Mitigating the Covid-19 shock – A simulation study on the cost compensation schemes of Finland, Norway and the United States

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Abstract:

During the Covid-19 pandemic, many countries implemented sizeable support programs for companies suffering from the pandemic. This thesis compares the effectiveness of the Business Cost Support of Finland, the Norwegian Business Compensation Scheme and the Paycheck Protection Program (PPP) of the USA in terms of mitigating pandemic effects on firm profitability, liquidity and solvency. All three programs are cost support schemes but they differ in what costs are covered and in their eligibility criteria.

The comparison is executed by simulating the pandemic-induced turnover shock on Finnish enterprises under each support scheme. Statistics Finland's detailed Financial statement data from 2019 provides the starting position for the simulation. The turnover shock is one year of length and assigned to firms based on their industry code. Effectiveness of the support schemes is measured by mitigation rate which describes the share of the effects of the pandemic that the scheme can mitigate. Additionally, the costs of the schemes are considered.

This thesis finds that the Norwegian scheme was the most effective in decreasing the number of unprofitable firms as well as the number of firms with liquidity troubles. It ranks the highest in all but one measure even when adjusted by its second highest price. The Finnish scheme yielded the highest price-adjusted mitigation rate in average quick ratio but trailed the Norwegian scheme slightly in all other categories. The PPP was the most expensive of the support schemes and thus the least effective in all the profit and liquidity related measures.

This thesis concludes that compensating fixed costs and targeting the support carefully were crucial in supporting the worst hit businesses for a reasonable price. The Finnish Business Cost Support fared well compared to its counterparts but allowing for higher and lower single support payments would have most likely increased its effectiveness. If the target of the scheme is maintaining employees on firm payrolls, a pure wage compensation scheme as the PPP yields better results.

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Tiivistelmä:

Koronapandemian aikana monet valtiot toimeenpanivat mittavia tukiohjelmia pandemiasta kärsiville yrityksille. Tämä tutkielma vertailee miten Suomen yritysten kustannustuki, Norjan kompensasjonsordning sekä Yhdysvaltojen Paycheck Protection Program (PPP) ovat pystyneet kompensoimaan koronapandemian vaikutusta yritysten kannattavuuteen, likviditeettiin ja maksukykyyn. Kaikki kolme tukea korvaavat yritysten kustannuksia, mutta eroavat toisistaan sekä korvauksen laskukaavan että korvauksen ehtojen osalta.

Vertailu suoritetaan simuloimalla koronapandemian aiheuttama liikevaihtošokki Suomen yrityksille eri tukijärjestelmien alaisuudessa. Simulaation lähtötilanne vastaa vuoden 2019 suomalaista yrityskenttää, jota kuvaa Tilastokeskuksen tilinpäätösaineisto. Liikevaihtošokki on simulaatiossa toimialakohtainen ja kestoltaan yhden vuoden. Tukijärjestelmän vaikuttavuutta arvioidaan mittaamalla, kuinka suuren osan pandemian vaikutuksesta tuki pystyy kompensoimaan, ottaen samalla huomioon simuloidun yritystuen hinta. Pandemian negatiivisia vaikutuksia mitataan kannattavuus- ja maksuvaikeuksiin joutuneiden yritysten määrällä, mutta myös koko yrityskentän tilaa kuvaavien keskiarvomuuttujien avulla.

Tutkimuksessa huomataan, että Norjan kompensaatiojärjestelmä onnistui parhaiten vähentämään niin tappiota tekevien kuin maksuvaikeuksista kärsivien yritysten määrää. Norjan tukijärjestelmä sijoittui yhtä lukuun ottamatta kaikissa kategorioissa ensimmäiseksi myös tuen hintaan suhteuttamisen jälkeen. Suomen kustannustuki tuotti hintaansa nähden simulaation korkeimman vaikuttavuuden keskimääräiseen maksuvalmiussuhteeseen, mutta jäi muissa suureissa niukasti norjalaisen mallin taakse. Yhdysvaltojen PPP oli tukijärjestelmistä kallein ja siksi tehottomin jokaisella kannattavuuden, likviditeetin ja maksukyvyn mittarilla.

