2020. Firms chose whether to apply for the arrangement of deferred taxes or not in the year 2020 within the industry they belonged to at the time.

When reporting to the Norwegian Tax Administration, firms are not required to register their accounting figures according to the Norwegian Accounting Standard ("Norsk regnskapsstandard"). A representative from the Norwegian Tax Administration writes that negative values in accounting figures are difficult to control as one will need access to accounts and attachments. These are not possible to get as we do not know which firms are which due to the randomised organisation number. The representative says they are aware that accounts are misused in terms of the Norwegian Accounting Standard but can be correct for calculating taxes (Sjøstedt, T., personal communication, November 25, 2022). There are also no guarantees that the accountant does everything correctly. This matters as we make use of the natural logarithm (ln) for some of the variables. When using the natural logarithm on some accounting figures, the negative values will not be calculated to the natural logarithm form. This excludes some values, but the sum of them is minor. Our main reason for excluding these numbers from the further analysis is that we do not know what they are.

3.3 Data Analysis

3.3.1 Dependent Variables

In our thesis, we wish to investigate different dependent variables and how they are affected by tax deferrals. We are interested in testing dependent variables that are affected by the liquidity situation within the company with the least impact from outstanding non-controllable factors. We have chosen wages, employees and investments from CCR and Income Statement 2 as the dependent variables, least expected to covariate with factors outside the company's control. Thereby, the dependent variables can present the effectiveness of the arrangement of tax deferrals, and we can analyse if companies with an arrangement have a significant positive effect compared to those without the arrangement. The dependent variables are essential for economic stability and activity, particularly in times of crisis. In contrast to dividends or other economic variables, these will have a more immediate ripple effect on greater segments of society.

Wages ("lønn, feriepenger mv."), also known as account 5000 from Income Statement 2, including the total payment of wages and holiday pay for the company. Our interest in wages appears because it is a fundamental concept in economics. Most people depend on wages as it is the primary source of income for the majority. At the same time, pensions and other benefits in the future are often calculated based on the level of wages. In light of the pandemic, Francis-Devine (2022) discusses the development in wages in the UK during the pandemic. It is pointed out that wages stagnated between November 2020 and December 2021. The article also points out differences between the private and public sectors in the UK, where the private sector used the furlough scheme more, and the public sector increased the number of working hours, especially in the health sector.

Employees within companies, retrieved from CCR, is our second dependent variable. During COVID-19, unemployment went up substantially. 10.4 percent of the workforce was unemployed, and furloughs explained 90 percent of this. During the period 3rd March 2020 and 24th March 2020, the number of unemployed citizens registered at the Labour and Welfare Administration ("NAV") went up from 65,683 to 291,483 in Norway (Holden et al., 2020, pp. 12-13). Sigrun Vågeng, director of the Labour and Welfare Administration, commented that

Norway's unemployment rate had been the highest since World War 2 (Kalajdzic et al., 2020). Research from China investigated how the pandemic affected the employment and income of vocational graduates, as they were the ones most affected by infection control measures. Their analysis showed differences in regions more affected by the virus, reducing employment and wages because of decreasing labour demand. They found heterogeneous effects in which industry they were working and whether the individual was in a management position (Liang et al., 2022). We see the unemployment rate during the pandemic as interesting. We are curious whether the tax deferral arrangement will impact employment across different groups.

Investments show the sum of financial investments as well as investments in tangible assets. Accounts included in this variable are presented in table A.2, and all accounts are collected from Income Statement 2. We have chosen to include both financial and tangible assets as our sample consists of a wide variation of firms within Norway. In an article, the Confederation of Norwegian Enterprise points out that 99 percent of all firms in Norway are considered to be SMEs[5] (NHO, n.d.). This indicates that many of these firms will not have financial investments in subsidiaries or other affiliates. When reviewing our data sample, we observe that enterprises do not have accounting figures for all account entries listed in table A.2. For example, not all companies do have ships or planes as that is not needed for their business. We include a broad spectre of account entries to ensure that the enterprises' investments are somewhat equally assessed.

The pandemic outbreak triggered share prices to plummet, and businesses experienced a decline in their investments (Bachman, 2022; Bradley & Stumpner, 2021). An article from the European Central Bank shows the sensitivity of investment relative to firm cash flow before the pandemic, finding that unexpected changes in operating cash flow led to a larger adjustment in investment decisions for vulnerable firms. Vulnerable firms were mostly SMEs and were highly represented in sectors most affected by the pandemic. Financial factors such as debt and cash flow were key determinants. However, they also found indications of a positive effect of the fiscal policy support as the changes in investment ratio were smaller than predicted (Andersson et al., 2022). Given the market turbulence in the first half of 2020, we think looking at the companies' total investments is interesting. A further description of the distribution of the dependent variables will follow in the descriptive analysis in chapter 3.4.

[5] The Confederation of Norwegian Enterprise define SMEs as firms that have less than 100 employees (NHO, n.d.).

3.3.2 Subgroups

The sample is divided into subgroups to research the variation within them. This is done so we can complete a broader analysis and see the impact of each specific sector, region and percentile of EBITDA on the dependent variables.

NACE-codes

Our interest in NACE-codes appears as there were large differences in incentives for infection control between industries with close contact in relation to industries with less personal contact. Among these is the accommodation and food service sector, where the volume of GDP decreased by 59 percent within the first two months of COVID-19. Strict travel restrictions and quarantine were a driving force behind the decline in the sector, and it is assumed that about 70 percent of the GDP fall of 36 percent in transportation[6] is due to this (Holden et al., 2020, pp. 17, 22–23). From January 2020 to April 2020, the sectors that suffered the most decline in GDP are arts, entertainment and recreation, accommodation and food service, and transport and storage. These experienced a decrease of 60, 59 and 36 percent in GDP. These sectors also had reduced VAT for part of the business, with a decline in VAT from 12 to 6 percent (The Norwegian Tax Administration, 2020).

It is estimated that the infection control measures have decreased the business activity within almost every industry by a minimum of 10 percent each, with the exclusion of banking and finance, housing service and vital functions of society such as electricity, gas and water supply industries. This is because of a ripple effect extending from one industry to another, reducing demand in the start value chain. In addition, infection control measures such as quarantine and closed schools, have affected the workforce dampening the production output as economic uncertainty and loss of income affect wholesale and trade (Holden et al., 2020, pp. 22–23). We group the industries into nine sectors; see table 3.2 for an overview of which industries are included in each sector.

[6] Excluding foreign shipping.

Table 3.2: *Grouping of sectors.*

Group	Our sector	NACE-codes	Included industries	Number of firms
1	Natural resources and mining	1-3	Agriculture, forestry, and fishing	4,071
		5, 7-9	Mining and quarrying	
2	Manufacturing	10-33	Manufacturing	9,216
3	Accommodation and food service	55-56	Accommodation and food service	7,165
4	Service activities	69-75	Professional, scientific and technical activities	37,754
		77-82	Administrative and support service activities	
		94-96	Other service activities	
5	Wholesale and retail trade	45-47	Wholesale and retail trade	31,765
6	Construction	41-43	Construction	26,712
7	Transport and storage	49-53	Transport and storage	6,592
8	Arts, entertainment and recreation	90-93	Arts, entertainment and recreation	2,756
9	Other sectors	58-63	Information and communication	36,482
		68	Real estate	
		97	Activities of households as employers of domestic personnel	

Regions

Due to varying incentives for infection control, businesses in different regions and municipalities have been differently affected by COVID-19. In addition to national infection control measures regulated for the whole of Norway, municipalities needed to control for infection outbreaks locally depending on cases of COVID-19 (Helse- og omsorgsdepartementet, 2020). Further in this thesis, we will only focus on the regions and not the municipalities. The regions are divided according to the new regions applied from 1st January 2020, which entails 11 regions. These are presented in table 3.3 below.

Table 3.3: *Regions applicable from 1st January 2020.*

Group	Region	Number of unique firms
1	42 – Agder	10,308
2	34 – Innlandet	9,969
3	15 – Møre og Romsdal	8,408
4	18 - Nordland	7,198
5	03 – Oslo	28,401

6	11 – Rogaland	14,021
7	54 – Troms og Finnmark	7,436
8	50 – Trøndelag	12,877
9	38 – Vestfold og Telemark	13,618
10	46 – Vestland	18,817
11	30 – Viken	37,360

Note: (Regjeringen, 2020a).

Percentiles of EBITDA

Lastly, our third variable of interest is the percentiles of EBITDA. We chose this to analyse companies operating with different earnings levels to see differences between small, medium, and large businesses and their operational efficiency. According to the Norwegian Government, many businesses, especially the smaller ones, struggled to pay taxes during the start of the pandemic (Regjeringen, 2022a). Analysing differences between different-sized firms in terms of earnings[7] , therefore, is relevant. We do this by calculating the 10 percent percentiles based on EBITDA[8] and categorising the companies from the smallest to the largest group. The percentiles are calculated as an average from 2017 to 2019 to present the level of earnings before COVID-19. The percentiles are rounded to the nearest 1000. See table 3.4 for a complete overview of the groups.

Table 3.4: *Percentiles of EBITDA with elaboration on chosen intervals.*

Group	Percentile	Number of unique firms	EBITDA percentile	Min value	Max value
1	10^{th} percentile	16,208	-141 000 and less	-8.68e+08	-141 003.1
2	10^{th} - 20^{th} percentile	16,268	-141 000 to -22 000	-140 982.9	-22 005.11
3	20^{th} - 30^{th} percentile	16,074	-22 000 to 9 000	-21 999.67	8 999.162
4	30^{th} - 40^{th} percentile	16,132	9 000 to 62 000	9 000.771	61998.08
5	40^{th} - 50^{th} percentile	16,263	62 000 to 152 000	62 003.22	151 990.8
6	50^{th} - 60^{th} percentile	16,301	152 000 to 301 000	152 009.4	300 993.4
7	60^{th} - 70^{th} percentile	16,312	301 000 to 561 000	301 015.9	560 979.3
8	70^{th} - 80^{th} percentile	16,328	561 000 to 1 086 000	561 014	1 085 953
9	80^{th} - 90^{th} percentile	16,323	1 086 000 to 2 560 000	1 086 008	2 559 882
10	90^{th} - 100^{th} percentile	16,304	2 560 000 and more	2 560 131	4.06e+09

[7] In terms of EBITDA.
[8] EBITDA = EBIT + Depreciation + Amortization.

3.4 Descriptive Analysis

One of the main missions of this thesis is to acquire an understanding of the companies with an arrangement of tax deferral while also interpreting if and how they differ from firms that did not have the same arrangement. This chapter presents a descriptive analysis of the processed dataset and how treated, and non-treated companies are divided within our sample.

As mentioned in chapter 3.1, the data sample consists of 162,513 unique firms which have data from 2017-2020. This sample contains 2,939 treated firms and 159,574 unique non-treated firms. The mean for treated is 1.8%, which tells us that 0.018 out of all firms in our dataset have an arrangement of tax deferral as a part of the support due to loss of revenue during 2020. Given the decision to keep firms that either had a change in status to dissolved or bankrupt in 2020, some values are missing from Income Statement 2 for the dependent variables. As discussed in chapter 3.2, some accounts may have been used incorrectly, causing false negative values. In appendix A.3, the distribution of the dependent variables is illustrated.

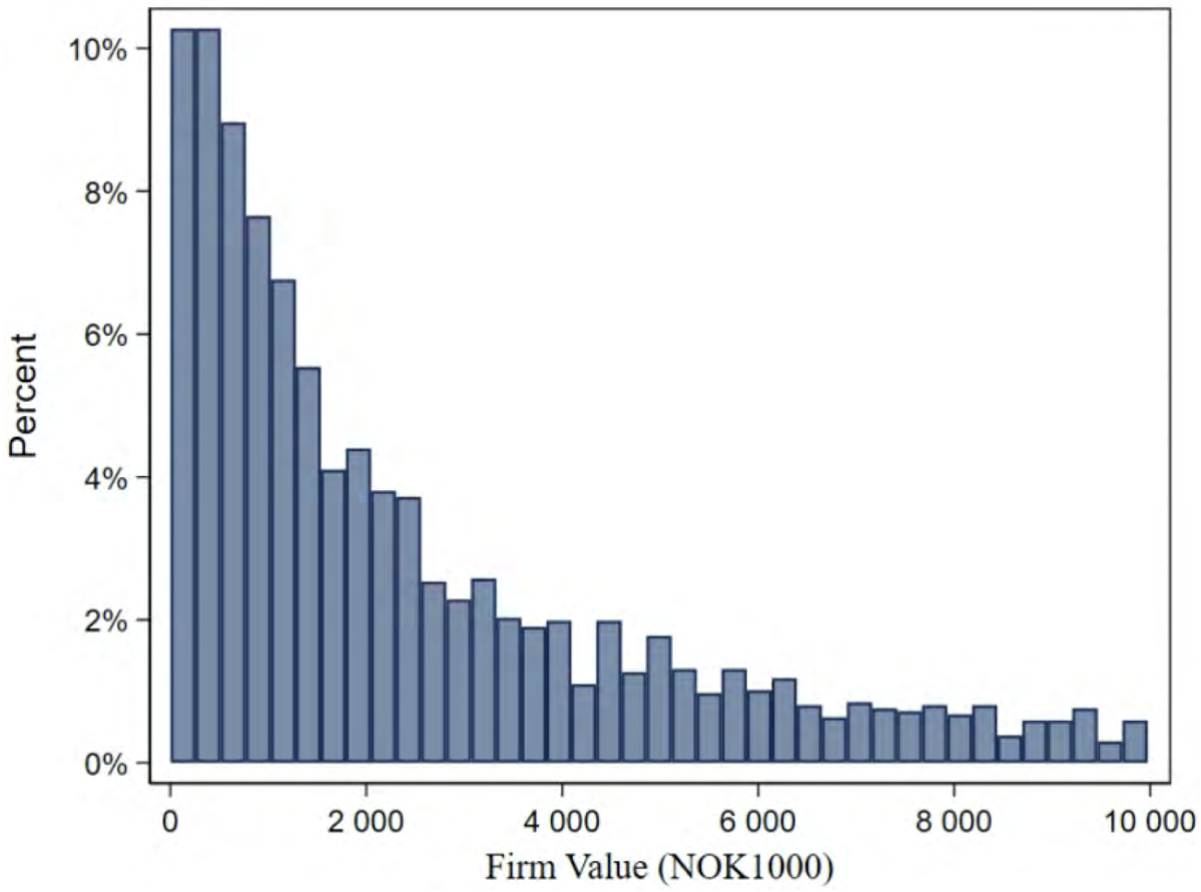
Table 3.5: *Variables from the dataset.*

Stats	Covid	Treated	Wages (NOK)	Employees	Investments (NOK)
N	650,052	650,052	636,791	650,052	636,787
Mean	0.250	0.018	3,355,047	8.725	16,500,000
Minimum	0	0	-99,500,000	0	-22,800,000
Maximum	1	1	5,430,000,000	15,164	142,000,000,000

The firm value[9] of treated firms is presented in the figure below. We can observe that the distribution is skewed to the right, showing that the percentage of firms deferring their taxes during the pandemic is mostly SMEs. The curve flattens out, and there are firms at all values eligible for the arrangement, but the majority of the treated firms are perceived to have a firm value lower than 2 million NOK.

[9] Firm value is calculated as book value equity + book value debt. Data from Income Statement 2.

Figure 3.1: *Distribution of firm value amongst treated firms.*



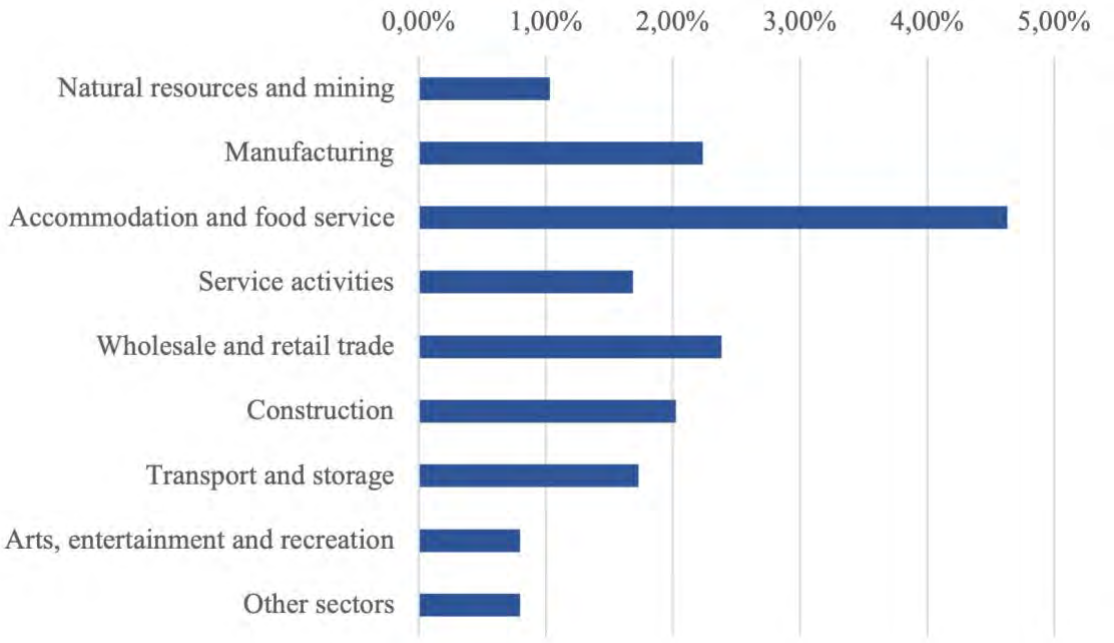
3.4.1 Subgroups

NACE-codes

Firstly, we look at which firms had an arrangement of deferred taxes within our subgroups. The bar plot below shows the percentage of firms that got tax deferrals within each sector. The accommodation and food service sector stands out from the other sectors in the bar plot and is the sector with the most tax deferrals. A total of 4.63 percent of firms within the sector have an arrangement of deferred taxes. The wholesale and retail trade sector has the second most firms with tax deferrals; a total of 2.38 percent of the firms have an arrangement. It is worth noticing that these numbers are small. One explanation for this could be interpreted from figure A.4; the figure shows the use of different schemes within each industry. The compensation scheme totals over 3,000 million Norwegian kroner for the accommodation and food service sector, while table A.3 shows deferred VAT for the sector equal to 203 million Norwegian kroner. As for wholesale and retail trade, the sector did not receive as much through the compensation scheme but has made greater use of the loan guarantee scheme

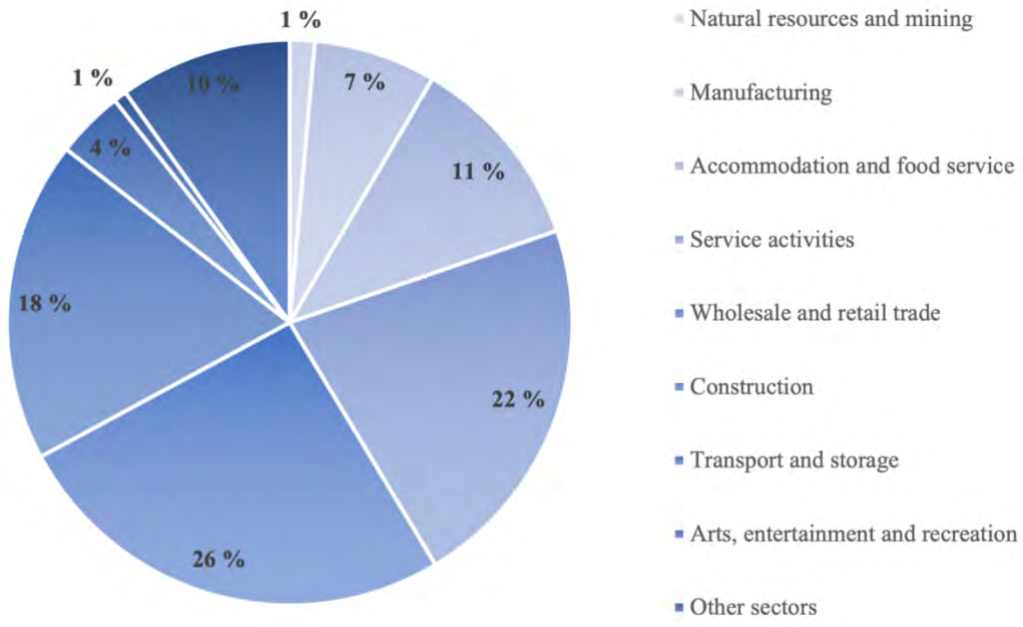
("Lånegarantiordningen"). Even if fewer firms in the wholesale and retail trade sector had an arrangement of deferred taxes, the value of deferred VAT is higher for this sector than for accommodation and food services—deferred VAT totals 940 million Norwegian kroner. Out of the firms with tax deferrals, many operate within industries hit hardest by measurements (Finansdepartementet, 2021). The hardest-hit industries also had the opportunity to apply for other schemes presented by the Norwegian government, as seen in figure A.4.

Figure 3.2: *Percentage treated firms in each sector.*



In addition, we calculate the percentage of deferrals within each sector as a part of all treated firms. The pie chart shows which sectors had the most firms with deferral. Wholesale and retail trade equal 25.76 percent of deferrals, and service activities equal 21.64 percent, thus having the highest amount of deferrals. We earlier discussed schemes within the wholesale and retail trade sector and observed in figure A.4 that the sector, in addition, received more through other schemes. Table A.3 presents the sector received 2,986 million Norwegian kroner in grants, while deferred VAT amounts to 940 million Norwegian kroner. In arts, entertainment and recreation 0.75% of firms deferred their taxes. Figure A.4 shows that the sector received more support through schemes for culture, sports and volunteerism ("Ordninger for kultur, idrett og frivillighet").

Figure 3.3: *Percentage of all treated firms by sector.*

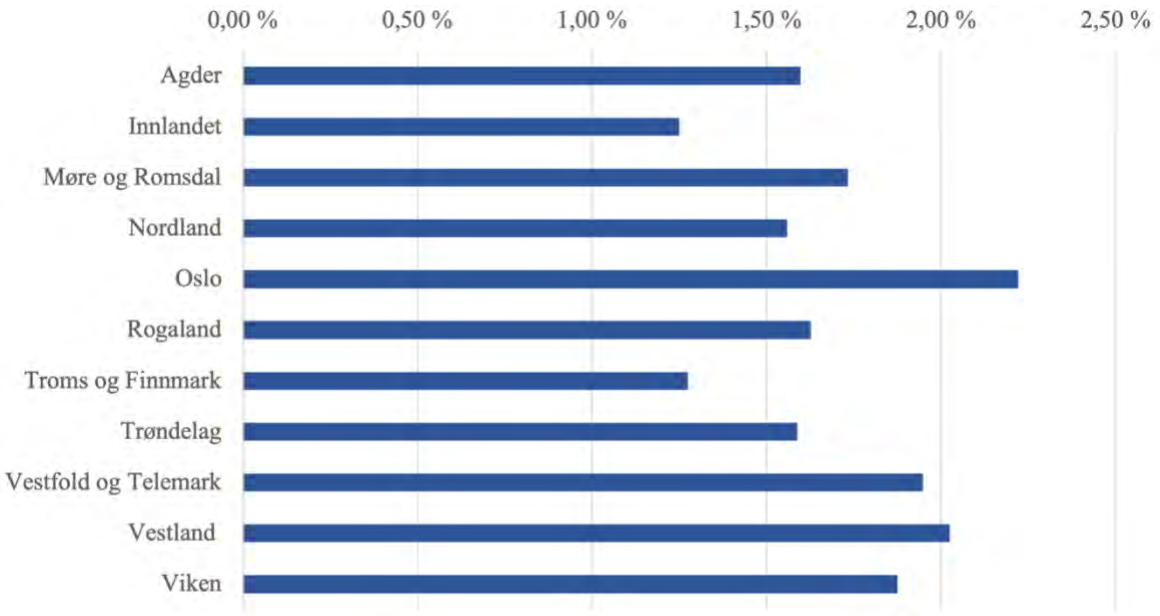


Regions

The percentage of firms which applied in each region is somewhat equally distributed compared to the distribution in sectors. Innlandet has the lowest amount of firms with tax deferral at 1.25 percent, while Oslo has the most firms at 2.22 percent. Norway had national and local restrictions, and locally, either by municipalities or regions, the restrictions were the most severe for the bigger cities with a higher infection rate. VG[10] (n.d.) has created a table with an overview of the total registered as infected with covid, using numbers from the Norwegian Institute of Public Health ("Folkehelseinstituttet"). In the table, 6 of the 11 regions have had over 100,000 cases of corona infection. These regions are Viken, Oslo, Vestland, Rogaland, Vestfold og Telemark and Trøndelag. Only Oslo and Viken have over 200,000 and 300,000 cases of corona infection. The figure below shows that these six regions have the highest amount of firms treated within the region.

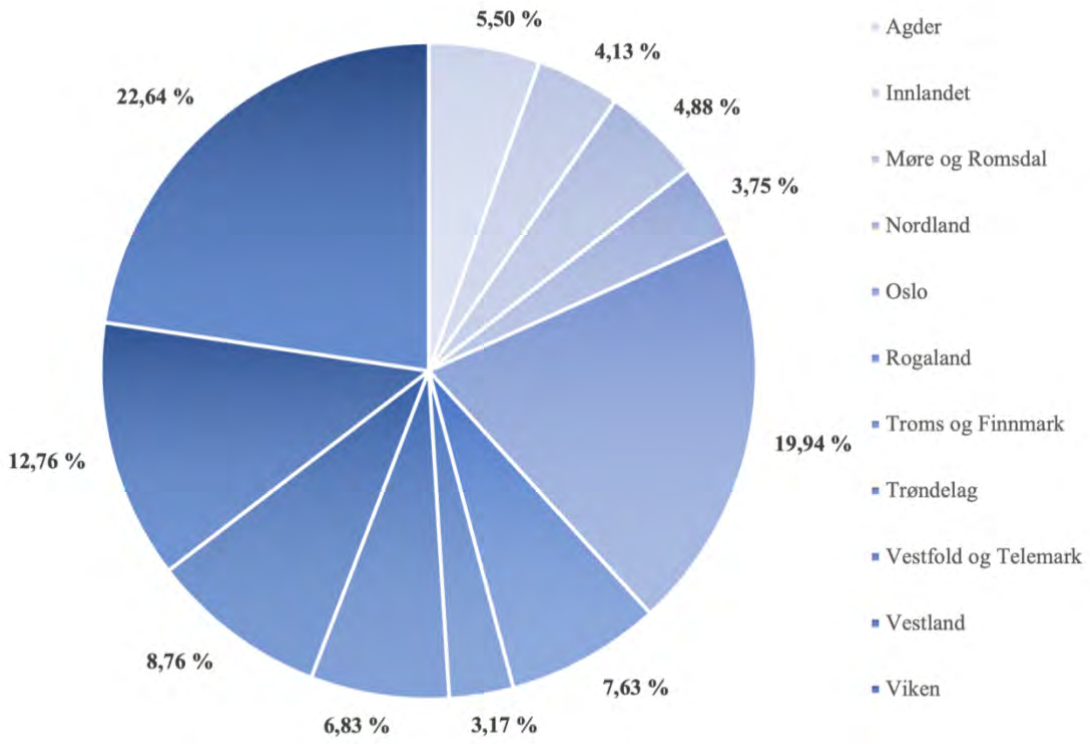
[10] VG stands for «Verdens Gang» and is a Norwegian newspaper.

Figure 3.4: *Percentage of treated firms in each region.*



Among the treated, Oslo has a high percentage of the treated firms. Firms in Oslo accounted for nearly 20 percent of all treated firms in total, only behind Viken with 22.64 percent. This is not surprising as the restrictions were strict within these regions and had the most cases of corona infection (VG, n.d.). Other regions also heavily affected by restrictions were Vestlandet and Vestfold og Telemark, where 12.76 percent and 8.76 percent of all treated got deferred their taxes. Among the top six regions with the highest percentage of treated firms of all treated firms, we also have Rogaland and Trøndelag. These six regions had over 100,000 registered corona infections and had the highest percentage of firms within the region with an agreement of tax deferral.

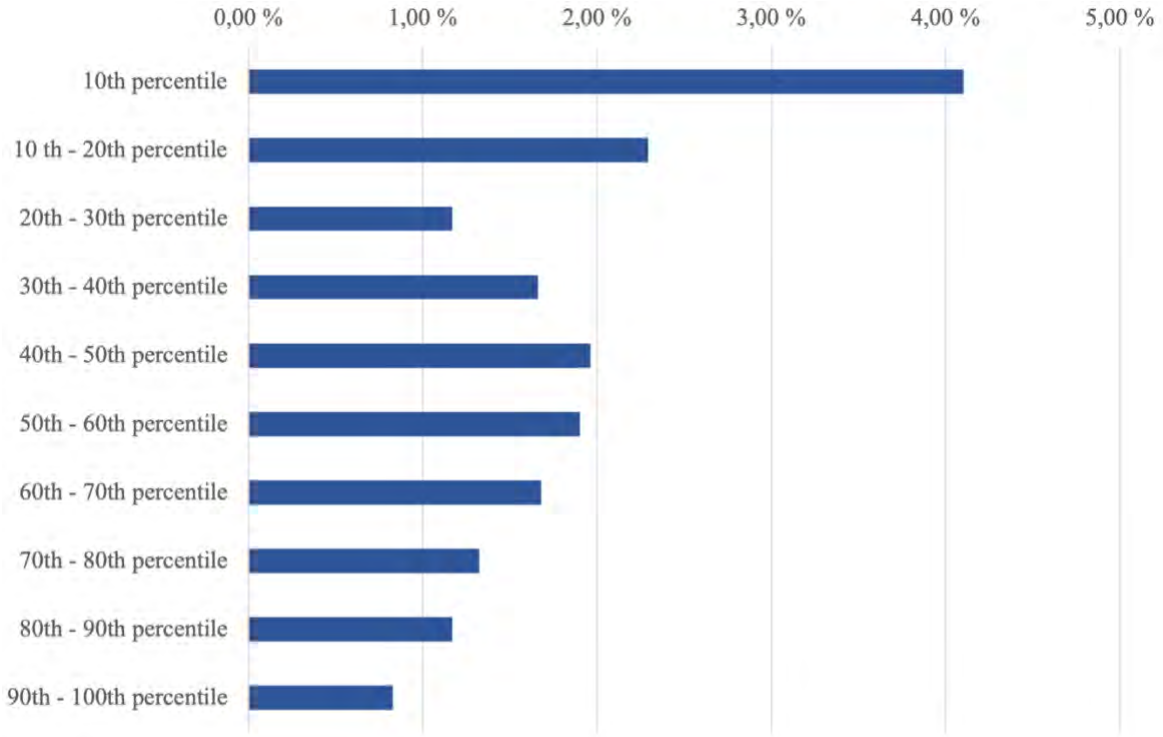
Figure 3.5: *Percentage of all treated firms by region.*



Percentiles of EBITDA

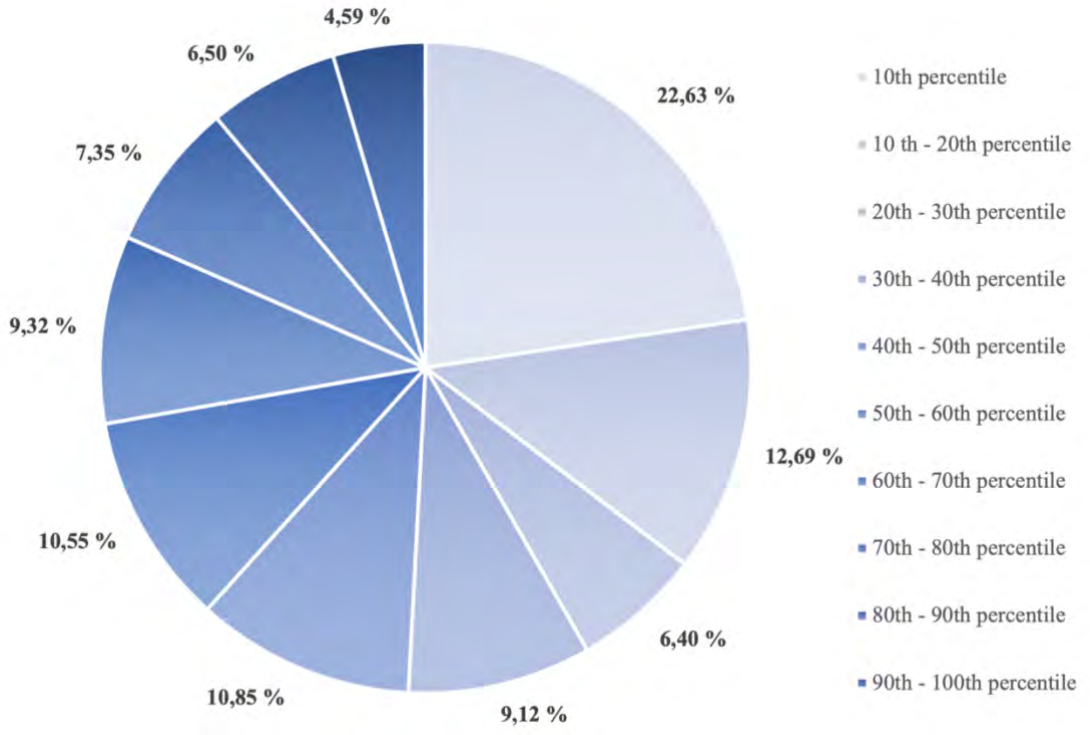
When analysing firms within the EBITDA percentiles, we observe that the firms within the 10th percentile have the highest percentage of enterprises with tax deferrals. A total of 4.10 percent of firms had an arrangement of tax deferral. These firms had an average EBITDA of -141,000 or less over the three years before COVID-19, which can be observed in table 3.4. The bar plot below shows 10th – 20th percentile has the second highest amount of tax deferrals within the percentile, with 2.29 percent. Firms in the 10th – 20th percentile had an average EBIDTA between -141,000 and -22,000. Other percentiles are more equally distributed, but the mean of earnings and the adjacent percentiles reaching from 40th to 60th percentiles shows that firms with positive earnings in sequent years also have tax deferrals.

Figure 3.6: *Percentage of treated firms in each EBITDA percentile.*



The 10th percentile also has the highest percentage of firms treated compared to treated firms in other percentiles; see the pie chart below. Firms with deferral belonging to the 10th EBITDA percentile made up 22.63 percent of the firms with an arrangement of tax deferral, while the 10th – 20th percentile made up 12.69 percent of the firms. These percentiles make up more than 1/3 of the firms with tax deferrals This implies that many businesses with deferral of taxes were not earning money and may have had problems before COVID-19. We cannot be sure that these are not start-ups or other businesses that account for negative earnings in the first years. Firms with an average EBITDA between 62,000 – 561,000, belonging to 40th – 70th percentile, also account for more than 1/3 of the firms.

Figure 3.7: *Percentage of all treated firms by EBITDA percentile.*



3.4.2 Key Performance Indicators

To further analyse the firms who applied and were granted tax deferrals, we look at key performance indicators (KPIs) to get a better understanding of their financial situation. The ratios analysed are listed in table 3.6 based on their performance area and what indication these give. When calculating mean and median values for the KPIs, we winsorize at a 5 percent level giving the tales of distribution the 99 percentile and 1 percent value. We do this to limit extreme values influence and reduce possible spurious outliers as the data is largely distributed.

Table 3.6: *Key Performance Indicators.*

Performance Area	Calculation	When high:
Solidity	$Debt\ ratio\ (DR)$: $\frac{Book\ value\ total\ debt}{Book\ value\ equity}$	The firm is more at risk in volatile times.
Liquidity	$Current\ ratio(CR)$: $\frac{Current\ Assets}{Current\ Liabilites}$ $Net\ Working\ Capital(NWC)$: $\frac{Current\ Assets - Current\ liabilities}{Firm\ value}$	The firm is in a better position to pay short-term obligations.
Efficiency	Total asset turnover(TAT): $\frac{Operating\ profit}{Total\ assets}$	The firm generates more sales relative to its assets.
Profitability	EBIT margin: $\frac{EBIT}{Operating\ profit}$	It indicates better operation profitability before financial costs and taxes.
Performance	$Return\ on\ assets$: (ROA) $\frac{EBIT}{Total\ assets}$	It shows better operational performance based on the profit obtained.

Note: (Horobet et al., 2021).

The output in table 3.7 shows a difference between mean values from 2017-2019 and mean values from 2020, both for treated and non-treated firms. Leverage and liquidity-wise, we see changes in the debt structure and the ability to pay short-term obligations. Debt levels were, on average, much higher for the treated firms and increased by 119% in 2020. It should be noted that there is considerable deviation within the sample after winsorizing. The current ratio shows an increase in debt relative to its equity for treaded firms because of an increase in debt

and a decrease in equity[11]. Mean and median values are better for the comparison group in both periods.

The largest change is in NWC, where there has been a substantial worsening for the treated with a decrease of 85 percent. However, the net working capital relative to firm value was already negative before the pandemic. This is also shown by the median current ratio being less than 1, meaning short-term assets are insufficient to cover the short-term liabilities. Long-term negative working capital can indicate problems meeting short-term obligations; thus, it for some industries is more normal than others to have a negative NWC. The TAT is higher for treated firms, indicating that they can utilise the capital tied up in the company, which can explain the negative NWC to some extent. In terms of profitability and performance, the EBIT margin has increased for both groups, though it was negative for the treated firms in both periods studied. Furthermore, ROA was positive and increasing for non-treated firms as opposed to treated firms.

Table 3.7: *KPIs for comparison and treated groups.*

		2017-2019		**2020**		**% Change**	
		Comparison	***Treated***	***Comparison***	***Treated***	***Comparison***	***Treated***
	Frequency	638,296	11,756	638,296	11,756		
	Percent	98,20%	1,80%	98,20%	1,80%		
Debt ratio	*Mean*	2,91	10,73	2,67	23,48	-8%	119%
	Median	1,07	1,49	0,83	0,35		
	SD	9,44	215,65	11,79	671,64		
Current ratio	*Mean*	6,28	1,50	7,26	1,14	16%	-24%
	Median	1,58	0,99	1,60	0,80		
	SD	19,38	3,85	24,98	3,52		
Net Working Capital	*Mean*	-0,06	-0,29	-0,05	-0,54	26%	-85%
	Median	0,16	-0,03	0,20	-0,12		
	SD	1,50	1,17	1,80	1,75		
Total asset turnover	*Mean*	1,56	2,83	1,38	2,94	-11%	4%
	Median	0,97	2,39	0,66	2,32		
	SD	1,88	2,23	1,90	2,54		
EBIT margin	*Mean*	-0,13	-0,06	-0,11	-0,03	19%	55%
	Median	0,04	0,00	0,07	0,01		
	SD	1,14	0,50	1,30	0,50		
Return on assets	*Mean*	-0,02	-0,09	0,00	-0,11	111%	-18%
	Median	0,04	-0,01	-0,05	-0,54		
	SD	0,44	0,38	1,80	1,75		

[11] Debt and equity change for treated and comparison firms in table A.5.

To further investigate the changes, we look at each subgroup and the difference between the treated and non-treated to see how the financial indicators have changed. Table 3.8 shows the percentage change of the mean KPIs from 2017-2019 and 2020. As there are different benchmarks for KPIs within each industry, this is the main focus, but other subgroups are listed for reference.

Analysing the liquidity, both CR and NWC show that there have been primarily positive changes for the non-treated firms[12]. The latter shows an over 100% decrease in manufacturing, service activities, wholesale and retail trade, construction and transport and storage. For these industries, the CR also decreased relative to its peers. This may be partially explained by increasing debt levels of manufacturing, wholesale and retail trade, and arts and entertainment as these industries have, on average, taken much more debt. Unlike these industries, the DR decreases for those within the lower percentiles of EBITDA. Looking at efficiency, profitability, and performance targets, it shows to have had a positive change for the latter percentiles independently, if treated or not. This may indicate that the support measures given during the pandemic have been helpful for the least profitable firms.

[12] See highlighted numbers in table 3.8.