Johtopäätöksenä voidaan todeta, että kiinteiden kustannusten korvaaminen on tärkeässä osassa pahiten koronasta kärsineiden yritysten tukemisessa. Suomen kustannustuen voidaan katsoa täyttäneen hyvin tehtävänsä suhteessa vertailun muihin tukiin, vaikka pienempien ja toisaalta suurempien yksittäisten tukisummien salliminen olisi voinut parantaa tuen vaikuttavuutta. Mikäli tuella tavoitellaan lomautusten ja irtisanomisten välttämistä, on PPP:n tyyppinen palkkakustannustuki selvästi vertailun paras vaihtoehto.

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1 Introduction

The Covid-19 pandemic has now ravished the world since early 2020. Lockdowns and voluntarily decreased movement have left their mark to society in every country of the world. Economic consequences have been severe and many governments have taken action to ease the situation for both their citizens and businesses. Citizens have received increased unemployment insurance benefits and other transfers, while firms have been compensated by more flexible labour and tax policies and subsidy schemes. The evaluation of these policies will provide researchers ample topics for research in the coming years as the pandemic tails away and increasing amounts of data become available. However, there are already some questions that can be answered. This thesis aims to add to the literature of firm vulnerability under the pandemic shock and to the literature of the effects of corporate cost support schemes.

This thesis will focus on Finland and the pandemic as it was encountered in this national context. In the first phases of the pandemic in early 2020, when shops and restaurants were still open in Finland, the most visible troubles firms faced concerned their supply chains as certain factories in China were shut down (Ulkoministeriö, 6.3.2020). However, the situation progressed rapidly. The first public measures by the Finnish Government were strengthened cleaning measures in hospitals and other public facilities as well as guidelines for individual hygiene for the citizens. In March 2020, these health-related measures were followed by legally binding restrictions on movement, social gatherings and facilities associated with social gatherings, such as restaurants and sporting events. As the severity of the pandemic became increasingly evident, Finland among the rest of Europe and North America, began to consider compensation policies for businesses that had been affected by the pandemic and the lockdown measures. These policies and the comparison of three national schemes in particular are the key theme of this thesis.

Different national economies had different approaches to public support programs to businesses. In Finland, the main program for mitigating the financial impact of the pandemic on businesses was the Business Cost Support (Finn. Yritysten kustannustuki). This program covered a share of a company's labour and other fixed costs, depending on how great of a fall in turnover the company had experienced (Laki yritysten määräaikaisesta kustannustuesta 508/2020). Norway implemented the Business Compensation Scheme (Norw. Kompensasjonsordning for næringslivet), which only covered fixed costs but which otherwise was more generous than the Finnish program (Lov om midlertidig tilskuddsordning for foretak

med stort omsetningsfall, 2020). In the United States, as a part of the CARES Act, the Paycheck Protection Program offered businesses a loan based their usual payroll costs, which was forgiven if the company kept paying most of its salaries (US Department of the Treasury, 2020). The Finnish and the Norwegian programs were put to place to reduce the number of bankruptcies and thus to limit the long-term damages of the pandemic. The PPP instead was mainly a scheme to maintain employment but also had a secondary goal to generally help enterprises counter the pandemic.

This thesis will compare the effects of the Covid-19-induced turnover shock on businesses under the three policy choices, while also observing the effects of the shock without any government policy. I will follow the simulation of Alstadsæter et al. (2020) where the authors study the effects of Norwegian and US policies on the data of Norwegian businesses. I will instead utilise detailed financial statement data on Finnish businesses and add the simulation of the shock under Finnish Business Cost Support.

The simulation aims to calculate the after-shock profit of each firm which will then be used to calculate the variables measuring the success of the support schemes. The length of the turnover shock assigned to companies is one year and it is described by sector-wise turnover figures of spring 2020. Once the shock reduces turnovers, the firms will also be able to reduce their costs depending on the size of the shock and their profit after the shock. There are four cost types in the simulation. First are material costs which adjust automatically at the same rate as turnover has dropped. Secondly, fixed costs stay fixed unless there is a support scheme that covers a certain share of them. Third are labour costs which can also be compensated by support schemes but can also be reduced by the firm through layoffs. Layoff scale depends on firm profit and size of the turnover shock. Last, there are residual cost type other costs which stay the same through the simulation. Profits are then calculated as after-shock profits net of costs after adjustment.