Table 3.8: *Change in KPIs.*

	Debt ratio		***Current ratio***		***Net Working Capital***		***Total Asset turnover***		***EBIT margin***		***Return on assets***	
	C	***T***	***C***	***T***	***C***	***T***	***C***	***T***	***C***	***T***	***C***	***T***
Total	-8%	**119%**	**16%**	-24%	26%	-85%	-11%	**4%**	**19%**	**55%**	**111%**	-18%
Natural Resources and Mining	-46%	-32%	**3%**	11%	**44%**	-41%	-6%	**8%**	**1%**	**157%**	**23%**	324%
Manufacturing	-12%	**2722%**	**11%**	-13%	**1191%**	-101%	-7%	**4%**	**28%**	**81%**	**134%**	49%
Accommodation and food service	-22%	-96%	**30%**	-24%	**3%**	-24%	-20%	-4%	-50%	-3%	**28%**	-32%
Service activities	-10%	-85%	**17%**	-41%	**27%**	-103%	-15%	**0%**	**5%**	**75%**	**19%**	-86%
Wholesale and retail trade	-11%	**1109%**	**16%**	-23%	**47%**	-134%	-6%	**5%**	**35%**	**56%**	**180%**	31%
Construction	-10%	-67%	**16%**	10%	**20%**	-146%	-8%	**9%**	**13%**	-53%	**77%**	-77%
Transport and storage	2%	-8%	**17%**	-49%	-5%	-535%	-11%	**26%**	-18%	23%	-278%	-124%
Arts, entertainment and recreation	-24%	**199%**	**31%**	-68%	**6%**	**19%**	-32%	**8%**	-34%	**14%**	-41%	-13%
Other	-3%	**2794%**	**13%**	-29%	**53%**	-39%	-16%	**3%**	**58%**	**22%**	**574%**	60%
Agder	-10%	-82%	**8%**	-25%	**6%**	-105%	-10%	**16%**	**34%**	**105%**	**177%**	**3%**
Innlandet	-9%	5%	**18%**	-8%	**37%**	-144%	-10%	**13%**	-19%	39%	**27%**	-44%
Møre og Romsdal	-5%	**1290%**	**15%**	-41%	**18%**	-104%	-9%	**7%**	**30%**	**121%**	**310%**	-17%
Nordland	-16%	-83%	**18%**	-52%	**914%**	-108%	-11%	-2%	-14%	65%	**415%**	-61%
Oslo	-9%	16%	**15%**	-22%	**12%**	-55%	-14%	-2%	**22%**	**44%**	**49%**	-77%
Rogaland	-5%	-56%	**13%**	-21%	**46%**	-63%	-10%	**2%**	**25%**	**148%**	**229%**	92%
Troms og Finnmark	-15%	**1552%**	**11%**	-39%	**399%**	-100%	-12%	**4%**	-2%	**82%**	**154%**	-101%
Trøndelag	-5%	**77%**	**19%**	-34%	**163%**	-106%	-10%	**3%**	**3%**	**22%**	**259%**	-89%
Vestfold og Telemark	-5%	**345%**	**15%**	-37%	**35%**	-192%	-11%	**5%**	**45%**	-265%	**190%**	-11%
Vestland	-8%	**136%**	**17%**	-30%	**28%**	-74%	-13%	**4%**	**10%**	**40%**	**74%**	**9%**
Viken	-9%	**373%**	**18%**	-3%	**23%**	-79%	-11%	**5%**	**19%**	**12%**	**127%**	**17%**
10th percentile	0%	29%	**23%**	-38%	-31%	-97%	-14%	**13%**	**26%**	**69%**	**51%**	**61%**
10th- 20th percentile	**14%**	**503%**	**2%**	-20%	-24%	-66%	-14%	**11%**	**41%**	**72%**	**55%**	**46%**
20th - 30th percentile	-9%	-83%	-2%	-37%	-1%	-41%	-10%	**13%**	**25%**	**74%**	**29%**	**24%**
30th - 40th percentile	-10%	-29%	**22%**	-34%	**84%**	-92%	-13%	**0%**	-5721%	-814%	-773%	-165%
40th - 50th percentile	-6%	**4302%**	**32%**	-7%	**78%**	-126%	-13%	**2%**	-206%	-77%	-90%	-77%
50th - 60th percentile	-10%	**34942%**	**30%**	-41%	**38%**	-48%	-11%	-5%	-90%	-136%	-45%	-233%
60th - 70th percentile	-8%	**1072%**	**35%**	-4%	**27%**	-313%	-11%	-6%	-51%	-90%	-34%	-167%
70th - 80th percentile	-15%	-95%	**41%**	-6%	**20%**	119%	-10%	-12%	-32%	-80%	-24%	-112%
80th - 90th percentile	-12%	-70%	**33%**	-23%	**14%**	-194%	-8%	-7%	-24%	-59%	-18%	-150%
90th -100th percentile	-10%	**2104405%**	**16%**	-3%	**11%**	-63%	-6%	-10%	-25%	-55%	-17%	-98%

Note: Calculated as: $\frac{(Mean\ of\ 2017-2019)-(Mean\ of\ 2020)}{Mean\ of\ 2017-2019}$*. Positive changes are highlighted. C=Comparison and T=Treated.*

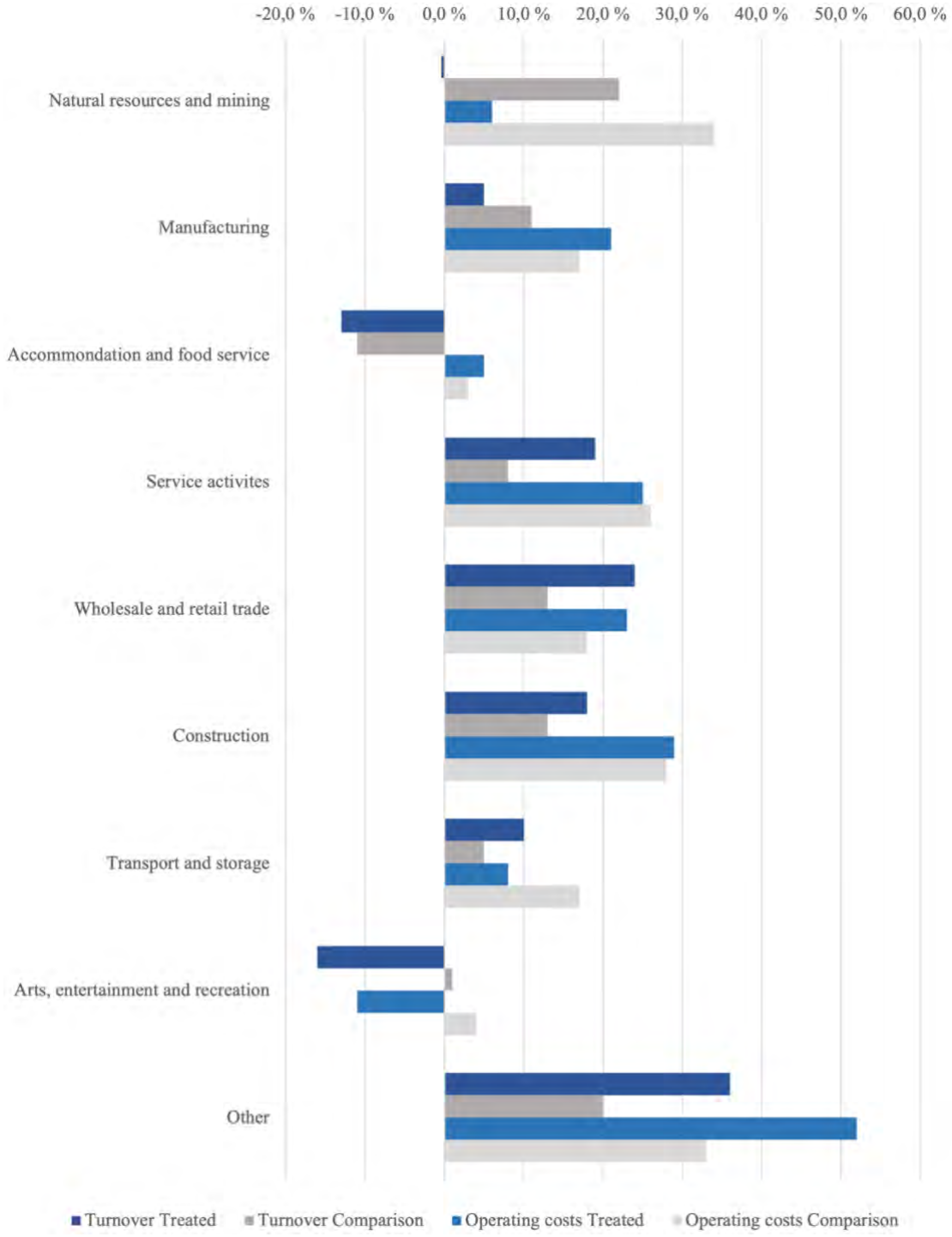
3.4.3 Changes in Turnover and Operating Costs

One of the main criteria of the arrangement of deferred taxes was a loss of income or increased costs. This criteria also applied for the compensation scheme but demanded at least a 30% decrease in profits or more (Finansdepartementet, 2021, p. 88). Therefore, it is interesting to look at how income and costs change among the treated and comparison groups. When creating the bar plots, we winsorize the turnover and operating costs at a 1 percent level, as some firms have more extreme changes in turnover and operating costs[13]. As mentioned, 99 percent of Norwegian firms are said to be SMEs, and hence 1 percent are large firms which can be noticeable in table 3.5 in chapter 3.4. We winsorize our sample to get a better picture of the changes within the 99 percent of SME firms.

For an overview of the average percentage change in turnover and operating costs between 2020 and 2019 in different sectors, see bar plot 3.8. We observe that all sectors experience increased costs for both treated and comparison groups, except arts, entertainment and recreation. This sector was heavily affected by restrictions, hence the decrease in GDP of 60 percent for the sector. The figure below shows that treated firms in the sector experience both a decrease in income and costs, indicating reduced business activity. The increase in income and costs observed for the comparison group in the sector are minor. On average, all sectors satisfy the requirement for tax deferral.

[13] Turnover («salgsinntekter»), account 3000. Operating costs («driftskostnader»), account 9010.

Figure 3.8: *Change in turnover and operating costs by sector.*



By observing costs for the regions, all have an increase of a minimum of 10 percent in costs, except treated firms in Troms og Finnmark. Measured by region, there is no decrease in income. Given the average output in the figure, the requirement of change in turnover and costs are met. See bar plot 3.9 for a complete overview of changes in turnover and costs in percentage per region.

Figure 3.9: *Change in turnover and operating costs by region.*

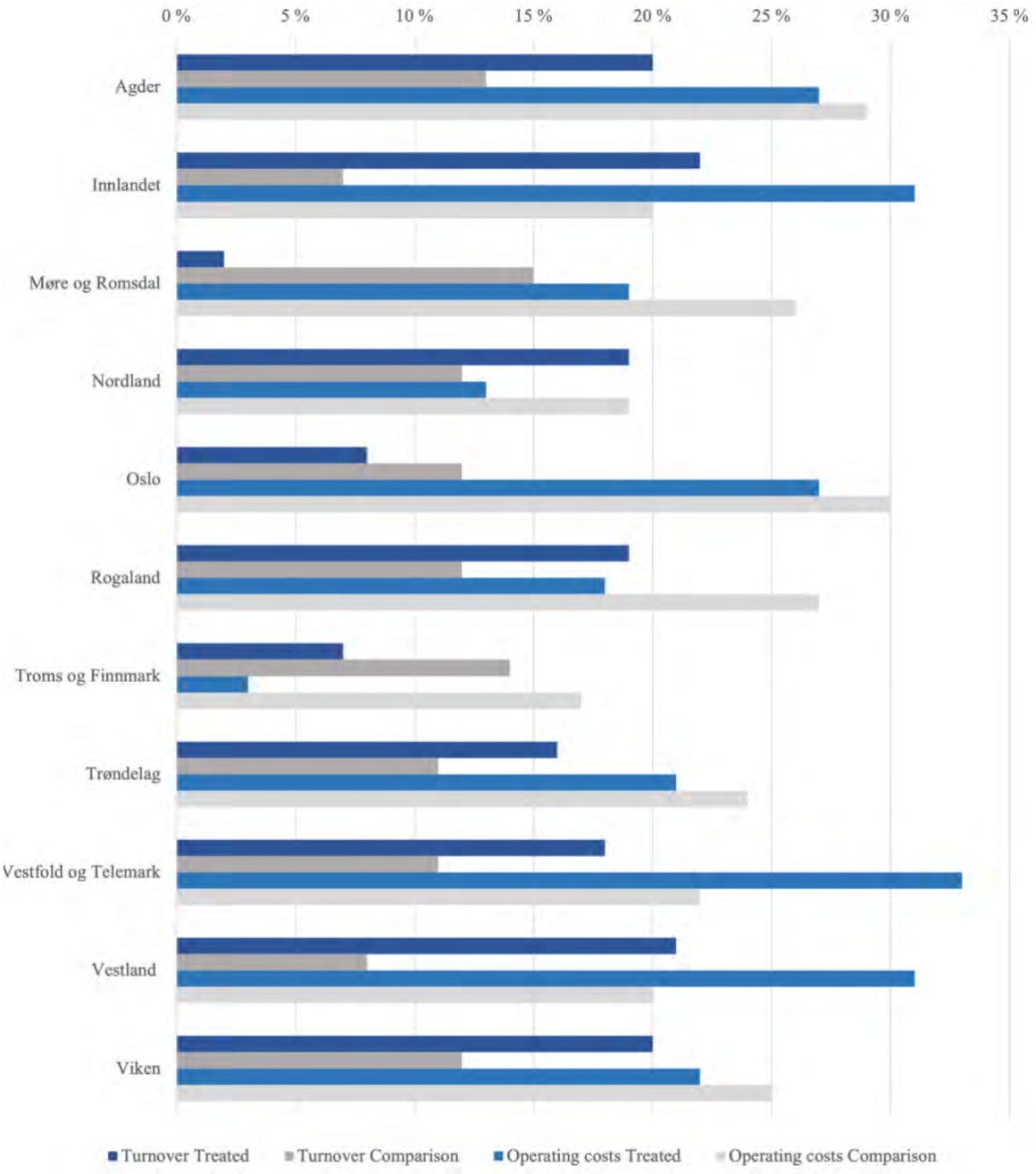
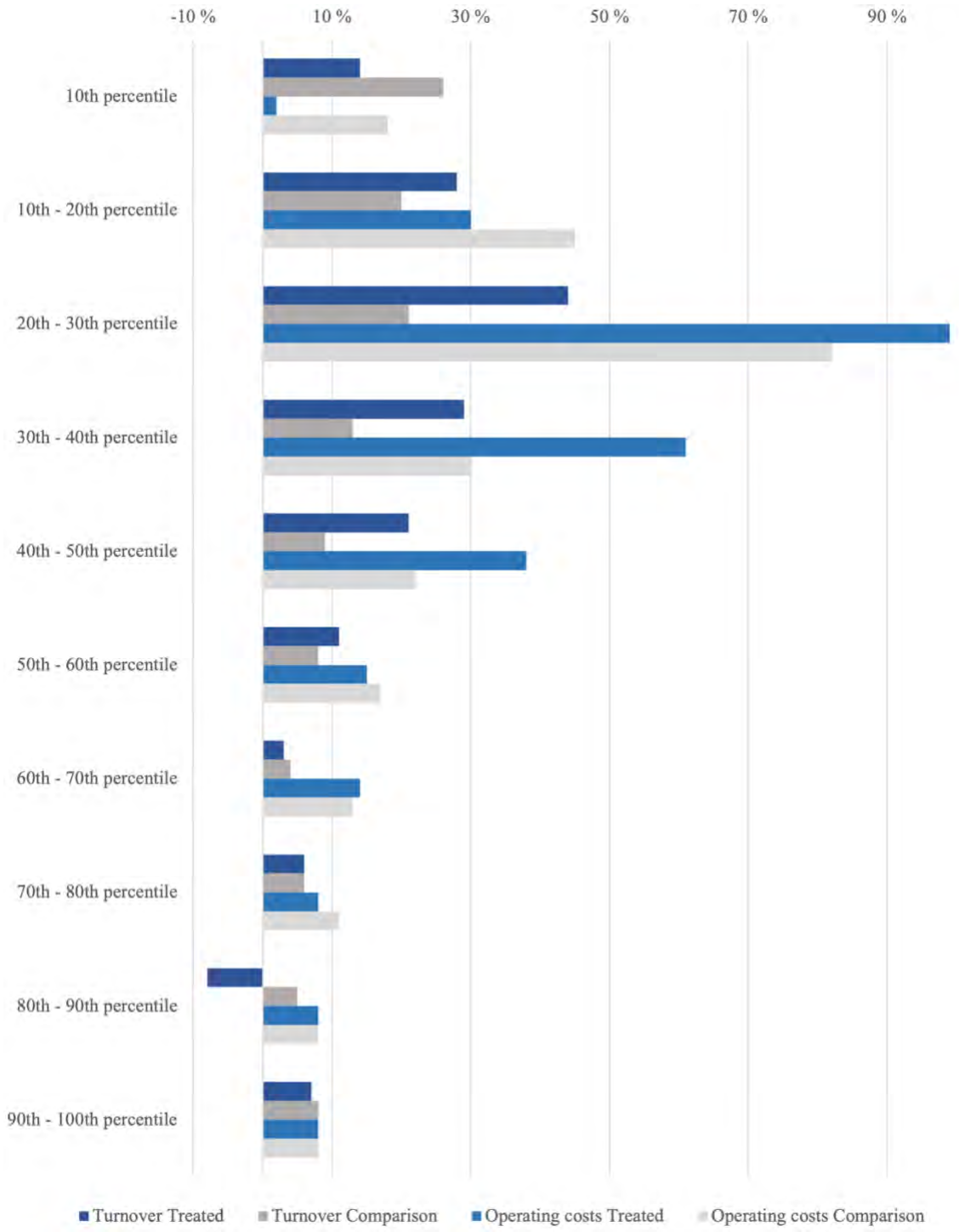


Figure 3.10 shows an overview of changes by percentage in the different percentiles, divided into firms with an agreement for deferred tax and firms without. Interestingly, the change in operating costs is above 30 percent for firms within 10^{th} – 20^{th}, 20^{th} – 30^{th}, 30^{th} – 40^{th} percentiles and treated firms within 40^{th} – 50^{th} percentile. For the firms within the larger percentiles, decreased income and increased costs are lower than for the percentiles mentioned above.

Figure 3.10: *Change in turnover and operating costs by EBITDA percentile.*



4. Empirical Methodology

4.1 Research Design

In this thesis, we will use an observational research design to study firms that defer taxes from our data. As described in chapter 1.2, the research question is whether tax deferrals have positively affected wages, employees and investments by improving firms' liquidity. We will use a Difference-in-Difference (DiD) estimator while controlling for essential assumptions to analyse differences between those who deferred tax payments and those who did not. Further, we will discuss if the results are sufficient to state the causal effect of treatment on wages, employees and investment (Remler & Ryzin, 2010). In this analysis, the firms with a tax deferral arrangement are in the treatment group, while the remaining firms are in the comparison group (Hill et al., 2018, p. 282). To strengthen the Difference-in-Difference model, a propensity score matching (PSM) is conducted in advance, as there are concerns that the treatment and comparison groups are different in observable characteristics dependent on treatment.

4.2 Propensity Score Matching

PSM can help with self-selection bias which may occur in a non-randomised study. Firms choose to take part in treatment by applying or not applying to the arrangement of tax deferrals. This can cause bias as choosing treatment can be driven by factors outside our model. The endogeneity in treatment arises because the companies have different basis and liquidity to cope with large fluctuations in the market, causing firms to have a different need for treatment (Remler & Ryzin, 2010). This is connected to the homogeneity of the treatment and comparison groups. More comparable treatment and comparison groups will improve causal inference and strengthen internal validity.

4.2.1 Variable Selection

PSM allows for matching along multiple variables at once, which gives a score of probability of being within the treated group based on specifc characteristics, also recognised as confounders. The model can be explained by equation 1.

Equation 1: PSM matching model

$$\hat{e}(x_i) = P\left(T_i = 1 \middle| ln\ CR_{1i}, ln\ DR_{2i}, lnNWC_{3i,} lnFirm\ value^{14}{}_{4i}\right)$$

$$\hat{e}(x_i) = \frac{1}{1 + e^{-(\hat{a} + \hat{b}_1 ln\ CR + \hat{b}_2 ln\ DR + \hat{b}_3 ln\ NWC, \widehat{b_4}\ ln\ Firm\ value)}}$$

Confounding variables are a type of extraneous variables correlated with the independent variable and dependent variable. It is necessary to understand the treatment and which factors may be influential as the researcher need to input variables in the probit model to see if matching is sufficient. The confounders presented in the equation above are found by testing which variables affect dependent and independent variables. Variables ln CR, ln DR, ln NWC and ln firm value are confounding covariates chosen from the descriptive analysis in chapter 3.4.2 based on averages from 2017-2019. Firms that deferred their taxes had more debt in the years before the crisis. In addition, they also had lower liquidity, measured by CR and NWC; hence we use them to conduct the PSM. In addition, we know from NHO that 99 percent of Norwegian firms are SMEs, and figure 3.1 shows that mostly SMEs have an arrangement of tax deferral. A regression analysis is conducted with the dependent variables, ln wages, ln employees and ln investment, where all suspected confounders are significant at a 1% level. In addition, there is a logistic regression with treated as the dependent variable showing significance for the confounding covariates. These are listed in table A.6. Variables thought to be related to the outcome but not the treatment should reduce bias because there is a chance that the variable also is related to the treatment. If omitted, it could be an unmeasured confounder biasing the treatment effect not meeting the conditional independence assumption. The assumption states that all factors are adjusted to make the treatment random. As with large datasets, it is beneficial to include variables thought related to the outcome (Garrido et al., 2014).

[14] See footnote 9 for calculation.

4.2.2 Choice of Method

There are several matching methods in PSM, and the choice of the model needs to be addressed. We have chosen the most common, single nearest neighbour (NN), after trying matching with Caliper (0.01)[15] and different confounders seen in appendix A.8. NN matches the treated with one of the comparison groups, which has the nearest propensity scores but can be modified, allowing each treated observation to match the three nearest control observations. Matching with replacement is a trade-off between bias and variance; allowing replacement increases the average quality of matching while decreasing bias (Caliendo & Kopeinig, 2005, pp. 9–10). The method has been criticised as other matching methods can minimise the distance of p-score between treated and matched comparison groups. As we will see further in this chapter, p-scores are not distant in our analysis; thus, this is not our biggest concern. A paper by Onur Baser (2006) concludes that there are no superior matching methods but states the importance of sensitivity analysis. As stated above, this is done by assessing different models and making a decision by the statistic Rubin´s B and Rubin's R.

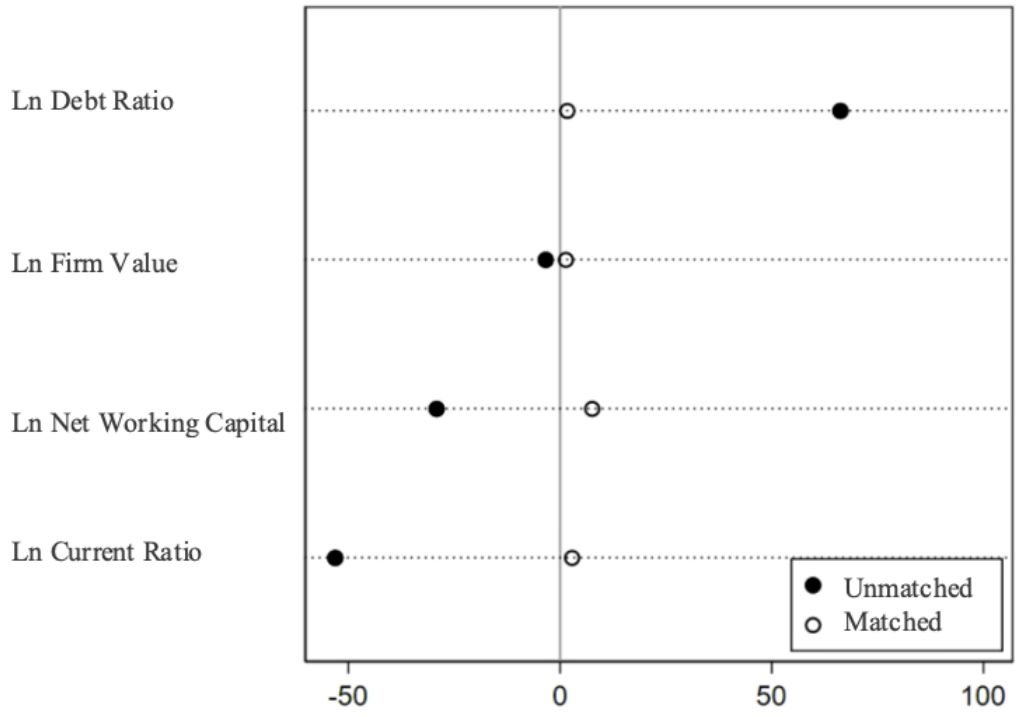
Rubin (2001) implies that Rubin's B <25 and Rubin's R should be between 0.5-2 to ensure the quality of the matching and in order for sufficient balance to be achieved. Rubin's B and Rubin's R are used to assessing overall variance and show how bias and variance differ between the treatment group and the comparison group. The absolute standardised difference (ASD) between the mean propensity scores for the treatment group and the comparison group is represented by Rubin's B. The ratio of the variance in propensity scores for the treatment group to the comparison group determines Rubin's R. In table A.8, Rubin's B and Rubin's R are shown before and after matching. Rubin's B is observed to be higher than 25 for the unmatched sample but less than 25 after matching, meaning p-scores between treated and comparison groups have been well-fitted with a low difference. Furthermore, Rubin's R is outside the interval of 0.5-2 when the sample is unmatched and within the interval after matching, meaning similar variances between the two groups. Both indicate that through matching, the unbalance in our sample is reduced.

[15] Parenthesis states propensity score deviation in matching.

4.2.3 Common Support

A balancing test for selected variables shows similar means for treatment and comparison, and density plots simulate before and after weighting. This can be seen in appendix A.7 as we choose to show the balance between confounders with a standardised difference in means by the treatment and comparison. Matched samples clearly show less bias across covariates in figure 4.1.

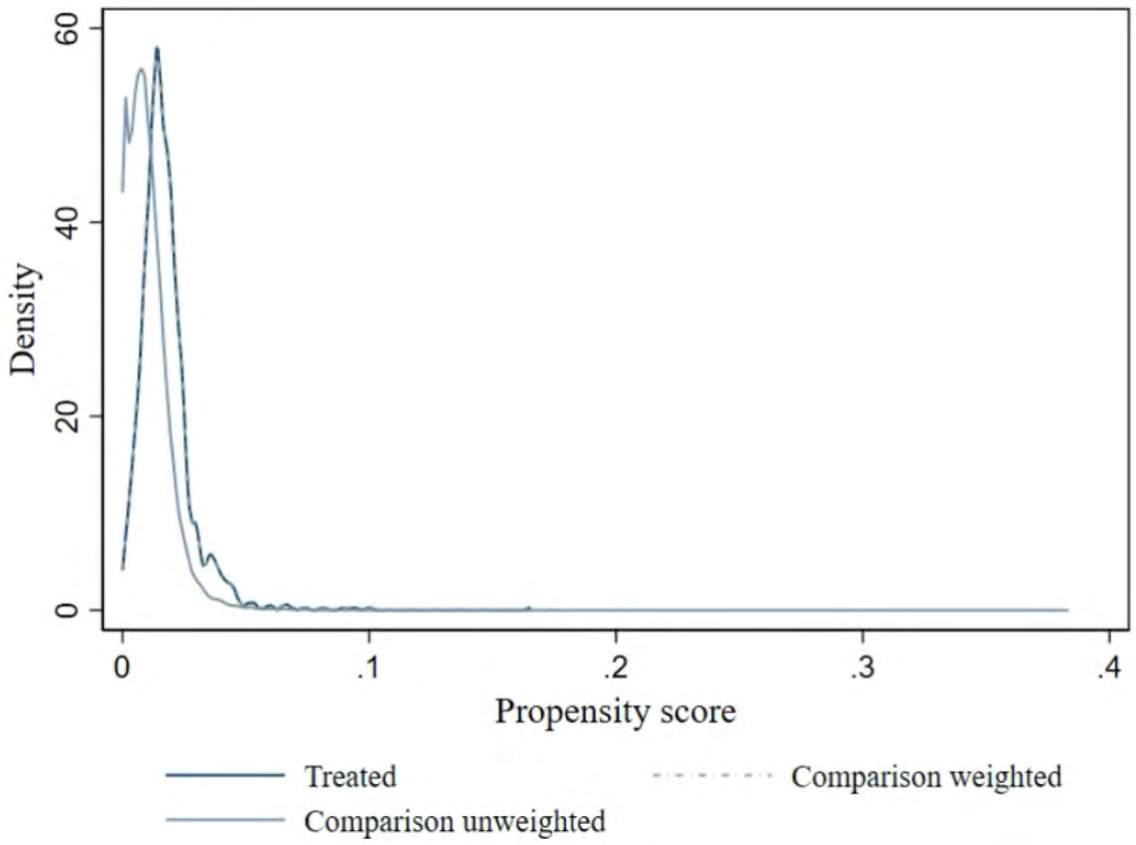
Figure 4.1: *Standardised % bias across covariates.*



After the propensity score is estimated, Stata calculates weights based on the score given to each firm used to re-weight comparison and treatment group in further analysis (Porter, 2015). These weights are based on the frequency of one observation to be matched in one sample. Graphing the propensity score, shows that the balance is equal for the treatment and comparison groups, as shown in figure 4.2, ensuring the common support is met. Common support means propensity scores are overlapping needed to ensure that the comparison group is representative of the original sample of treated firms (Harris & Horst, 2016). In addition, the graph shows low values for the p-score, even when treated. However, the purpose of a PS is not to forecast treatment allocation but rather to adjust effectively for confounding. Measures of model fit are, therefore, inadequate since they assess a model's ability to predict

treatment allocation rather than its capacity to account for confounding factors (Bergstra et al., 2019).

Figure 4.2: *Density plot for treated and comparison groups before and after weight.*



One requirement for all matching methods is that each individual needs to have a nonzero probability of being treated (Harris & Horst, 2016). As described in chapter 1.3, requirements for being eligible for tax deferrals were loss of income or increased costs as a result of the pandemic. These requirements did not have any further guidelines of what extent these needed to be as the compensation scheme had. It is challenging to say if some did not have the opportunity to take part in the treatment as the pandemic has affected most industries to some degree, either by decreased income or increased costs. In chapter 3.4.3, statistics show that all treated firms within our subgroups have either had a loss of income or an increase in costs. Also, with a few exceptions, most sectors experienced a 10% decline in activity, as presented in chapter 3.3.2. This decline in activity corresponds to a real economic cost for enterprises. The sectors that did not experience a decline in activity are removed from the sample in chapter

3.1. We, therefore, consider the requirement of the nonzero probability of being treated as fulfilled.

4.3 Difference-in-Difference Method

The Difference-in-Difference method is suited to evaluate the impact of various treatment and policy changes. The method is one of the most frequently used methods among impact studies being intuitive and used by fields such as economics, health and research and public policy fields (Fredriksson & Oliveira, 2019).

DiD compares two groups with similar characteristics where one looks at the differences in regression estimates before and after treatment. The equations can be written as below, dependent on time and treatment of the panel data. Equation 2 is the average treatment effect of the comparison (ATC), while equation 3 shows the average treatment effect of the treated (ATT). By subtracting equation 2 from equation 3, we find the average treatment effect (ATE) δ in the population. This shows the means over time between the two groups estimating the difference between the after and before periods.

Equation 2: Comparison group- after minus before

$$E[\bar{Y}_{i2020}|Deftax_i = 0] - E\left[\bar{Y}_{i2019,2018,2017}\middle|Deftax_i = 0\right]$$

Equation 3: Treatment group- after minus before

$$E[\bar{Y}_{i2020}|Deftax_i = 1] - E\left[\bar{Y}_{i2019,2018,2017}\middle|Deftax_i = 1\right]$$

Because of differences between groups and variation within our sample, the DiD analysis consist of a fixed effects estimation applying a broader set of conditions of covariates across groups (Wing et al., 2018). This is needed because of the selection of treatment; applying for tax deferral is available for all Norwegian firms giving a large variety within the sample, causing group-specific effects. A fixed effect estimator will give more variation in the details of the research design when trying to best estimate if there are causal effects. Deferred taxes will help liquidity immediately as offset tax costs can be used for operational costs, and we see this condition as met.

The regression equation 4, shown below, further displays how our analysis is regressed in our model. With the "reghdfe" command in Stata, it is possible to implement a two-way fixed effect that defines the model's unit-specific and time-specific unobserved confounders. The group fixed effects are shown by u_i, controlling for permanent differences between firms as the randomised organisational numbers. These are absorbed for each individual firm i. We also absorb time fixed effect in our regression over the subsequent years t, denoted by v_t. These time-fixed effects control for differences in our variables changing from year to year when common for all firms. This way, there is no need to remove inflation or adjust for real wages in account entries used from Income Statement 2, as the fixed effects would absorb this. Given the group- and time-fixed effects used in our equation, our independent variables Treated and Covid will be omitted as they are collinear with the fixed effects. As these are collinear, they are dropped from the equation, so it better reflects the variables of interest. The idiosyncratic error term ε_{it} will denote other effects outside the model.

Equation 4: Regression equation of DiD analysis

$$ln\, Y_{it} = u_i + v_t + \delta(Treated * Covid)_{it} + \varepsilon_{it}$$

To catch the DiD effect of the treated firms, a dummy variable denoted Covid is created, taking the value 0 in years from [2017,2019] and 1 if the year is 2020. Also, a dummy variable for treated firms with the value of 0, if not treated and 1 if treated from all years in the dataset [2017,2020], is created. The interaction term ($Treated * Covid$) will be 1 if the firm is both treated and is in the post-period year 2020. Thus, the DiD effect seen from the coefficient δ can be calculated as the percentage change of the dependent variable Y of treated firms relative to the non-treated firms. As our coefficient δ is a dummy variable in log-linear models, the percentage change in y associated with switching the dummy variable from 0 to 1 is (Halvorsen & Palmquist, 1980):

Equation 5:

$$100 \cdot (e^{\beta_1} - 1)$$

Our three dependent variables are largely distributed, as shown through the minimum and maximum values in chapter 3.4. As a part of our estimation, we convert the three dependent

variables to natural logarithm form to analyse percentage change and make the distributed dataset more fitted for regression (Benoit, 2011). Hence the three regressions done in the analysis are shown in equations 6 – 8 and are regressed on each subgroup, hence for each sector [1,9], region [1,11] and percentiles of EBITDA [1,10].

Equation 6 Regression equation Wages

$$Ln(Wages)_{it} = u_i + v_t + \delta(Treated * Covid\ )_{it} + \varepsilon_{it}$$

Equation 7 Regression equation Employees

$$Ln(Employees)_{it} = u_i + v_t + \ \delta(Treated * Covid\ )_{it} + \varepsilon_{it}$$

Equation 8 Regression equation Investments

$$Ln(Investments)_{it} = u_i + v_t + \delta(Treated * Covid\ )_{it} + \varepsilon_{it}$$

The DiD estimator has an advantage as it does not require the treatment and the comparison group to have similar means in the outcome variable or the covariates. The design of the estimator measures the effect of treatment and comparison group in relative change over time (Daw & Hatfield, 2018). Thus, we have used PSM on average rates from 2017 to 2019 to select out some of the selection bias of the natural study, which adjusts for the time-varying confounders that may bias our estimates (Baser, 2006). Still, there are some pitfalls with a statistical inference of the DiD estimator. There has been discussed how valid the standard errors estimated are as they may be biased because of serial correlation (Bertrand et al., 2004).

4.3.1 Assumptions

The first assumption is the common shock assumption which states that an exogenous force should affect both groups equally in the post-period. This cannot be tested as it is hard to know what shocks may affect all firms in the future, but it is related to the second assumption, the parallel trend assumption.

The parallel trend, also called the common trend assumption, is critical when doing a DiD research design. The analysis yields unbiased estimates if the treatment group, in the absence of treatment, has the same trend as the comparison group. Thus, this can never be tested, making a discussed topic within the study of the DiD estimator.

As with a non-random assignment, there will always be a concern that the treatment group would have followed a different trend than the comparison group because they may have characteristics making them more prone to treatment. As described in chapter 3.1, we have a balanced dataset which contains data from 2017-2020 for all firms where the treatment, deferral of taxes, is assumed to be within the last year because of the unavailability of the dates when deferrals were granted. Since the data collected have several pre-periods, we can check for trends using plots to visually see the trendlines within the years before treatment and how this changes after treatment in 2020: the longer period, the more robust the assumption (Fredriksson & Oliveira, 2019). We do not wish to exclude further firms from our current sample and consider it sufficient to analyse the parallel trend assumption with these firms even if they lack some data before 2017, as more firms will give a more accurate trend. Firms established between 2010 and 2017 may miss some data when plotting the trend line. It should be noted that with the relatively short time horizon, it can be difficult to distinguish between statistical noise and real deviation from parallel trends (Wing et al., 2018).

Looking at the trend plots in figures 4.3 and 4.4, we observe a clear parallel trend for ln wages and ln employees. Both treatment and comparison group changes equally; however, ln wages is more volatile for the treated group. We are interested in seeing how the two groups differ in the post-period vertical line where treatment has taken place. In the trend line of the ln wages, there is a sharp decrease from 2019 to 2020 for both groups, but the decrease is steeper for the treated. This is also the case with ln of employees.