The variables of interest are firm profitability, liquidity and solvency which provide an estimate of success and survival of firms during the pandemic. Even though maintaining firm profits was not the target of these schemes, firm ability to produce profit does provide a useful indicator about their well-being. Especially if one scheme has decreased the number of unprofitable firms by a much higher rate than another scheme, this can be counted as a positive sign for the scheme. I will compare the average profit margin produced by the schemes. For the purposes of this research, profit margin is defined as post-pandemic profit divided by post-

pandemic turnover. Additionally, I will compare the share of firms with negative profits. Liquidity, measured by quick ratio in this simulation, gives an estimate on whether firms are still able to pay their upcoming bills or whether they are running out of liquid assets during the pandemic. Here, quick ratio is calculated by dividing quick assets by short-term debt. After-shock profits affect the quick ratio by changing the amount of quick assets. For example, a loss-making firm will use its quick assets to pay for the losses. When measuring the quick ratio, it is assumed that firms are not able to lend more money and hence the debt side stays unchanged. This research will focus on the average quick ratio that the support schemes produce, as well as on the share of firms they leave with below one or equal to zero quick ratios. Particularly, the two latter measures give an image of how many firms possess an acute default risk, the phenomenon which the support schemes were specifically designed to solve. Solvency measures firm long-term ability to meet its obligations and is calculated by dividing all debt on all assets, also known as debt ratio. Opposite to quick ratio, post-pandemic profit changes the debt side, which leads firms to fund their possible shortcomings by lending. In terms of solvency, the compared factors are average debt ratio, and more importantly, the number of firms with larger debt than assets, debt ratio over one. Similarly as before, we are most interested in the share of firms with debt ratio over one as high debt ratio is an indicator of bankruptcy risk. These eight variables are central to understanding the shock-mitigating effects of the cost support programs and comparing them to each other.

The fiscal costs of the policies will be taken into account by computing the support sum that was used in each of the simulation scenarios. I will also adjust the performance of the support schemes to their costs and study their per euro effectiveness in mitigating the pandemic shock. This is especially important as the costs of the support schemes end up varying significantly. Additionally, the layoff effects of the three schemes will be studied as they were the main policy goal of the PPP.

This thesis consists of six chapters. Chapter 1 has introduced the context and aims of this research. Chapter 2 describes the institutional settings and the qualities of the three support schemes. The third chapter presents the used data and constructs variables required for the analysis. Chapter 4 introduces the simulation system and defines the assumptions and simplifications made to the support scheme rules. The fifth chapter studies the results and the sixth chapter concludes the findings.

2 Institutional setting

Understanding the context and events of the Covid-19 pandemic is important for analysing its effects on business and society. According to Google Trends, a functionality of the search engine that measures relative popularity of a search term or topic, the Finnish word for the corona virus, "korona", had attracted little to no attention in Finland until late January of 2020. Then by late February it had already surpassed in search popularity topics such as ice hockey and skiing, two of the most followed and practiced sports at that time of the year (Google Trends, 16.10.2021). From March 2020 forward, together with the rest of the Europe, Finland issued several restrictions to individuals and businesses, limiting physical contact and the operation of facilities where the disease could spread. In addition to hard restrictions, plenty of instructions and guidelines for protecting public health were published. This chapter first describes the timeline of the pandemic and government restrictions on social and economic activity in Finland from March to June 2020 as these are the months which will eventually describe the pandemic shock in our simulation. Then the aim is to motivate the need for economic aid for companies that led to implementing Business Cost Support among other means in the spring of 2020. Since our simulation later in this thesis is based on Finnish companies, it is relevant to describe the context of the pandemic from the Finnish perspective. Finally, I dive into the details of the three support schemes of interest, implemented in Finland, Norway and the United States.

2.1 Covid-19 and related restrictions in Finland

The first confirmed case of Covid-19 on a non-tourist in Finland was detected on February 25th, 2020. At that time, the only government action in response to the disease were instructions for better hygiene and intensified cleaning, and there were no real restrictions on individuals or businesses. More serious recommendations were put to place during the second week of March, when both infection rates and hospitalisations began to rise on a rapid pace. On March 12th, the Finnish Institute for Health and Welfare (THL) issued recommendations to avoid crowds and traveling inside the country as well as to keep a safe distance of at least one meter. At the same time people were advised to work from home if their duties allowed. A few days later public spaces such as schools and libraries were closed and over 70-year-olds were mandated to stay in quarantine-like conditions (HS, 16.3.2020.). From March 18th onwards, the Emergency Powers Act was enabled in Finland for the first time since the Second World War. These

powers were eventually used in moderation. However, they enabled the government to implement a three-week-long lockdown of the Uusimaa region from the rest of the country between 27th of March and 15th of April (HS, 27.3.2020).

As is visible from the following figure 1 from Tiirinki et al. (2020), the peak in hospitalisations in the spring and summer of 2020 occurred in late March. The figure also denotes the length of emergency conditions and the length of the Uusimaa lockdown. After the peak in hospitalisations was reached, some of the restrictions were lifted, beginning with the Uusimaa lockdown. In the beginning of May, travel across national borders for work was allowed, and in mid-May pupils returned to schools (YLE, 14.5.2020). Some of these had a direct impact on the ability of firms to conduct their business. In May 2020, maximum attendance for public events and gatherings was increased from 10 to 50 people (Tiirinki et al. 2020). On the first of June, restaurants were opened with 50 percent capacity and recommendation to avoid traveling within Finland was lifted.

Figure 1

Covid-19 patients in hospitals and restrictive measures in Finland in spring 2020

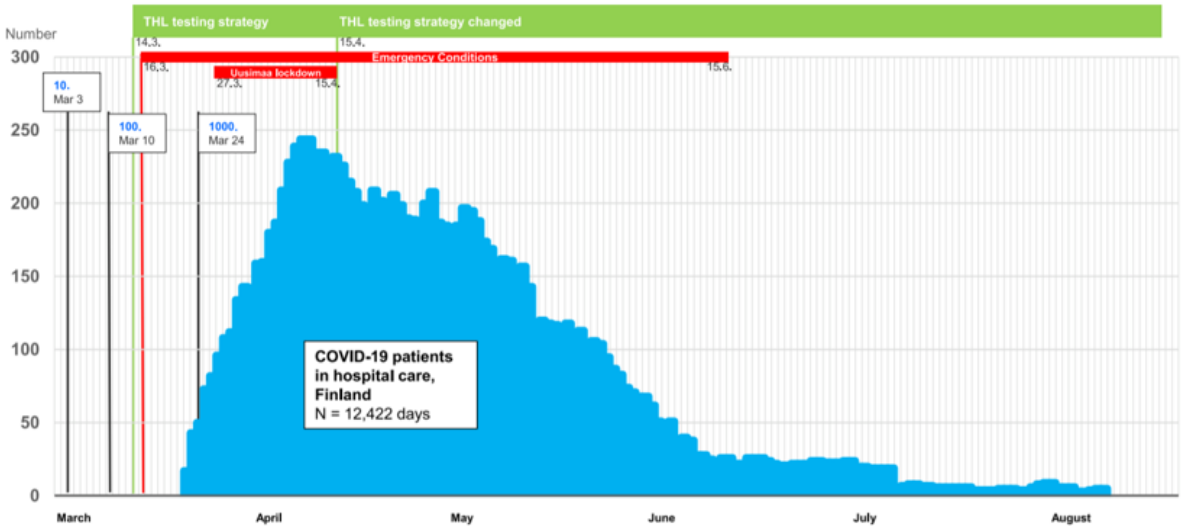


Figure 1 shows that after the peak in hospitalisations in April 2020 the number of hospitalised patients remained low, and the summer of 2020 was spent in rather normal conditions. However, as fall came, the pandemic returned and proved out to be a long-lasting phenomenon not only globally but also in Finland. A new peak in hospitalisations was reached in December and the third peak, the highest so far, in March 2021. At the time of writing, in October 2021, most of the population in Finland has been vaccinated and most of the restrictions lifted. Altogether, the effects of the pandemic remained relatively mild in Finland compared to other

countries in Europe or the US. In July 2021, a German newspaper Der Spiegel (28/2021) stated that Finland had managed the best among 154 countries in fighting the pandemic. Their comparison took into account medical, economic and social measures. Additionally, as of October 2021, Finland had experienced the least Covid-19 cases per capita among European countries.