Figure 4.3: *Trend in ln of wages from 2010 to 2020.*

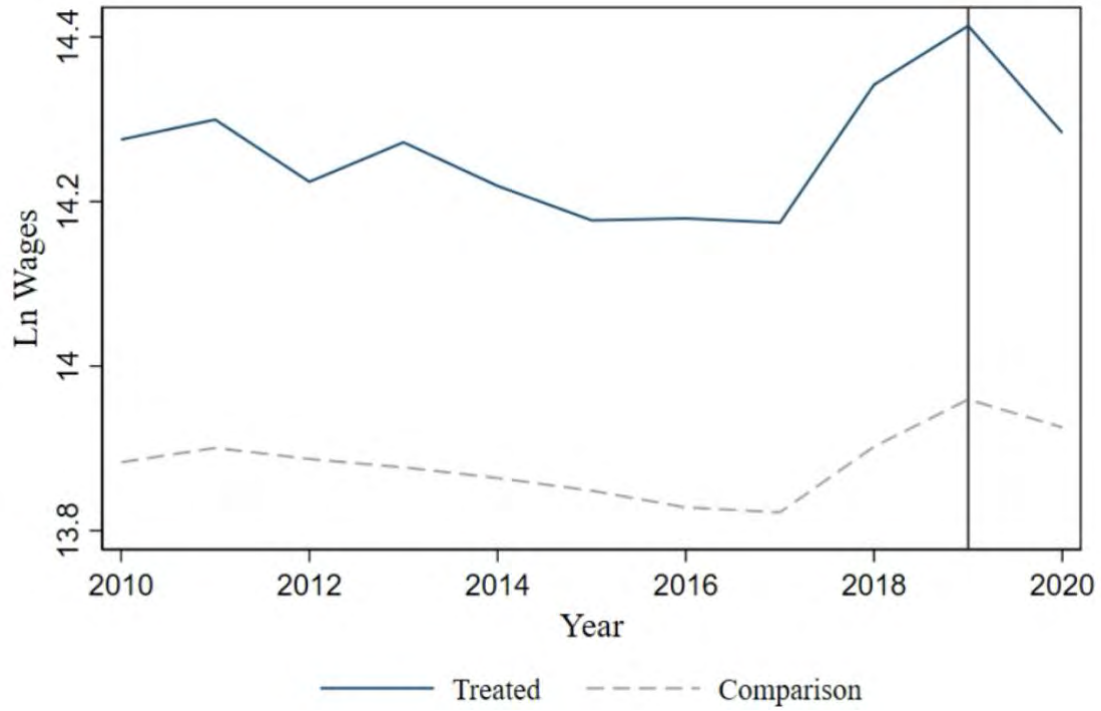


Figure 4.4: *Trend in ln of employees from 2010 to 2020.*

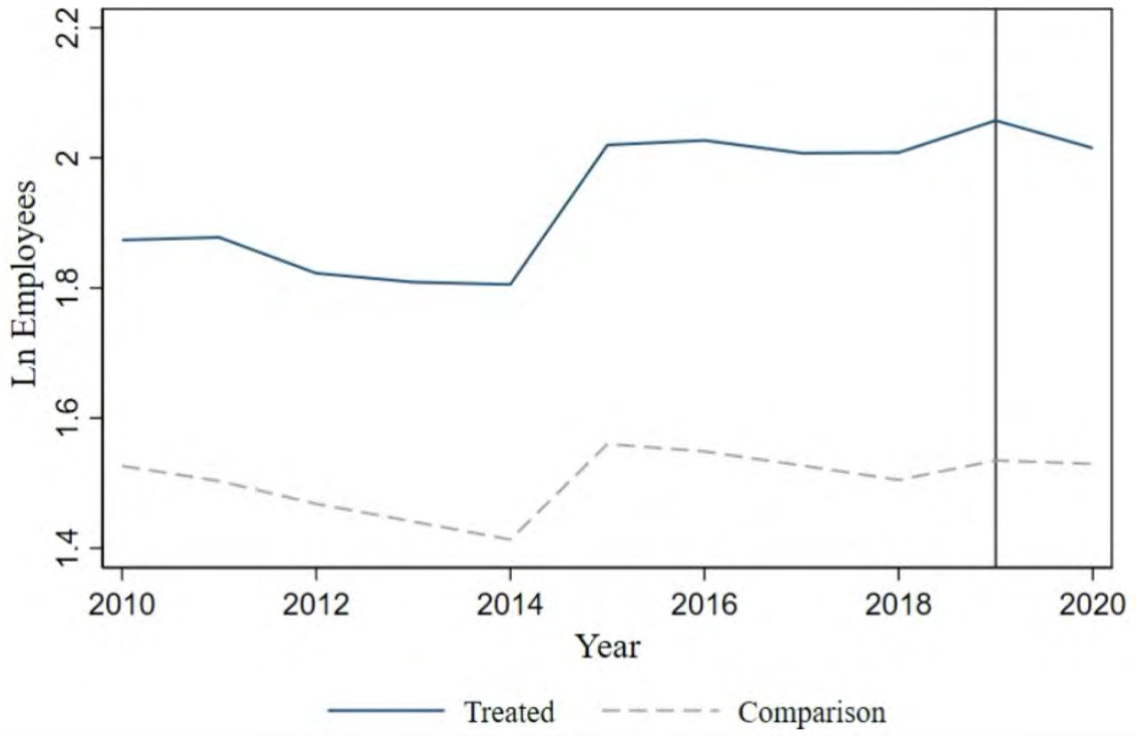
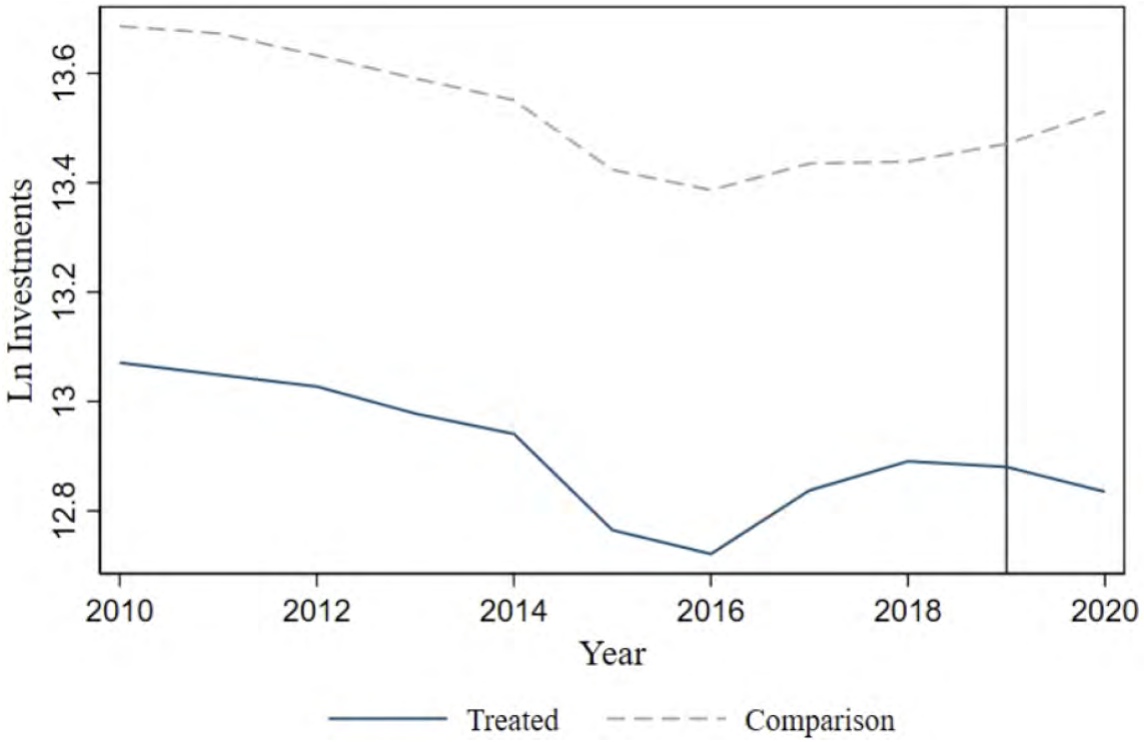


Figure 4.5: *Trend in ln of investments from 2010 to 2020.*



Ln of investment trend plot is consistent as investments move with the parallel trend assumption. It can be seen from the graph that from 2018 there is a slight change in trend there is a decline in investments for the treated firms but and increase for comparison firms. As discussed in chapter 3.4.2, treated firms had worse liquid positions before the pandemic, which may explain the lack of investments for the treated.

To further support the parallel trend assumption there is conducted a placebo regression with the treated and non-treated sample with the years before the tax deferrals (Fredriksson & Oliveira, 2019). There should be no difference between the fake treated group and the comparison group to justify a more robust parallel trend assumption. Regressions are shown in table A.12 and are weighted to portray similar to the final regressions for the actual DiD analysis. The regression shows no significance for ln wages, ln employees or ln investments. We see the parallel trend assumption as met.

5. Analysis

In this chapter, we will present our findings from the analysis. Firstly we do simplified regressions to see the overall effect ($Treated * Covid$) might have on the dependent variables. We then continue with propensity score matching and regressions within our subgroups. The coefficient of ($Treated * Covid$) equals the DiD effect of the interaction term and will therefore be denoted as DiD further in this thesis. We will map if and how well the arrangement of deferred tax can explain the changes in wages, employees and investments.

First, we can see that DiD is significant on a 1 percent level for ln wages and ln employees while significant at a 5 percent level for ln investments. The coefficient for ln wages is 0.052 which is interpreted as an increase of 5.34 percent in wages after treatment. The DiD coefficient for ln employees is 0.03, resulting in a 3.05 percent increase in employment rate after treatment. The DiD effect on ln investments is negative by 6.20 percent. This can be interpreted as firms with an arrangement of tax deferral during 2020 will have more of a decline in investments compared to firms without an arrangement. As seen in chapter 4.3.1, the parallel trend assumption deviated to some extent in the years leading up to the pandemic, indicating that the negative trend may not only be because of restrictions.

Table 5.1: *Regressions before PSM.*

Variables	Ln of Wages	Ln of Employees	Ln of Investments
Covid	-	-	-
Treated	-	-	-
DiD	0.052***	0.030***	-0.064**
	(0.016)	(0.010)	(0.026)
Constant	13.960***	1.557***	13.493***
	(0.000)	(0.000)	(0.000)
Observations	399,591	397,207	476,756
R-squared	0.918	0.949	0.929

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

After the PSM, there is a change in coefficients and observations due to PSM. The method also makes the sample smaller, reducing the number of observations included further in the analysis. The DiD coefficient is significant for both ln of wages and ln of employees on a 5 and 1 percent level but not significant for ln investments. This indicates that the treatment is

insignificant for firms' financial and other long-term investments. When the DiD coefficient equals 0.072, wages increase by 7.47 percent. Employment increase by 7.68 percent after treatment.

Table 5.2: *Regressions after PSM.*

Variables	Ln of Wages	Ln of Employees	Ln of Investments
Covid	-	-	-
Treated	-	-	-
DiD	0.072**	0.074***	0.090
	(0.036)	(0.024)	(0.073)
Constant	14.436***	1.937***	13.157***
	(0.005)	(0.003)	(0.009)
Observations	6,212	6,175	5,807
R-squared	0.918	0.942	0.902

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

These regressions give more of an overview of the treatment's effect. However, to give more specific feedback on the arrangement, we conduct further analysis within firms in the different sectors, regions or EBITDA percentiles.

5.1 NACE-codes

Initially, various schemes were mentioned to help businesses, society and people through a period of strict restrictions. Figure A.4 provides an overview of how different schemes and grants were distributed across industries in millions of Norwegian kroner. The grey part of the bar plot in the figure shows the amount deferred VAT in the different sectors. A quick view over table A.3 shows that the sectors with the greatest decline in GDP are among the sectors granted the most support from the schemes. By regressing each sector for itself, it is possible to see if the sectors have had different effects on the arrangement of deferred taxes.

5.1.1 Wages

Table 5.3 shows the dependent variable ln of wages regressed on the interaction term ($Treated * Covid$). It can be observed that the DiD effect is significant at 1 percent level for the sector arts, entertainment and recreation. Arts, entertainment and recreation has a total of 126.37 percent increase in wages, given a DiD coefficient of 0.817. This implies that firms

with tax deferral arrangements get a higher wage increase over time compared to those without the arrangement. The effect should be interpreted with caution because of few observations and support schemes for culture directly aimed at the sector. For the rest of the sectors, there are no significant values observed. As discussed, other policy instruments were more targeted towards different types of firms.

Table 5.3: *Regressions on ln wages for different sectors.*

Variables	Natural resources and mining	Manufacturing	Accommodation and food service	Service activities
DiD	0.372	0.146	0.076	0.132
	(0.392)	(0.094)	(0.138)	(0.088)
Constant	14.56***	15.14***	14.66***	14.29***
	(0.050)	(0.015)	(0.020)	(0.011)
Observations	111	495	302	1,443
R-squared	0.916	0.924	0.906	0.905

Wholesale and retail trade	Construction	Transport and storage	Arts, entertainment and recreation	Other
-0.004	0.096	0.211	0.817***	0.056
(0.062)	(0.071)	(0.164)	(0.214)	(0.125)
14.27***	14.79***	14.33***	13.56***	13.90***
(0.009)	(0.009)	(0.019)	(0.011)	(0.013)
1,808	1,269	235	32	517
0.923	0.919	0.930	0.899	0.913

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.1.2 Employees

Table 5.4 also shows nine individual regressions with the dependent variable as ln of employees. The regressions show that ($Treated * Covid$) is significant for the sectors accommodation and food service and service activities, at a 5 percent level. This equals an increase of 33.11 percent of employees in accommodation and food service, and 13.54 percent increase of employees in service activities. Table 3.8 show changes in CR for different sectors, for accommodation and food service, and service activities; there is observed to be a decrease for treated firms with 24 and 41 percent. For the sectors where treatment is not significant, which it is not for most, the change in employees cannot be explained by this arrangement.

Table 5.4: *Regression on ln employees for different sectors.*

Variables	Natural resources and mining	Manufacturing	Accommodation and food service	Service activities
DiD	0.094	0.116	0.286**	0.127**
	(0.355)	(0.073)	(0.132)	(0.051)
Constant	1.961***	2.521***	2.852***	1.685***
	(0.044)	(0.012)	(0.019)	(0.007)
Observations	113	494	297	1,442
R-squared	0.830	0.944	0.864	0.952

Wholesale and retail trade	Construction	Transport and storage	Arts, entertainment and recreation	Other
0.060	0.006	0.039	0.273	0.048
(0.039)	(0.051)	(0.164)	(0.230)	(0.082)
1.885***	2.123***	1.786***	2.036***	1.337***
(0.006)	(0.007)	(0.019)	(0.013)	(0.009)
1,805	1,281	233	29	481
0.933	0.940	0.905	0.978	0.943

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.1.3 Investments

The latter dependent variable is the ln of all investments. Service activities is significant at a 5 percent level for investments. After treatment, this increases 45.50 percent in investments, given the DiD effect. The significance of treatment on investments in service activities, implies that the sector will have 45.5 percent increase in investments measured against non-treated firms within the sector. Their EBIT-margin has increased by 75%, and their costs have increased less than their peers, providing more investment opportunities.

Table 5.5: *Regression on ln investments for different sectors.*

Variables	Natural resources and mining	Manufacturing	Accommodation and food service	Service activities
DiD	-0.140	0.184	-0.048	0.375**
	(0.477)	(0.284	(0.208)	(0.171)
Constant	14.86***	13.65***	13.28***	12.39***
	(0.052)	(0.044)	(0.029)	(0.022)
Observations	118	480	286	1,167
R-squared	0.919	0.886	0.949	0.887

Wholesale and retail trade	Construction	Transport and storage	Arts, entertainment and recreation	Other
0.166	-0.050	0.324	-0.652	0.036
(0.158)	(0.174)	(0.295)	(0.366)	(0.138)
12.59***	13.16***	13.60***	13.59***	14.46***
(0.022)	(0.023)	(0.039)	(0.035)	(0.012)
1,450	1,255	193	35	823
0.877	0.844	0.917	0.978	0.948

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.2 Regions

The subchapters show regression results for each dependent variable for each region after PSM. From chapter 3.4.1, it is known that some of the regions were more heavily affected by COVID-19, measuring up against the number of infection cases. In particular, the regions Viken, Oslo, Vestland, Rogaland, Vestfold og Telemark and Trøndelag, had over 100,000 cases of corona infection. We find that about 78 percent of treated firms were treated within one of these regions; see figure 3.5. Firms within all regions are found to have increased operating costs from 2019 to 2020.

5.2.1 Wages

Table 5.6 shows the individual regressions of the dependent variable. For the region Vestfold og Telemark, the DiD coefficient is significant at a 10 percent level showing an increase of 20.08 percent in wages after treatment. For this region, table 3.8 shows the highest decrease in NWC amongst regions of 192 percent.

Table 5.6: *Regressions on ln wages for different regions.*

Variables	Agder	Innlandet	Møre og Romsdal	Nordland	Oslo
DiD	0.250	0.127	0.149	-0.212	0.003
	(0.195)	(0.206)	(0.184)	(0.143)	(0.0843)
Constant	14.17***	14.24***	14.66***	14.42***	14.64***
	(0.022)	(0.023)	(0.025)	(0.019)	(0.012)
Observations	307	295	304	250	1,164

R-squared	0.889	0.921	0.941	0.893	0.927

Rogaland	Troms og Finnmark	Trøndelag	Vestfold og Telemark	Vestland	Viken
-0.095	0.243	0.217	0.183*	-0.030	0.076
(0.145)	(0.152)	(0.162)	(0.098)	(0.098)	(0.062)
14.49***	14.35***	14.35***	14.15***	14.53***	14.43***
(0.018)	(0.020)	(0.019)	(0.013)	(0.014)	(0.008)
444	210	442	520	673	1,564
0.912	0.890	0.905	0.902	0.922	0.934

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.2.2 Employees

An additional eleven distinct regressions for ln of employees are shown in table 5.7. The coefficient is significant at a 5 percent level for the regions Trøndelag and Vestfold og Telemark. For Trøndelag the DiD coefficient is 0.168; hence there is an 18.29 percent increase in employees. The increase in employees is somewhat smaller for Vestfold og Telemark, at 17.35 percent.

Table 5.7: *Regressions on ln employees for different regions.*

Variables	Agder	Innlandet	Møre og Romsdal	Nordland	Oslo
DiD	0.023	0.117	0.067	0.074	0.021
	(0.093)	(0.103)	(0.114)	(0.121)	(0.056)
Constant	1.872***	1.999***	2.229***	2.083***	2.060***
	(0.011)	(0.012)	(0.015)	(0.016)	(0.008)
Observations	307	279	304	246	1,152
R-squared	0.957	0.954	0.952	0.915	0.953

Rogaland	Troms og Finnmark	Trøndelag	Vestfold og Telemark	Vestland	Viken
0.037	-0.072	0.168**	0.160**	0.089	0.057
(0.114)	(0.127)	(0.074)	(0.080)	(0.071)	(0.048)
1.824***	1.978***	2.058***	1.717***	1.939***	1.846***
(0.014)	(0.017)	(0.009)	(0.011)	(0.010)	(0.006)
451	215	436	505	685	1,554
0.921	0.936	0.951	0.936	0.938	0.944

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.2.3 Investments

Table 5.8 displays the regression of the dependent variable ln of investments. As seen in the table below, the DiD coefficient is not significant for any regions when measuring the impact on investments. This indicates that there are no significant differences between the investments of treated and comparison groups in different regions.

Table 5.8: *Regressions on ln investments for different regions.*

Variables	Agder	Innlandet	Møre og Romsdal	Nordland	Oslo
DiD	-0.076	0.401	0.449	0.026	0.281
	(0.210)	(0.458)	(0.378)	(0.251)	(0.234)
Constant	13.34***	13.30***	13.90***	13.73***	12.90***
	(0.025)	(0.043)	(0.051)	(0.032)	(0.034)
Observations	318	258	319	278	997
R-squared	0.932	0.915	0.909	0.932	0.889

Rogaland	Troms og Finnmark	Trøndelag	Vestfold og Telemark	Vestland	Viken
0.412	0.365	0.189	0.103	-0.041	-0.208
(0.259)	(0.236)	(0.208)	(0.281)	(0.181)	(0.152)
13.12***	13.02***	13.14***	12.96***	13.36***	13.00***
(0.031)	(0.027)	(0.024)	(0.038)	(0.024)	(0.019)
396	230	426	514	652	1,376
0.906	0.962	0.890	0.906	0.919	0.881

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.3 Percentiles of EBITDA

The subchapters tabulate regression results for each percentile of EBITDA. By differencing by the range of companies' EBITDA sizes, we want to find out if there is a significant effect from the arrangement of tax deferrals in relation to different percentiles. For a full overview of the percentiles, see table 3.4.

5.3.1 Wages

Table 5.9 shows regressions with the dependent variable, the ln of wages. Based on the regressions on wages, it is observed DiD coefficient is significant at a 5 percent level for 60th

– 70th percentile and at a 10 percent level for 70th – 80th percentile. There is an increase in wages of 19.36 percent and 18.18 percent for these percentiles. These firms have an average EBITDA between 301,000 and 1,086,000 NOK years before covid.

Sadiq and Krever (2021) found that deferred taxes were most helpful for more profitable firms and that the ones least affected by the downturn have more significant benefits from deferrals. We cannot with certainty say how the firms within these percentiles have been affected by the pandemic and infection prevention controls but we know that these firms are amongst the ones with medium to a high levels of earnings. Hence, it can be discussed if the treatment has been significant for these firms as they are more profitable than companies with lower EBITDA.

Table 5.9: *Regressions on ln wages for different percentiles.*

Variables	10th	10th – 20th	20th – 30th	30th – 40th	40th – 50th
DiD	-0.042	0.002	0.225	0.195	0.119
	(0.107)	(0.170)	(0.274)	(0.123)	(0.114)
Constant	15.03***	13.70***	13.13***	13.22***	13.69***
	(0.021)	(0.023)	(0.032)	(0.017)	(0.017)
Observations	716	333	250	548	688
R-squared	0.878	0.836	0.792	0.807	0.832

50th – 60th	60th – 70th	70th – 80th	80th – 90th	90th – 100th
0.166	0.177**	0.167*	-0.154	0.021
(0.121)	(0.084)	(0.096)	(0.100)	(0.093)
13.93***	14.39***	14.58***	15.14***	16.15***
(0.017)	(0.011)	(0.011)	(0.011)	(0.008)
755	812	760	712	638
0.879	0.910	0.906	0.925	0.940

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.3.2 Employees

Ten separate regressions with the same dependent variable, the ln of employees, are shown in table 5.10. From these regressions the DiD coefficient is significant for the 30th – 40th percentile at a 10 percent level. Given the interaction term of 0.138, this indicates that rate of employment increase by 14.80 percent. In addition, the DiD coefficient is significant at a 1 percent level for both the 60th – 70th and 70th – 80th percentile, which equals 23.12 and 20.44 percent increase in employment rates.

Table 5.10: *Regressions on ln employees for different percentiles.*

Variables	10th	10th – 20th	20th – 30th	30th – 40th	40th – 50th
DiD	-0.072	0.083	0.019	0.138*	0.101
	(0.116)	(0.119)	(0.103)	(0.081)	(0.074)
Constant	2.368***	1.513***	1.148***	0.990***	1.367***
	(0.023)	(0.017)	(0.012)	(0.011)	(0.011)
Observations	724	329	253	543	687
R-squared	0.921	0.901	0.922	0.913	0.921

50th – 60th	60th – 70th	70th – 80th	80th – 90th	90th – 100th
0.038	0.208***	0.186***	0.009	0.003
(0.071)	(0.069)	(0.068)	(0.072)	(0.084)
1.632***	1.828***	2.068***	2.387***	3.232***
(0.011)	(0.009)	(0.008)	(0.008)	(0.007)
737	820	748	713	621
0.887	0.917	0.921	0.947	0.946

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

5.3.3 Investments

Regression results for the latter dependent variable, ln of investment, are shown in table 5.11. As for these regressions, the interaction term is only significant for the 60th – 70th EBITDA percentile at a 10 percent level. Given the coefficient of 0.399, the expected increase in investments is 49.03 percent.