2.1.1 Need for economic aid

The economic consequences of the pandemic quickly became evident after the government had imposed several restrictions on businesses. To support businesses in the challenging economic situation, the first response of the Finnish government was the implementation of the existing channels of Business Finland, which is a government organization for innovation funding, trade, travel and investment promotion, and area-specific ELY centres. Additionally, the government-owned financing institution Finnvera's guarantee policies were loosened to increase availability of loans for businesses. (Työ- ja elinkeinoministeriö (TEM), 20.3.2020)

However, the support channelled through these channels was not fit for the purpose of emergency relief under pandemic conditions. For example, the Business Finland funding faced critical review in the media, as some of the funding had gone to rather profitable and stable companies. The rules behind these initial support channels were originally developed for economically normal conditions and they preferred companies which were able to launch new projects or R&D programs even during the pandemic (YLE, 23.4.2020). The consensus quickly turned to favour a cost compensation scheme that would be exclusively targeted to businesses that had suffered from Covid-19 and relatively easy to apply to make it accessible for small enterprises as well. In May 2020, the government agreed on a new scheme that replaced other support channels, such as the Business Finland scheme (Valtioneuvosto, 14.5.2020). This new scheme was named the Business Cost Support and will be explored in further detail in chapter 2.2.1.

The aggregate increase in spending was extraordinarily large in Finland as well as in the rest of the Western world. The Finnish government unveiled its first additional budget proposal on 20th of March 2020. It contained a little under 400 million euros to both combating the pandemic and supporting people and businesses economically affected by the pandemic. Later, the government ended up proposing seven additional budget proposals which altogether set the government net lending to equal slightly under 20 billion euros. This was roughly 17 billion

euros more than in the original budget proposal for the year 2020. (Valtionvarainministeriö, 2019)

2.2 Economic policies implemented by Finland, Norway and the US

This chapter introduces the cost compensation policies of the three countries in focus in this thesis: Finland, Norway and the United States. The Finnish minister of economic affairs stated that the target of the support was to "prevent a wave bankruptcies and job loss" (Valtioneuvosto 14.5.2020). Meanwhile the Norwegian government stated that the main goal of their Business Compensation Scheme was to help otherwise profitable companies through the pandemic and thus reduce the number of unnecessary bankruptcies that could enhance the negative economic effects of the pandemic (Regjeringen, 10.11.2020). On the other hand, the PPP in the US was mostly an employment scheme meant to keep the workers on payrolls (U.S. Department of Treasury, 2020). Common for all the schemes was that they all aimed to compensate firms for some of the costs they would face even if their production was entirely or partially halted due to the pandemic. Differences are found from the kinds of costs that were covered and the criteria for eligibility. The main aspects of the support schemes are introduced in this chapter, and the stylised versions used in the simulation will be presented in chapter four.

2.2.1 Business cost support in Finland

First, I discuss the characteristics of the Finnish Business Cost Support. The original bill was signed by the President of Finland on 26th of June 2020 and the State Treasury began distributing the support on the 7th of July. The support program was initiated a bit later than similar programs in many other European countries as Finland had first resorted to the other existing support channels described earlier. The logic behind the new Business Cost Support was fundamentally different from its predecessors. For example, the government noted that Business Finland's support was not well-suited for the sudden, across-the-board nature of the Covid-19 crisis. In terms of the target of the scheme, the government stated in the bill that the goal of the Business Cost Support is to decrease the number of bankruptcies by securing the liquidity of firms. The bill also emphasised that the support is to be targeted to the firms and industries which were hit the hardest by the pandemic. Ultimately, the goal was to make the recovery of employment faster after the crisis. (HE 97/2020)

Later, the law was amended first in December 2020 and multiple times thereafter to allow for new application periods and to alter the rules of the scheme. The first version of the Business Cost Support covered costs from April to May 2020. The second round took into account the five months from July to October. Third round covered the months from November 2020 to February 2021, and the fourth one from March to June 2021. Similarly to our simulation, the real-world length of the scheme was at this point approximately one year. In the fall of 2021, there have been talks of extending the support scheme for another period. For the simulation I will use a stylised version of the scheme, emphasising the third and the fourth application periods. However, this chapter will explain the characteristics of each application period in order to facilitate a fuller understanding of the nature, characteristics and developments of this rapidly planned and executed scheme.

Certain qualities of the Business Cost Support law have stayed the same throughout the changes. From the beginning, firms were only eligible for Business Cost Support if their turnover had dropped at least 30% between the support period and the comparison period. The support period was defined as those months whose costs were covered, and the comparison period as the months to which the turnover of the support period was compared. In all but the first round, the comparison period was for the majority of firms the same months of the year 2019. Additionally, on all rounds, no support sums lower than 2000 euros were paid out.