Table 5.11: *Regressions on ln investments for different percentiles.*

Variables	10th	10th – 20th	20th – 30th	30th – 40th	40th – 50th
DiD	-0.031	0.165	0.072	0.297	0.229
	(0.332)	(0.374)	(0.453)	(0.368)	(0.149)
Constant	13.43***	12.02***	11.20***	11.00***	11.91***
	(0.063)	(0.047)	(0.052)	(0.047)	(0.022)
Observations	695	243	137	417	574
R-squared	0.867	0.822	0.886	0.856	0.889

50th – 60th	60th – 70th	70th – 80th	80th – 90th	90th – 100th
0.009	0.399*	0.173	-0.017	0.042
(0.190)	(0.216)	(0.220)	(0.153)	(0.159)
12.31***	12.85***	13.62***	14.14***	15.26***
(0.026)	(0.028)	(0.026)	(0.017)	(0.013)
654	800	804	765	718

0.848	0.841	0.815	0.886	0.934

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

6. Discussion

Our research of the scheme contributes to knowledge of tax deferral as an aid during liquidity issues. Through this thesis, we have analysed the firms applicable for VAT deferrals looking at effects on wages, employees, and investments, thereby helping to relieve firms in financial distress. We discuss whether one can see a causal effect of the arrangement or not.

In our analysis of tax deferrals, we discovered that firms that chose to defer their taxes had a worse liquid position, high relative debt, and lower margins and return on assets than those that did not. Finding a significant positive effect for wages and employment before and after matching suggests that the scheme may have affected not furloughing workers. Various businesses have used the arrangement of deferrals within all analysed subgroups. From our estimates, the deferrals have been most effective for some of the hardest-hit industries with infection control as arts, entertainment and recreation, accommodation and food service and the service industry. Still, other industries also had strict infection control measures where the effect was not significant, which may be because of other schemes or the strength of infection control measures within these industries. In Vestfold og Telemark, there is a significant positive change for the two dependent variables indicating deferrals have been more of a help in this region. However, this region does not stand out in the KPI table. For the investment variable, only the service industry has a net positive effect of the arrangement. A reason for the lack of investment is most preferably the hesitation to invest when market conditions are volatile and future uncertainty, regardless of earnings before the pandemic. Earnings before the pandemic and our results show this to be significant at wages and employment for the higher percentiles of EBITDA. This is consistent with existing literature finding that deferral is most helpful for the most profitable firms.

Even if our choice of method controls for confounders and estimated change in means, we are cautious in estimating a causal effect because support schemes implemented simultaneously may affect the estimates. As discussed in our thesis, several policy instruments were introduced to help different types of firms in different situations. Without data access to all schemes, it is difficult to assess their effect on firms and why they chose other policy instruments during COVID-19. Considering our sample, only 1.8% of the firms had an arrangement of tax deferral. Through research on the different policy instruments, we found

that enterprises with over 30% turnover loss could apply for the compensation scheme. At the same time, some industries also had other schemes directly aimed at those. Figure A.4 shows that firms within accommodation and food service, transport and storage, and wholesale and retail trade have received more than 1 billion through the compensation scheme.

At the same time, it is possible to discuss whether the high-interest rate can contribute to companies opting out of the scheme. Vedum stated that the interest rate was lowered after inquiries from small, concerned businesses, which could indicate that firms were struggling to pay the payment interest (Solli, 2022). Our analysis shows that treatment has not been significant on the dependent variables for many of the sectors, regions, and percentiles presented. Indicating the effect of the arrangement has not helped firms in financial distress as rapidly as hoped. Figure A.4 clearly shows that deferral of VAT was not the main support scheme used within any of the sectors. The repayment interest of 6 and 8.5 percent could indicate that the other schemes were sufficient for firms with payment difficulties. OECD's report (2021) presents that Korea and New Zealand exclusively targeted SMEs, while Italy enhanced deferrals for severally affected industries. Also, most countries had implemented a reduction in interest applying to late payments. One could assess these schemes' effect further and consider if one should have made some changes to the arrangement so it would have more of a significant impact.

Following treatment, there were few significant changes in wages, employees, or investments. According to Vito and Gomez's (2020) research, tax deferrals help only a small number of firms avoid becoming illiquid compared to other arrangements. Based on their findings, there may be better schemes to prevent firms from financial distress and stimulate the same accounts entries. Initially, we mentioned that the scheme was meant to help firms' liquidity. From chapter 3.4.3, we know that all firms experienced an adverse change in income or expenses and thus were eligible for the scheme. Unpaid wages are considered short-term debts, and given that treatment is significant for a few groups, deferred VAT is not the reason for the change in most subgroups. It is assumed that the subgroups with no significant values have chosen to allocate the deferred VAT differently.

6.1 Validity and Limitations

In addition to the challenges presented in the last chapter, one of the challenges with this analysis has been the lack of sufficient data and uncertainty around negative values in the accounting entries as described in chapter 3.2. This may cause our estimates to be negatively biased, not showing the total effect of the arrangement. In addition, it is difficult to rule out effects from other arrangements within the dataset and how these influence the accounts within the year 2020. In Income Statement 2 the accounting entries public subsidy/reimbursement ("Offentlig tilskudd/refusjon")[16] and grant compensation scheme ("Tilskudd kompensasjonsordning")[17] are listed, but they are not within our dataset. It is unknown whether these accounts are a part of operating income or not and how these, among other schemes, have influenced the dependent variables.

With the choice of an empirical method combining a PSM and Difference-in-Difference method, the analysis tries to best interpret the effect on our dependent variables based on our available data. Matching is a complex process; the dataset and its quality should determine the best matching method. Even if an analysis is performed using the method that best balances the data, the matching process may still be bias due to missing confounders making the assumption of conditional independence not met. This is caused by non-controlled factors influencing the treatment or the outcome. These factors could be leadership and board management not possible to control without identification of firms, among other unknown factors. If we had exclusively used the DiD method without matching, it could give more extreme values and overestimating effects because of a bigger sample of the non-treated.

6.2 Further Research

The economic consequences of the pandemic are complex, and it is essential to assess different aspects of government support during COVID-19 for contingency planning for a future crisis. The analysis and discussion from this thesis can be helpful for others researching the topic of government support and the arrangement of tax deferrals. Extensions to this thesis are intriguing to further research as we have learned valuable information about the scheme.

[16] Account 3400.
[17] Account 3410.

When data for the whole period of the scheme are available, it would be insightful to evaluate the arrangement for further research. The pandemic was still a fact, with varying degrees of measures for infection prevention control, past 2020. Our paper is only based on data from the first arrangement, as mentioned in the introduction, which means there are more firms in the sample which have yet to be included in the analysis. Wages, employment, and investments could be further assessed with longer time horizons giving more valid results. We only have one data point in the analysis when evaluating these dependent variables from the end of 2020. The ideal dataset would have account entries and information on the arrangement of deferred taxes and fees for the whole period of the scheme.

Our analysis is comprehensive and mainly focuses on which firms applied for the deferrals and if the deferral of taxes has impacted the level of wages, employment and investments independently. Further research could assess the amount deferred and if there are any differences between firms with different amounts of deferred taxes. One could also consider analysing which firms fell out of the arrangement, why they did and which types of firms paid back the deferred taxes before the last instalment as soon as the data for this is available. Some firms went bankrupt, and it could be insightful to assess which types of firms this was and what their financial situation was like at the time of deferment. More insight into the arrangement can help the scheme better help firms in financial distress more rapidly during the next crisis.

7. Conclusion

The aim of this thesis was to examine how the arrangement of deferred taxes has helped firms in liquid shortage by assessing its impact on the three dependent variables wages, employment and investments. Our focus has been on deferral of VAT from the first arrangement.

Our findings show that wages, employees and investments have some significant results, indicating that tax deferrals have helped to some extent. The arrangement has best helped firms which are profitable, despite the average firm in the sample had worse liquidity and profitability position. However, the estimates should be assessed with caution because of few observations for some regressions and the unknown effect of other schemes. Given the other policy instruments in place to help businesses, it could seem as tax deferral was chosen as a last resort. Even if the treatment only has helped few firms, it has somewhat helped. However, it could be further assessed if the arrangement should be adjusted for future use as a policy instrument to better help more firms.

References

Altinn. (2022, June 20). *Exemptions from the VAT obligation*. https://www.altinn.no/en/start-and-run-business/direct-and-indirect-taxes/indirect-taxes/exemptions-from-the-vat-obligation/

Andersson, M., Stefano, C. D., Sun, Y., & Vinci, F. (2022). The recovery in business investment—Drivers, opportunities, challenges and risks. *Economic Bulletin*, *2022*(5). https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_01~ffb80444e5.en.html

Bachman, D. (2022, January). *Is the writing on the wall for buildings? Business investment since COVID-19*. Deloitte. https://www2.deloitte.com/us/en/insights/economy/spotlight/business-investment-trends-post-covid.html

Baser, O. (2006). Too Much Ado about Propensity Score Models? Comparing Methods of Propensity Score Matching. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, *9*(6), 377–385. https://doi.org/10.1111/j.1524-4733.2006.00130.x

Benoit, K. (2011). Linear regression models with logarithmic transformations. *London School of Economics*, *22*(1), 23–36.

Bergstra, S. A., Sepriano, A., Ramiro, S., & Landewé, R. (2019). Three handy tips and a practical guide to improve your propensity score models. *BMJ Journals*, *5*(1). http://dx.doi.org/10.1136/rmdopen-2019-000953

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-In-Differences Estimates? *The Quarterly Journal of Economics*, *119*(1), 249–275. https://doi.org/10.1162/003355304772839588

Bradley, C., & Stumpner, P. (2021, March 10). *The impact of COVID-19 on capital markets, one year in*. McKinsey & Company. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/the-impact-of-covid-19-on-capital-markets-one-year-in

Brasch, T. von, Cappelen, Å., Holden, S., Lindstrøm, E. L., & Skretting, J. (2022). *COVID-19, tapt verdiskaping og finanspolitikkens rolle*. Statistics Norway. https://www.ssb.no/nasjonalregnskap-og-konjunkturer/konjunkturer/artikler/covid-19-tapt-verdiskaping-og-finanspolitikkens-rolle%20-

2022/_/attachment/inline/bda08880-e3d7-450d-9e63-b4273d8e737c:ff4942ce37a93e8425535b94aa7fe87066304bba/RAPP2022-15.pdf

Brunstad, M. K. (2020, June 9). Forenklet ordning for betalingsutsettelse. *Blogg pwc*. https://blogg.pwc.no/skattebloggen/forenklet-ordning-for-betalingsutsettelse

Caliendo, M., & Kopeinig, S. (2005). *Some Practical Guidance for the Implementation of Propensity Score Matching* [DIW Discussion Papers, No. 485]. Deutsches Institut für Wirtschaftsforschung (DIW). https://www.econstor.eu/bitstream/10419/18336/1/dp485.pdf

Daw, J. R., & Hatfield, L. A. (2018). Matching and Regression to the Mean in Difference-in-Differences Analysis. *Health Services Research*, *53*(6), 4138–4156. https://doi.org/10.1111/1475-6773.12993

Devereux, M. P., Güceri, I., Simmler, M., & Tam, E. H. F. (2020). Discretionary fiscal responses to the COVID-19 pandemic. *Oxford Review of Economic Policy*, *36*(1), 225–241. https://doi.org/10.1093/oxrep/graa019

Forskrift om utsettelse av skatteinnbetalinger mv. For å avhjelpe konsekvensene av Covid-19-utbruddet, (2020). https://lovdata.no/dokument/SF/forskrift/2020-04-07-764

Finansdepartementet. (2021). *Meld. St. 2 (2020-2021)*. Regjeringen. https://www.regjeringen.no/contentassets/34570d00a82b444196de2c36a9efb993/no/pdfs/stm202020210002000dddpdfs.pdf?fbclid=IwAR15KIm5-doD-FTrHYAykqAQS8Cm668bGh6S0BLfQgKaWVMPNxMdHDKNCAA

Francis-Devine, B. (2022). *What happened to wages in the coronavirus pandemic?* https://commonslibrary.parliament.uk/what-happened-to-wages-in-the-coronavirus-pandemic/

Fredriksson, A., & Oliveira, G. M. de. (2019). Impact evaluation using Difference-in-Differences. *RAUSP Management Journal*, *54*(4), 519–532. http://dx.doi.org/10.1108/RAUSP-05-2019-0112

Garrido, M. M., Kelley, A. S., Paris, J., Roza, K., Meier, D. E., Morrison, S., & Aldridge, M. D. (2014). Methods for Constructing and Assessing Propensity Scores. *Methods Corner Article Collection*, *49*(5), 1701–1720. https://doi-org.ezproxy.nhh.no/10.1111/1475-6773.12182

Halvorsen, R., & Palmquist, R. (1980). The Interpretation of Dummy Variables in Semilogarithmic Equations. *The American Economic Review*, *70*(3), 474–475.

Hanna, C. H. (2009). The Real Value of Tax Deferral. *Florida Law Review*, *61*(2). https://scholarship.law.ufl.edu/cgi/viewcontent.cgi?article=1676&=&context=flr&=

&sei-redir=1&referer=https%253A%252F%252Fscholar.google.com%252Fscholar%253Fhl%253Dno%2526as_sdt%253D0%25252C5%2526q%253Dtax%252Bdeferral%252Bbenefits%2526btnG%253D%2526oq%253Dtax%252Bdeferral%252B#search=%22tax%20deferral%20benefits%22

Harris, H., & Horst, S. J. (2016). A Brief Guide to Decisions at Each Step of the Propensity Score Matching Process. *Practical Assessment, Research, and Evaluation*, *21*(4). https://doi.org/10.7275/yq7r-4820

Helse- og omsorgsdepartementet. (2020). *Rundskriv om kommunale smitteverntiltak*. Helse- og omsorgsdepartementet. https://www.regjeringen.no/contentassets/5a5099f052864a23a513aff6a7a71b54/rundskriv-kommunale-smitteverntiltak-2810-2020.pdf?fbclid=IwAR2jeW5ZzDbJUrps6t_p9fERcADr1mCb15-zC5FerzVXDapDhcKEo1udYLQ

Hill, R. C., Griffiths, W. E., & Lim, G. C. (2018). *Principles of Econometrics* (Fifth). Wiley.

Holden, S., Brasch, T. von, Torstensen, K. N., Magnussen, J., Sæther, E. M., Evje, T., Hirsch, V. H., Hansson, L. F., Sælensminde, K., Aavitsland, P., & Røttingen, J.-A. (2020). *Samfunnsøkonomisk vurdering av smitteverntiltak—Covid-19*. Helsedirektoratet. https://www.helsedirektoratet.no/rapporter/samfunnsokonomisk-vurdering-av-smitteverntiltak-covid-19/Samfunnsøkonomiske%20virkninger%20smitteverntiltak%20covid-19.pdf/_/attachment/inline/cf0faf7e-1789-4183-968b-7f230d20b63f:5a06ef046ea00a0ec3881f42eae60fb722621525/Samfunnsøkonomisk%20vurdering%20av%20smitteverntiltak%20-%20covid-19.pdf

Horobet, A., Curea, S. C., Popoviciu, A. S., Botoroga, C.-A., Belascu, L., & Dumitrescu, D. G. (2021). Solvency Risk and Corporate Performance: A Case Study on European Retailers. *Journal of Risk and Financial Management*, *14*(11), 536. https://doi.org/10.3390/jrfm14110536

Hovland, K. M. (2021, April 16). Utsetter betalingsfristen på skatter og avgifter: - Nå gir vi bedriftene et pusterom. *E24*. https://e24.no/naeringsliv/i/x30l28/utsetter-betalingsfristen-paa-skatter-og-avgifter-naa-gir-vi-bedriftene-et-pusterom

Kalajdzic, P., Wernersen, C., Tomter, L., & Norum, H. (2020, March 24). Høyeste arbeidsledighet i Norge siden krigen. *NRK*. https://www.nrk.no/norge/nav_-hoyeste-arbeidsledighet-i-norge-siden-krigen-1.14957983

Liang, X., Rozelle, S., & Yi, H. (2022). The impact of COVID-19 on employment and income of vocational graduated in China: Evidence from surveys in Januray and July 2020. *China Economic Review*, *75*. https://doi.org/10.1016/j.chieco.2022.101832.

NHO. (n.d.). *Fakta om små og mellomstore bedrifter (SMB)*. nho.no. Retrieved 9 December 2022, from https://www.nho.no/tema/sma-og-mellomstore-bedrifter/artikler/sma-og-mellomstore-bedrifter-smb/

OECD. (2021). *Tax Policy Reforms 2021: Special Edition on Tax Policy during the COVID-19 Pandemic*. OECD Publishing.

Porter, S. (2015, September 7). Understanding Weight Calculations in Stata's psmatch2. *Stephenporter.Org*. https://stephenporter.org/understanding-weight-calculations-in-statas-psmatch2/

Regjeringen. (2020a, January 8). *Nye kommune- og fylkesnummer fra 2020*. Regjeringen.No. https://www.regjeringen.no/no/tema/kommuner-og-regioner/kommunestruktur/nyekommuneogfylkesnummer/id2629203/

Regjeringen. (2020b). *Covid-19—Analyse av økonomiske tiltak, insentiver for vekst og omstillig.* Regjeringen. https://www.regjeringen.no/contentassets/5be3089013d34ad0abf953f2f88ff343/covid-19--analyse-av--okonomiske-tiltak-insentiver-for-vekst-og-omstilling-26.-mai-20202.pdf

Regjeringen. (2022a, January 14). *Ny ordning for utsatt innbetaling av skatter og avgifter*. Regjeringen.no. https://www.regjeringen.no/no/aktuelt/ny-ordning-for-utsatt-innbetaling-av-skatter-og-avgifter/id2895556/

Regjeringen. (2022b, February 12). *The infection control measures are being removed on Saturday 12 February*. Regjeringen.No. https://www.regjeringen.no/en/aktuelt/the-infection-control-measures-are-being-removed-on-saturday-12-february/id2900873/

Remler, D. K., & Ryzin, G. G. V. (2010). Natural and Quasi Experiments. In *Research Methods in Practice: Strategies for Description and Causation* (1st ed., pp. 427–461). SAGE Publications.