Table 1

An overview on the four rounds of Business Cost Support

Round	Support period	Max. amount	Requirements for minimum	Coverable expenses	Additional restrictions
I	April 2020 – May 2020	500 000	Support equation over 2000	Strict list of coverable expenses + wages	Turnover of comparison period must be over 20 000
II	June 2020 – October 2020	500 000	Support equation over 2000	All mandatory non-flexible costs + wages	
III	November 2020 – February 2021	1 000 000	Coverable costs over 2000	All mandatory non-flexible costs + wages*1,2	
IV	March 2021 – May 2021	1 000 000	Coverable costs over 2000	All mandatory non-flexible costs + wages*1,2	

The table above describes the differences in the characteristics of the four application rounds of the Business Cost Support. Most notable tweaks were made with the aim to include more small businesses as support recipients (TEM, 4.3.2021). Particularly, only requiring 2000 euros in coverable expenses to receive the minimum cost amount regardless of the outcome of the support equation caused an increase in approved applications. The support equation will be discussed in more detail below. In the first round, only 27 percent of the applications were approved, but on the third round the share of approved applications rose significantly to 77

percent. The support amounts also rose as the maximum individual support sum was lifted from 500 000 euros to one million euros. After the first round, the definition of fixed costs was expanded to include all non-flexible costs. This definition left room for consideration and meant that certain costs would be counted as coverable expenses for one business but not for another. For example, certain vehicle related costs could be accepted for taxi firms but not for barber shops whose operation does not depend on a car. Meanwhile many costs such as rents and utilities remained acceptable for all firms. Additionally, some costs related to wages were accepted by multiplying labour costs by 1,2. This change allowed the programme to cover costs such as unemployment insurance and pension fees that are mandatory for firms that have employees. In terms of support paid out, the third round was approximately as large as the first two rounds combined. The fourth round was similar to the third round in all main aspects.

The support equation mentioned before is a formula that is used to calculate the support sums given out to businesses. Here, turnover means the monthly average turnover of said period. The drop in turnover produces the coefficient with which the sum of fixed costs and payroll costs is multiplied. Firms have a 30% deductible, which means that only firms whose turnover has dropped more than 30 percent are eligible for Business Cost Support. Additionally, the maximum payable sum could not exceed 500 000 or one million euros, depending on the round. Also, due to EU regulation on corporate subsidies, maximum amount for business concerns was first 800 000 and from third round onwards, 1 800 000 euros.

$$Support = \left(\frac{Turnover\ of\ the\ comparison\ period - turnover\ of\ the\ support\ period}{Turnover\ of\ the\ comparison\ period} - 0.3 \right) \times$$
$$(\text{Fixed costs of the support period} + \text{payroll costs of the support period})$$

It is also worth noting that the turnover drop is calculated differently for very new firms and small firms which file their taxes annually of quarterly instead of the regular monthly schedule. Firms founded after 1.1.2019 are eligible for the support based on the turnover of their industry. (HE 97/2021)

2.2.2 Compensation scheme for businesses in Norway

The government of Norway announced their new Compensation Scheme for Businesses on March 27th, 2020 This was a couple months earlier than the Finnish Business Cost Support but about the same time as many other European nations announced their plans. According to the finance minister Jan Tore Sanner, the scheme was targeted to companies which had experienced a large fall in turnover due to the Covid-19 pandemic and would ensure that viable companies make it through the crisis (Regjeringen, 02.04.2020).

During the pandemic, many changes have been made to the rules of the Norwegian support scheme. The Compensation Scheme for Businesses consists of support periods, much like its Finnish counterpart. The support periods differ by the months whose turnovers are being compared but also by the support calculation formula and other restrictions. In the building of the simulation model of this thesis, the latest available version of the support scheme has been emphasised. Therefore, I now move to introduce the rules of the support periods from March to October 2021. The exact rules adopted in the simulation will be discussed in Chapter four.

The Norwegian scheme focused solely on fixed costs and did not cover payroll costs. The included fixed costs were largely the same as in the Finnish scheme. As was the case with the Finnish scheme, the Norwegian scheme also defined fixed costs as costs which cannot be reduced in line with the economic activity, which means that they are non-flexible in relation to turnover. One notable difference between the definition of fixed costs in relation to the Finnish scheme is that the Norwegian scheme did not cover purchased services other than accounting, whereas the Finnish scheme covered all necessary purchased services because they were parallel to labour costs.