Rubin, D. B. (2001). Using Propensity Scores to Help Design Observational Studies: Application to the Tobacco Litigation. *Health Services & Outcomes Research Methodology*, *01*(2), 169–188. https://doi.org/10.1023/A:1020363010465

Sadiq, K., & Krever, R. (2021). Does tax policy fit in the portfolio of COVID-19 responses? *Pacific Accounting Review*, *33*(2), 212–220. https://doi.org/10.1108/PAR-08-2020-0119

Solli, M. (2022, January 14). Vedum setter ned renta: Får gjennomgå av regnskapstopp. *Nettavisen*. https://www.nettavisen.no/okonomi/vedum-setter-ned-renta-far-gjennomga-av-regnskapstopp/s/12-95-3424226972

Statistics Norway. (2009, January). *Classification of Standard Industrial Classification*. https://www.ssb.no/en/klass/klassifikasjoner/6

Tarkom, A. (2022). Impact of COVID-19 exposure on working capital management: The moderating effect of investment opportunities and government incentives. *Finance Research Letters*, *47*(B). https://doi.org/10.1016/j.frl.2021.102666

Tchinda, C., & Dejardin, M. (2021). Are Business Policy Measures in Response to the COVID-19 Pandemic to Be Equally Valued? An Exploration According to SMEs Owners' Business Expectations. *Sustainability*, *13*(21). https://doi.org/10.3390/su132111576

The Norwegian Tax Administration. (n.d.-a). *Income statement 2*. Retrieved 10 October 2022, from https://www.skatteetaten.no/en/forms/income-statement-2/

The Norwegian Tax Administration. (n.d.-b). *Merverdiavgiftsloven kapittel 6. Fritak for merverdiavgift*. Retrieved 11 October 2022, from https://www.skatteetaten.no/rettskilder/type/handboker/merverdiavgiftshandboken/gjeldende/M-6/

The Norwegian Tax Administration. (2020, April 8). *Endring i den reduserte satsen for merverdiavgift fra 12 til 6 prosent*. https://www.skatteetaten.no/rettskilder/type/uttalelser/prinsipputtalelser/endring-i-den-reduserte-satsen-for-merverdiavgift-fra-12-til-6-prosent/

The Norwegian Tax Administration. (2021a). *Retningslinje for betalingsutsettelse ved betalingsproblemer som følge av Covid-19-utbruddet*. Skatteetaten. https://www.skatteetaten.no/en/rettskilder/type/rundskriv-retningslinjer-og-andre-rettskilder/rundskriv/retningslinje-for-betalingsutsettelse-ved-betalingsproblemer-som-folge-av-covid-19-utbruddet/

The Norwegian Tax Administration. (2021b, December 2). *Negativ petroleusskatt på netto 21,4 milliarder for 2020*. https://www.skatteetaten.no/en/presse/nyhetsrommet/negativ-petroleumsskatt-pa-netto-214-milliarder-for-2020/

The Norwegian Tax Administration. (2022a, April 28). *Tiltakspakker i forbindelse med koronasituasjonen*. Skatteetaten. https://www.skatteetaten.no/tiltakspakker/#utsatt-betaling-og-avdragsordning

The Norwegian Tax Administration. (2022b). *Status på utsatte skatte- og avgiftskrav som følge av koronasituasjonen*. The Norwegian Tax Administration. https://www.skatteetaten.no/presse/nyhetsrommet/status-pa-utsatte-skatte--og-avgiftskrav-som-folge-av-koronasituasjonen/

The Norwegian Tax Administration. (2022c). *Status på utsatte skatte- og avgiftskrav som følge av koronasituasjonen per august*. The Norwegian Tax Administration. https://www.skatteetaten.no/presse/nyhetsrommet/status-pa-utsatte-skatte--og-avgiftskrav-som-folge-av-koronasituasjonen-per-august/

The Secretary of the Treasury. (1984). *Tax Reform for Fairness, Simplicity, and Economic Growth*. The Department of the Treasury. https://home.treasury.gov/system/files/131/Report-Tax-Reform-v1-1984.pdf

VG. (n.d.). *Coronaviruset*. vg.no. Retrieved 1 December 2022, from https://www.vg.no/spesial/corona/

Vito, A. D., & Gómez, J.-P. (2020). Estimating the COVID-19 cash crunch: Global evidence and policy. *Journal of Accounting and Public Policy*, *39*(2). https://doi.org/10.1016/j.jaccpubpol.2020.106741

Wing, C., Simon, K., & Bello-Gomez, R. A. (2018). Designing Difference in Difference Studies: Best Practices for Public Health Policy Research. *Annual Review of Public Health*, *39*, 453–469. https://doi.org/10.1146/annurev-publhealth-040617-013507

Appendix

A.1 Distribution of Regions

The table shows the distribution of firms within our sample after the data treatment in chapter 3.1. It can be observed that the number of firms within each region changes from year to year, but the total number of firms throughout the years are consistent at 162,513 observations.

Table A.1: *Distribution of regions.*

Region	2017	2018	2019	2020
Agder	10,112	10,118	10,129	10,122
Innlandet	9,689	9,676	9,703	9,719
Møre og Romsdal	8,265	8,278	8,287	8,287
Nordland	7,072	7,071	7,072	7,079
Oslo	26,610	26,473	26,311	26,145
Rogaland	13,822	13,785	13,763	13,749
Troms og Finnmark	7,319	7,328	7,310	7,298
Trøndelag	12,671	12,653	12,645	12,608
Vestfold og Telemark	13,184	13,209	13,226	13,266
Vestland	18,550	18,539	18,515	18,486
Viken	35,219	35,383	35,552	35,754
Sum	162,513	162,513	162,513	162,513

A.2 Accounting Figures

Table A.2: *Accounting figures.*

Account	English	Norwegian
1105	Commercial buildings	Forretningsbygg
1115	Building and construction, hotel, etc.	Bygg og anlegg, hotel o.l.
1117	Electrotechnical equipment in power companies, etc.	Elektroteknisk utrustning i kraftforetak mv.
1130	Construction, machines during execution	Anlegg, maskiner under utføreslse
1150	Plots and other land areas	Tomter og andre grunnarealer
1160	Housing incl. residential plots, cabins	Bolig inkl. boligtomter, hytter
1180	Investment Properties	Investeringseiendommer
1205	Passenger cars, machinery, inventory, etc.	Personbiler, maskiner, inventar mv.
1221	Ships, rigs, etc.	Skip, rigger mv.
1225	Planes, helicopters, etc.	Fly, helikopter mv.
1239	Zero-emission vans	Varebiler med nullutslipp
1280	Office machines etc.	Kontormaskiner o.l.
1290	Other fixed assets	Andre driftsmidler
1312	Investments in subsidiaries and group companies assessed as a partnership	Investeringer i datter- og konsernselskap med deltakerfastsetting
1313	Investments in other subsidiaries and group companies	Investeringer i andre datter- og konsernselskap
1331	Investments in affiliates assessed as a partnership	Investeringer i tilknyttede selskap med deltakerfastsetting
1332	Investments in other affiliates	Investeringer i andre tilknyttede selskap
1350	Investments in stocks and mutual fund shares	Investeringer i aksjer, andeler og verdipapirfondsandeler

A.3 Distribution of Dependent Variables

The distribution of the different dependent variables is presented below. For wages and investments, the negative observations are removed. This is justified by the fact that we do not know if these are correct from the account entries and when using the natural logarithm on our dependent variables, negative values and zero will not be taken into account. The box plots show minimum and maximum values, upper and lower quartiles, and the median. Figures A.1 – A.3 exclude outside variables.

Figure A.1: *Distribution of wages.*

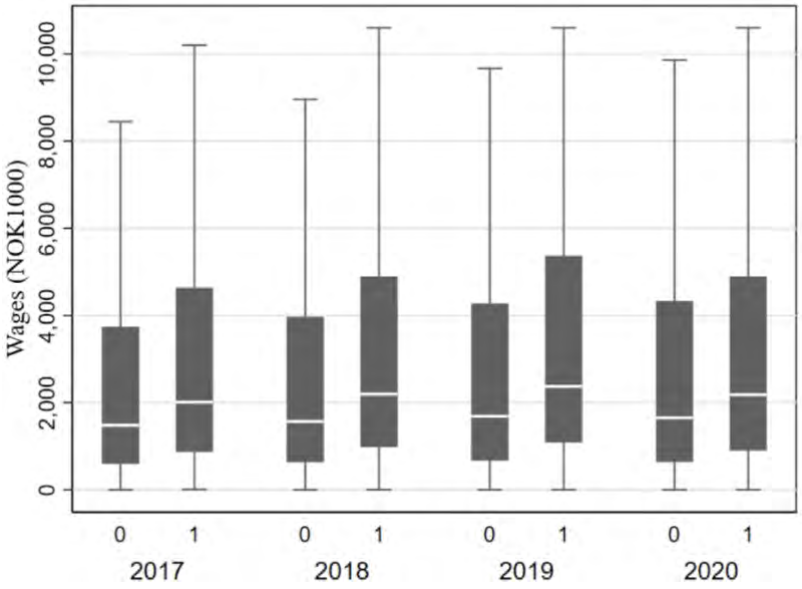


Figure A.2: *Distribution of employees.*

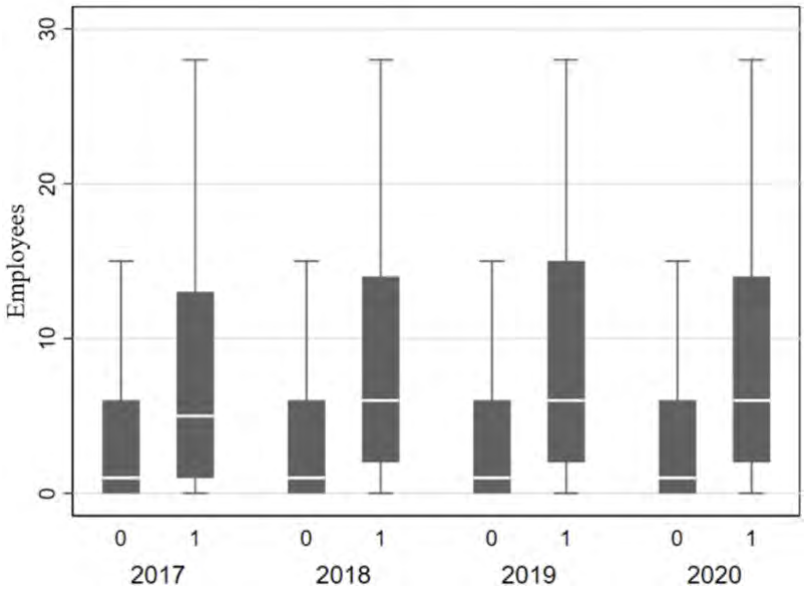
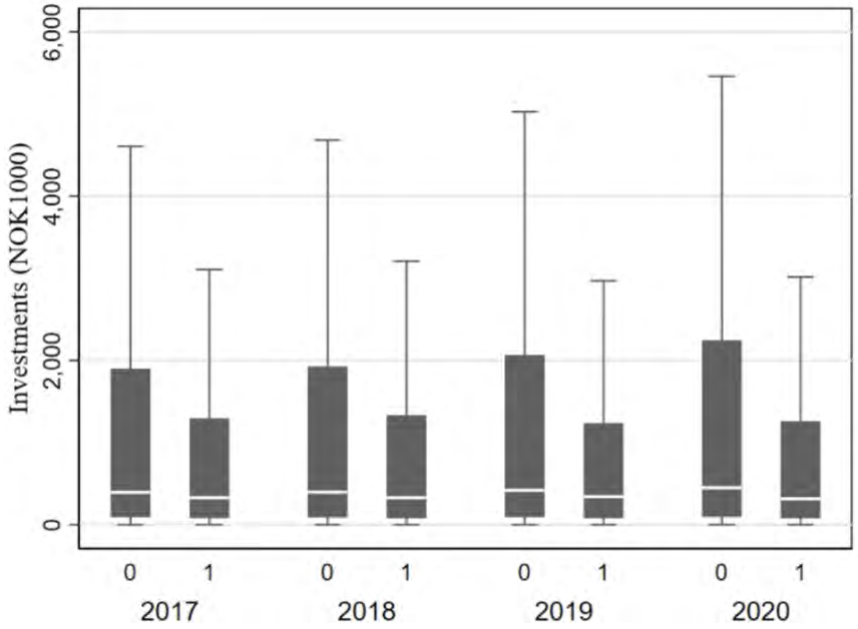


Figure A.3: *Distribution of investments.*



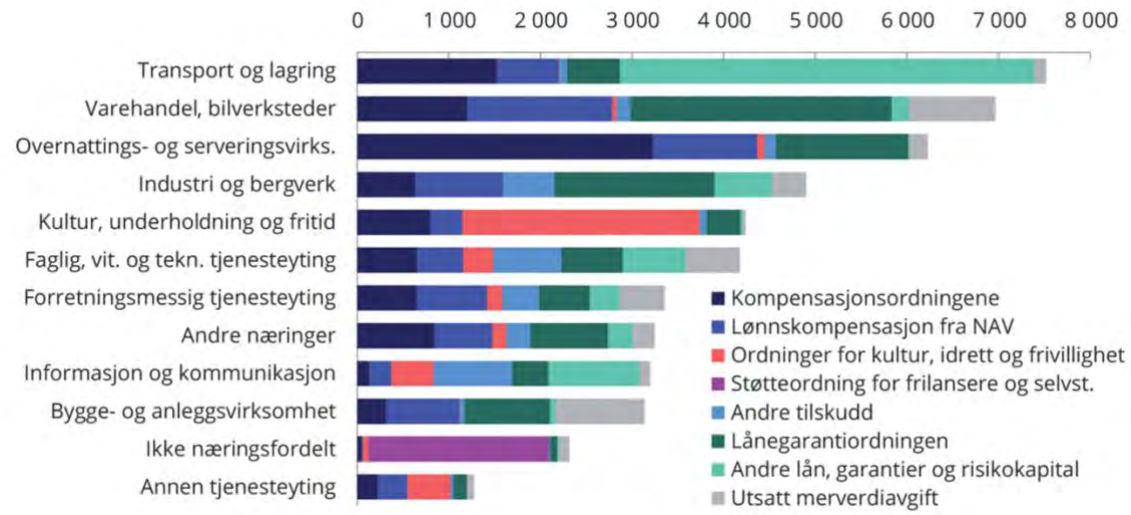
A.4 Policy Instruments during COVID-19

Table A.3: *Use of support schemes in various industries.*

	Grant		**Loans, guarantees and other risk capital**		**Deferred Value Added Tax**	
Industry	Quantity	Mill. kr	Quantity	Mill. kr	Quantity	Mill. kr
Manufacturing and mining	4,391	2,154	469	2,376	407	373
Construction	8,082	1,171	332	994	1,273	971
Wholesale, repair of motor vehicles	15,206	2,986	1,101	3,039	1,617	940
Transport and storage	5,483	2,292	250	5,105	363	125
Accommodation and food service	7,051	4,572	749	1,455	895	203
Information and communication	3,104	1,695	492	1,385	259	117
Professional, scientific and technical activities	7,154	2,230	575	1,358	826	588
Administrative and support service activities	3,819	1,986	309	879	497	487
Arts, entertainment and recreation	8,294	3,817	148	394	91	26
Other service activities	9,177	1,051	169	149	330	75
Other industries	12,690	1,889	429	1,122	589	235
Not distributed to industry	25,576	2,108	20	91	110	114
Total	110,027	27,948	5,043	18,347	7,257	4,254

Note: As of 30th April 2021, accessed through the revised national budget with our own translations (Finansdepartementet, 2021, p. 98).

Figure A.4: *Use of different policy instruments by industry.*



Note: Numbers given in million Norwegian kroner, accessed through the revised national budget (Finansdepartementet, 2021, p. 99), hence the Norwegian text. Translations are, therefore, presented below.

Table A.4: *Translation for figure A.1.*

Norwegian	English
Transport og lagring	Transport and storage
Varehandel, bilverksteder	Wholesale, repair of motor vehicles
Overnattings- og serveringsvirks.	Accommodation and food service
Industri og bergverk	Manufacturing and mining
Kultur, underholdning og fritid	Arts, entertainment and recreation
Faglig, vit. og tekn. Tjenesteyting	Professional, scientific and technical activities
Forretningsmessig tjenesteyting	Administrative and support service activities
Andre næringer	Other industries
Informasjon og kommunikasjon	Information and communication
Bygge- og anleggsvirksomhet	Construction
Ikke næringsfordelt	Not distributed to industry
Annen tjenesteyting	Other service activities
Kompensasjonsordningene	Compensation scheme
Lønnskompensasjon fra NAV	Salary compensation from NAV
Ordninger for kultur, idrett og frivillighet	Schemes for culture, sports and volunteerism
Støtteordning for frilansere og selvst.	Support schemes for freelancers and self-employed
Andre tilskudd	Other grants
Lånegarantiordningen	Loan guarantee scheme
Andre lån, garantier og risikokapital	Other loans, guarantees and venture capital
Utsatt merverdiavgift	Deferred Value-Added Tax

A.5 Equity and Debt Means

Table A.5: *Equity and debt.*

		Treated	Comparison
Equity	**2017-2019**	2 185 606	13 100 000
	2020	1 510 899	15 200 000
	Change	-31%	16%
Short-term debt	**2017-2019**	5 962 477	7 947 157
	2020	6 443 038	8 880 249
	Change	8%	12%
Long-term debt	**2017-2019**	4 188 200	9 315 819
	2020	4 619 266	10 700 000
	Change	10%	15%

A.6 Confounding Covariates

Table A.6: *Logit and ln dependent variable regressions with ln of confounders.*

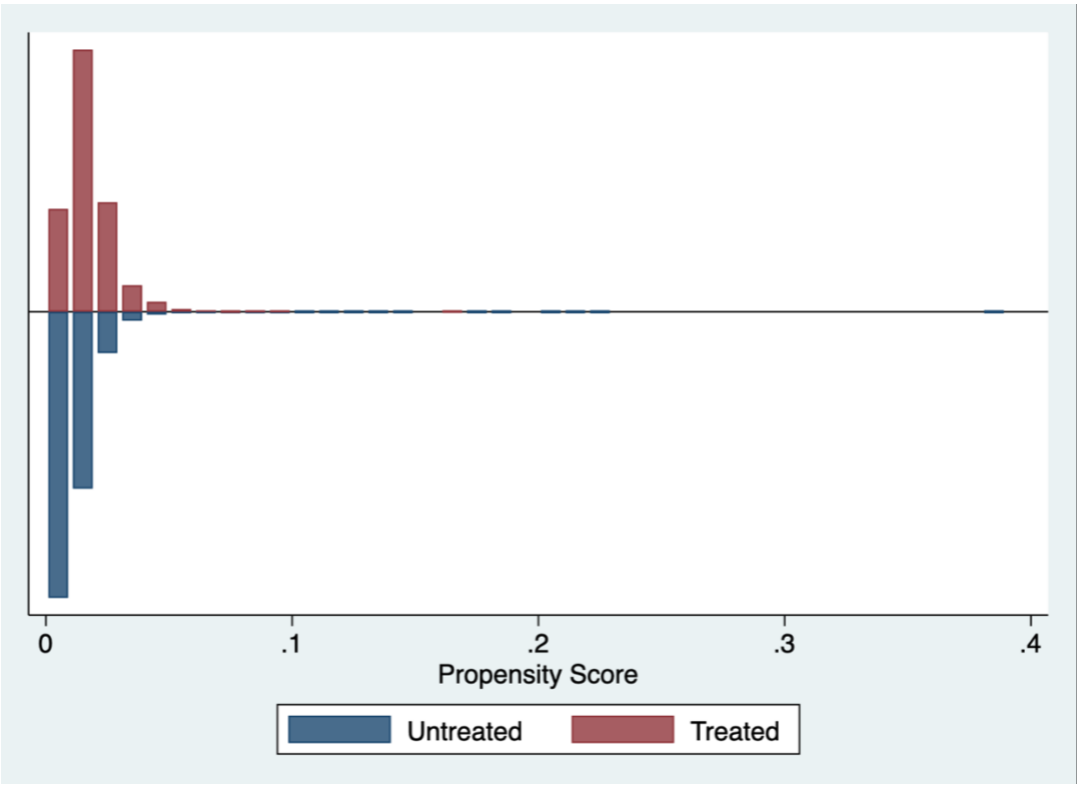
Variables	treated	Ln wages	Ln employees	Ln invest
Ln Current Ratio	-0.616***	-0.932***	-0.523***	0.307***
	(0.025)	(0.003)	(0.003)	(0.003)
Ln Debt Ratio	0.365**	0.087***	0.083***	-0.112***
	(0.011)	(0.002)	(0.002)	(0.002)
Ln Net Working Capital	0.101***	0.416***	0.186***	-0.701***
	(0.015)	(0.003)	(0.002)	(0.003)
Ln Firm Value	0.014	0.670***	0.464***	0.990***
	(0.009)	(0.001)	(0.001)	(0.002)
Constant	-4.403***	5.225***	-4.777***	-3.358***
	(0.133)	(0.020)	(0.016	(0.027)
Observations	412,784	286,017	281,250	319,924
R-squared		0.524	0.460	0.588

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1

A.7 Covariate Imbalance Testing and Graphing

Figure A.5: *Propensity Score.*



Strategy A1: Nearest Neighbor, common 3 replacements.

Table A.7: *Matching for NN3.*

Variable	Unmatched	Mean			%reduct	t-test		V(T)/
	Matched	Treated	Control	%bias	|bias|	t	p>|t|	V(C)
Ln Current Ratio	U	.54161	1.147	-59.1		-32.15	0.000	0.36*
	M	.54161	.50665	3.4	94.2	2.36	0.018	1.38*
Ln Debt Ratio	U	1.3266	.19738	73.7		43.61	0.000	0.61*
	M	1.3266	1.3007	1.7	97.7	0.87	0.387	0.83*
Ln Net Working	U	-1.8219	-1.4757	-30.1		-19.67	0.000	0.97
Capital	M	-1.8219	-1.9129	7.9	73.7	3.55	0.000	0.83*
Ln Firm Value	U	15.135	15.08	3.3		2.01	0.045	0.74*
	M	15.135	15.111	1.4	56.0	0.68	0.499	0.76*

* if variance ratio outside [0.94; 1.06] for U and [0.94; 1.06] for M

Table A.8: *Rubin's B and R, NN3 with four confounders.*

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.056	2734.60	0.000	41.5	44.6	78.1*	0.38*	75
Matched	0.002	21.50	0.000	3.6	2.6	9.9	1.00	100

* if B>25%, R outside [0.5; 2]

A.8 Matching Strategies

Strategy A2: Nearest Neighbor, common NN3

Figure A.6: *Standardised % bias across covariates, NN3 with seven covariates.*

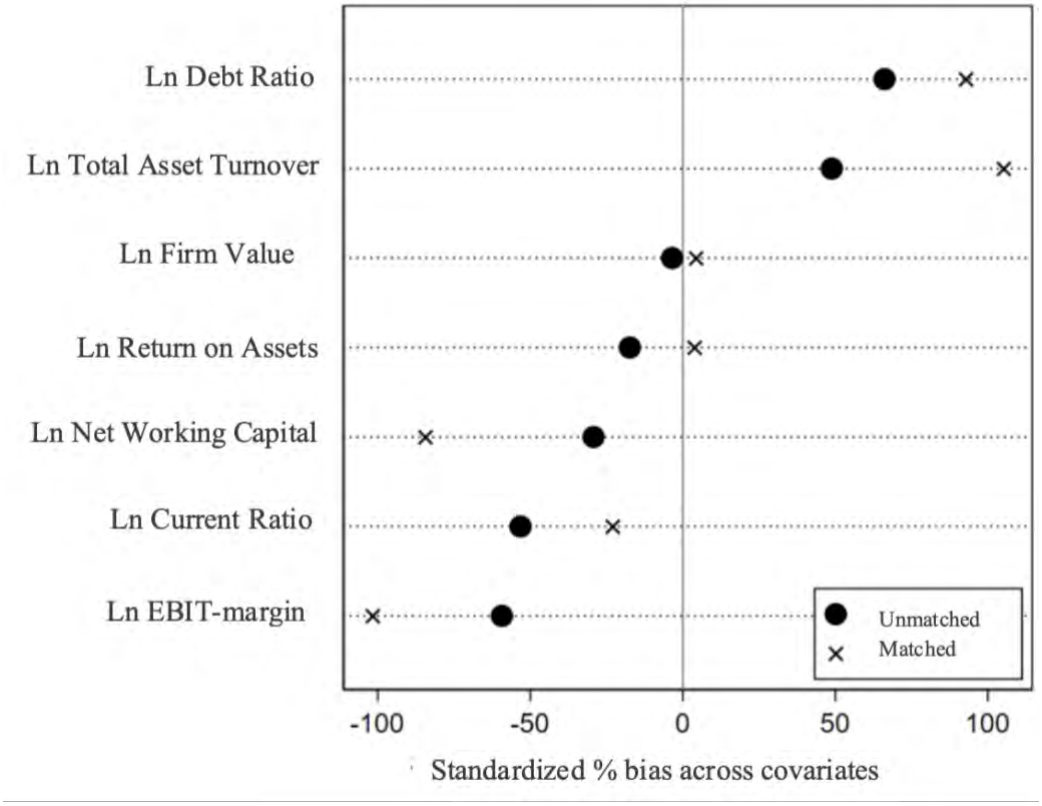


Table A.9: *Rubin's B and R, NN3 with seven covariates.*

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.057	1716.55	0.000	3970	48.8	82.2*	0.74	100
Matched	0.401	11068.14	0.000	59.3	84.5	201.0*	1	66

* if B>25%, R outside [0.5; 2]

Strategy B1: Caliper 0.01 common

Figure A.7: *Standardised % bias across covariates, caliper 0.01 with four covariates.*

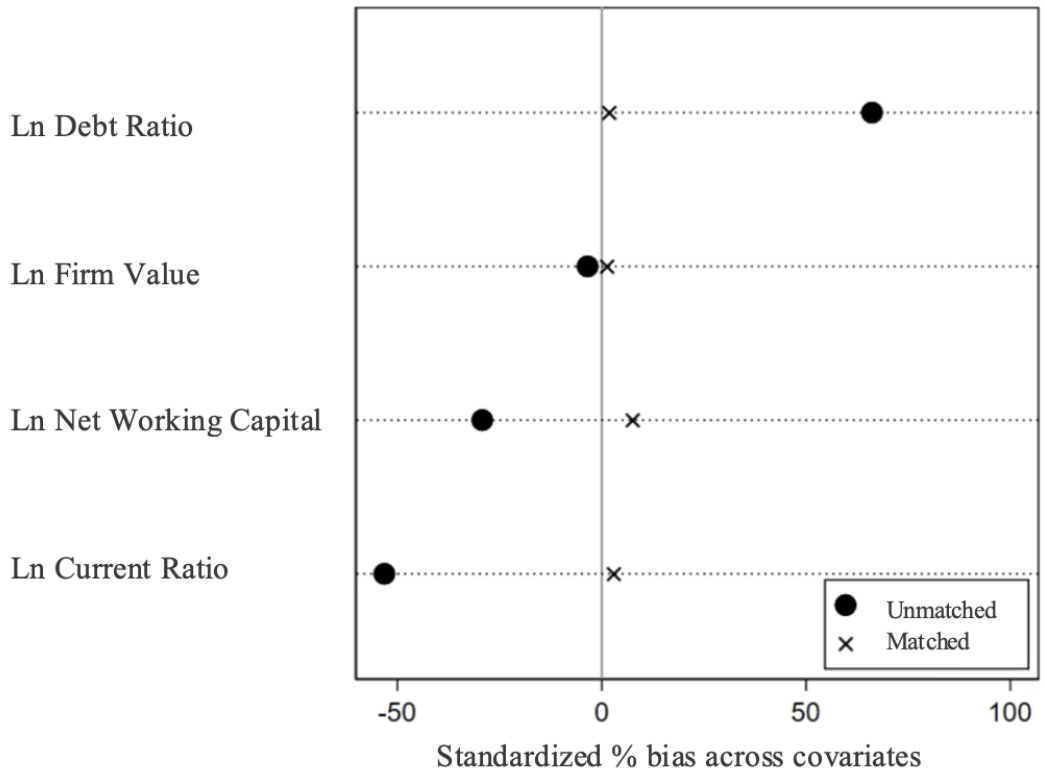


Table A.10: *Rubin's B and R, caliper 0.01 with four covariates.*

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.056	2734.60	0.000	38.0	41.2	78.1*	0.38*	75
Matched	0.002	22.63	0.000	3.3	2.3	10.2	1.03	100

* if B>25%, R outside [0.5; 2]

Strategy B2: Caliper 0.01 common

Figure A.8: *Standardised % bias across covariates, caliper 0.01 with seven covariates.*

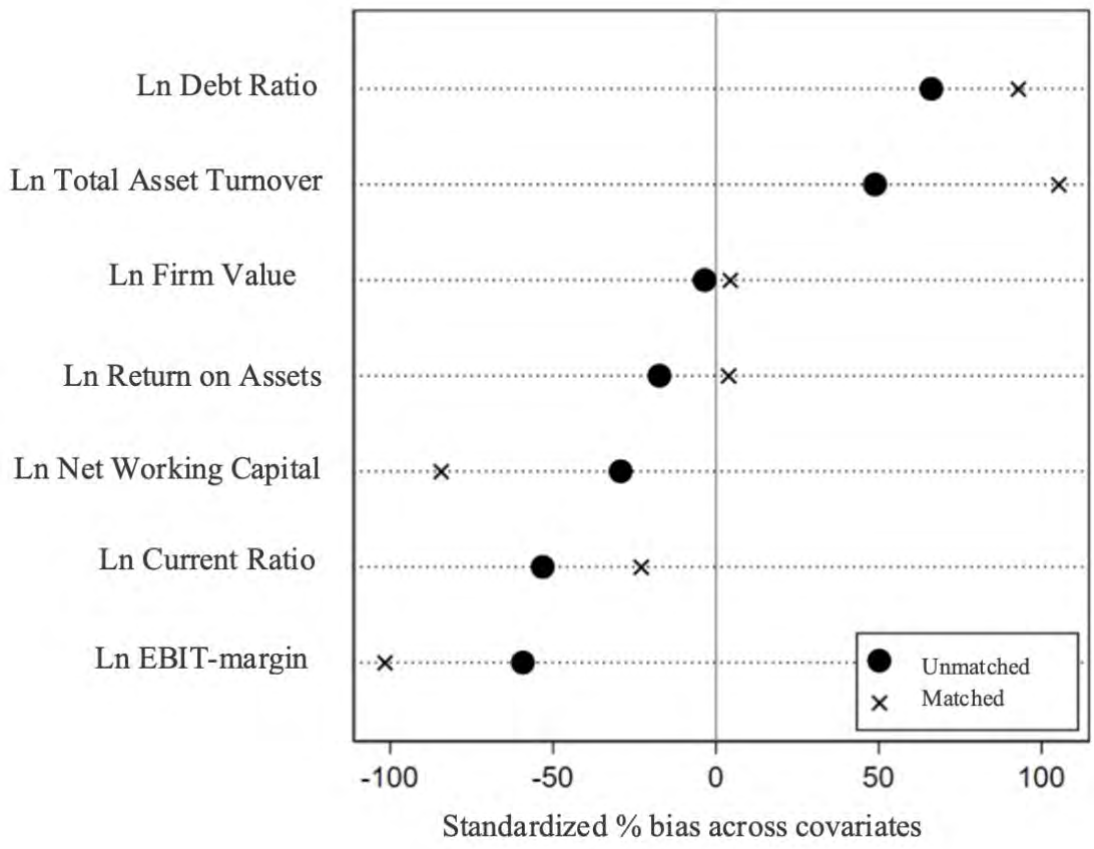


Table A.11: *Rubin's B and R, caliper 0.01 with seven covariates.*

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.057	1716.55	0.000	39.7	48.8	82.2*	0.74*	100
Matched	0.401	11068.14	0.000	59.3	84.5	201.0*	1.00	86

* if B>25%, R outside [0.5; 2]

A.9 Density Plots for Covariates

Figure A.9: *Density plot for ln debt ratio.*

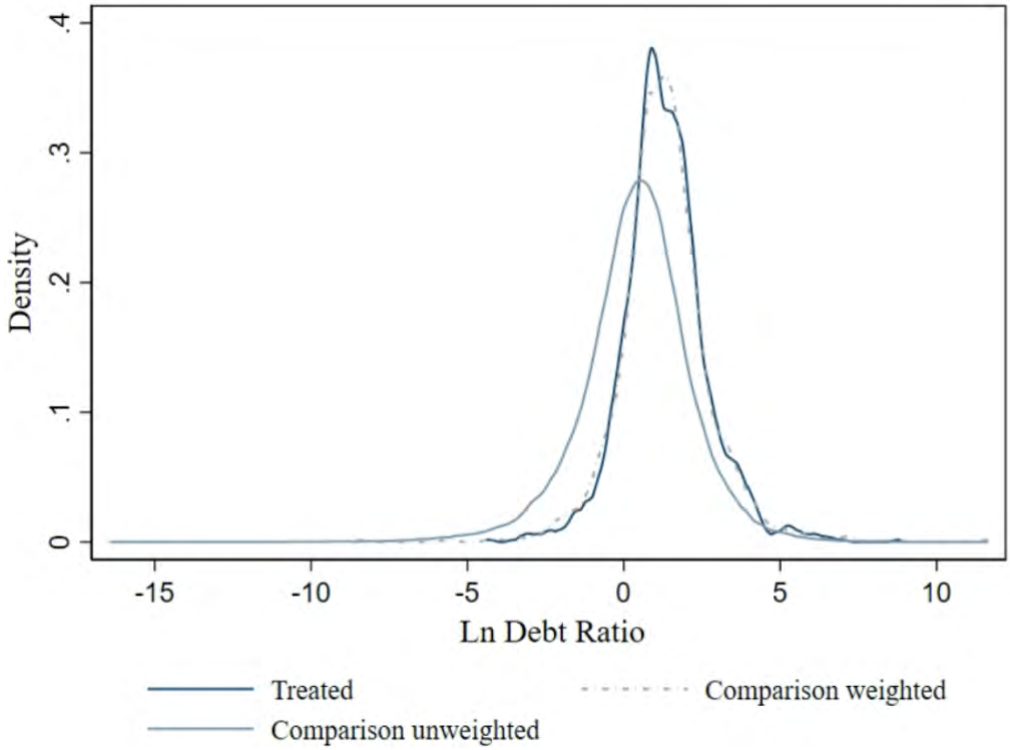


Figure A.10: *Density plot for current ratio.*

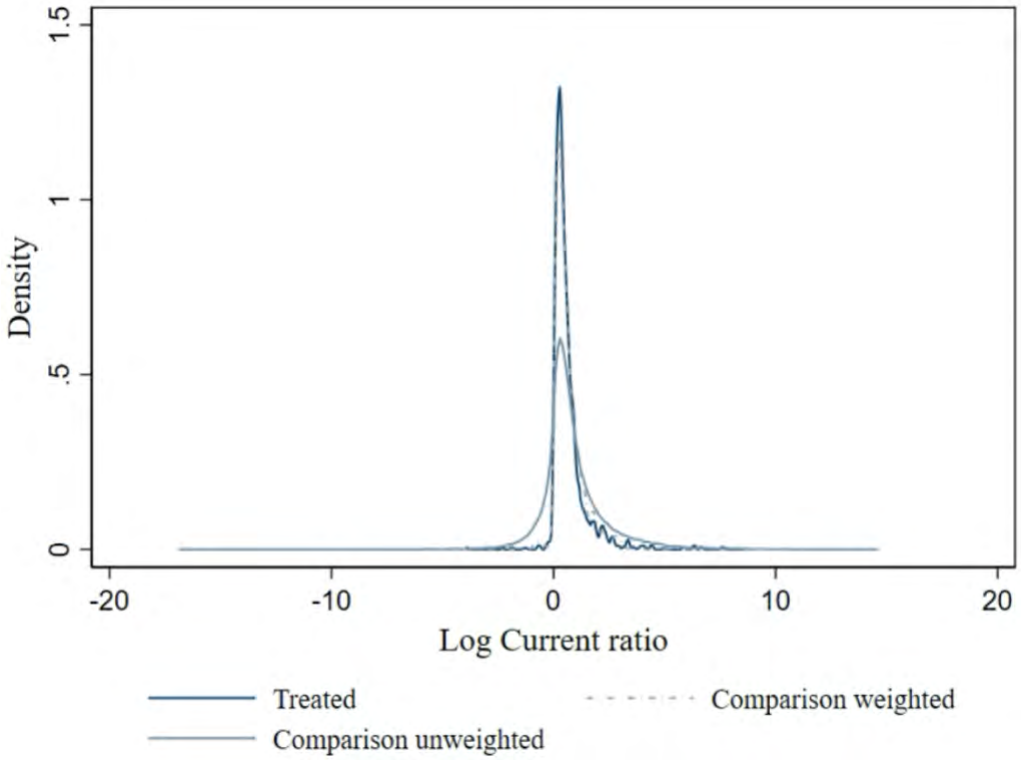


Figure A.11: *Density plot for ln net working capital.*

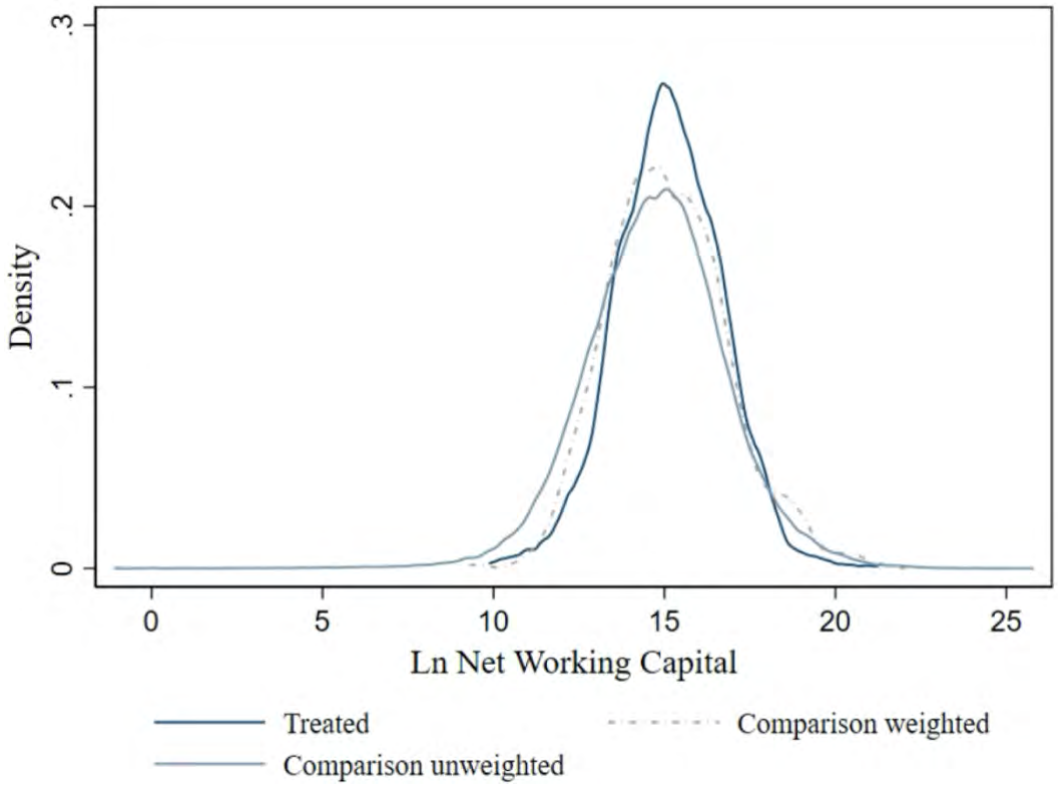
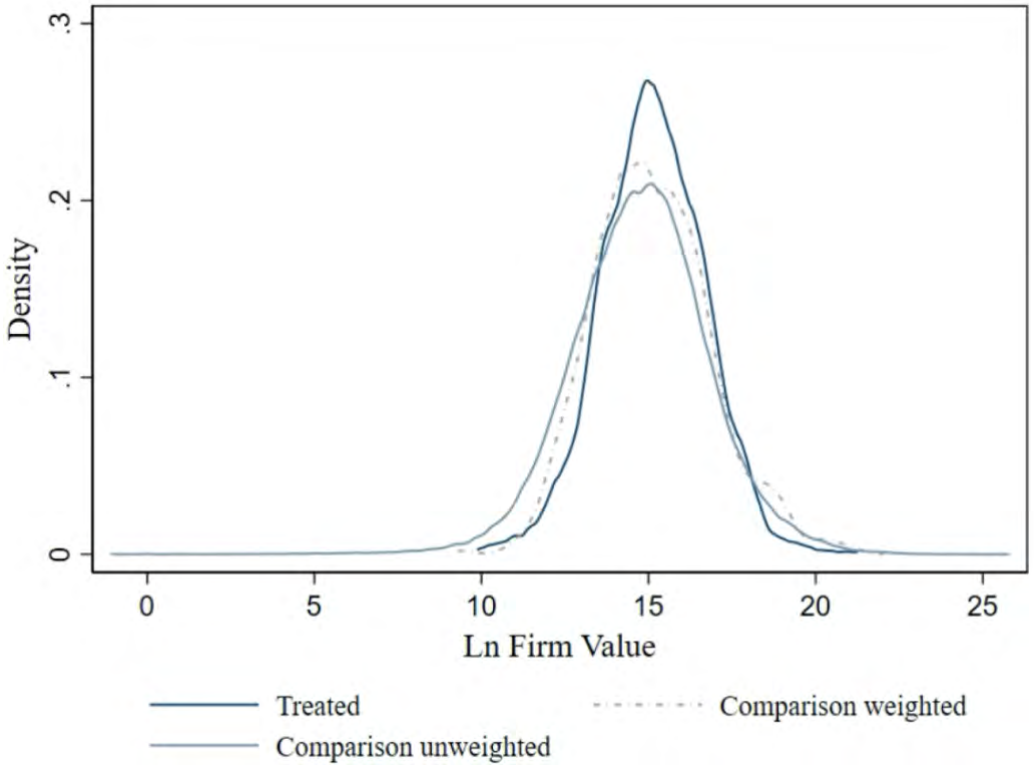


Figure A.12: *Density plot for ln firm value.*



A.10 Placebo Regressions

Table A.12 shows a placebo regression with the reference year 2017 as a dummy variable, replacing the covid year 2020.

Table A.12: *Placebo regressions.*

Variables	Ln of Wages	Ln of Employees	Ln of Investments
2017 – Placebo year	-	-	-
Treated	-	-	-
DiD	0.026	0.027	0.049
	(0.046)	(0.030)	(0.059)
Constant	14.324***	1.834***	13.203***
	(0.003)	(0.002)	(0.003)
Observations	10,894	10,693	10,574
R-squared	0.855	0.956	0.931

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, *p<0.1