The formula used to calculate the amount of the compensation in the Norwegian scheme is presented below. In this scheme, the drop in turnover is used as a coefficient to calculate the share of compensated fixed costs. In addition, there is an adjustment factor that is used to determine the intensity of the support. It has varied between 0.5 and 1.2, depending on the pandemic situation as well as on other specifications of the formula. According to the latest version of the law, adjustment factor is 0,85 for all businesses. As of the spring and summer of 2021, the support sum could not exceed the calculated deficit of the support period multiplied with 0,9 or 0,7, depending on the size of the company. The support sum also could not exceed fixed costs net of result of the previous financial year multiplied with turnover loss. These rules on past and current profit were designed to avoid giving out compensation to profitable or purposedly unprofitable firms, such as growing start-ups.

Below is an example formula for calculating the support sum for a small enterprise applying support for periods March-April 2021. The firm has experienced a 45 percent drop in turnover, had 20 000 NOK in fixed costs and has made 30 000 NOK deficit during the support period and a 5 000 NOK deficit in the previous financial year.

- Compensation = Loss in turnover × Fixed costs × Adjustment factor
- Compensation = 0,45 × 20 000 × 0,85 = 7 650 =>

- Compensation = 7 650 ≤ 30 000 × 0.9 = 27 000 =>
- Compensation = 7 650 ≤ (20 000 – 5 000) × 0,45 = 6750 =>
- Compensation = 6750 NOK

Similarly to the Finnish scheme, the drop in turnover is calculated differently for newly founded companies.

The minimum payable subsidy was 5 000 NOK and in March 2020 no subsidy could be larger than 80 million NOK. Later this limit was changed multiple times and the most recent change occurred for the support periods between March and October 2021. Then it was stated that the complete sum of subsidy payments during this time could not exceed 100 million NOK. (Lov om midlertidig tilskuddsordning for foretak med stort omsetningsfall etter august 2020)

2.2.3 The Paycheck Protection Program in the United States

On March 27th 2020, the United States implemented a sizeable set of policy interventions called the US CARES Act to counter the economic consequences of the Covid-19 pandemic. This act included the Economic Impact Payments or "Covid checks" which were a direct injection of cash to households targeted to stimulate private consumption. The other major part of the act was the Paycheck Protection Program (PPP), which I take as the point of interest in this thesis. This section summarises the content of the program.

The Paycheck Protection Program is a loan program that issues loans to firms and non-profit organisations employing less than 500 employees. However, the United States Small Business Administration would forgive the loans in whole if the firm filled all employment retention criteria and used the loan amount to selected expenses. The promise for loan forgiveness combined with the employment retention criteria made the scheme to function as a payroll support scheme. The publicly stated goal of the program was to give businesses an incentive to maintain personnel on their payroll even if there was only little work to be done. This intention suits well for the American labour market as it lacks the extensive unemployment insurances that are in place in the Nordic countries.

The amount of the PPP loan was determined to be 2.5 times the monthly payroll, and the sum was to be used within 24 weeks. Therefore, the amount depends solely on the payroll costs of the firms. 60 percent of the support sum had to be spent towards salary costs. The other 40 percent can be directed to rent and utilities, much like in the Finnish and Norwegian schemes

with the addition that some other costs such as damage caused by vandalism and looting were covered. The maximum loan amount to any single applicant was 10 million dollars.

The employee retention criteria that have to be fulfilled in order to apply for loan forgiveness includes the need to maintain the number of employees that the company had employed before the pandemic. If the firm has laid off employees, they must be rehired for loan forgiveness eligibility. One of the most important rules in the context of our simulation was that each employee had to be paid at least 75 percent of their original salary. This condition means that a firm can cut 25 percent of their labour costs and still receive the full support sum based on their original payroll. The adaptation of the rules in the simulation will be further explored in Chapter four. (US department of the Treasury, 2020)

3 Data

3.1 Financial statement data on Finnish businesses

In the simulation model presented in this thesis, two types of data are used. The first and the most crucial is the Financial Statement Data Panel constructed by Statistics Finland. This data is collected from corporate financial statements and it provides detailed information about Finnish corporations' profit and loss accounts and balance sheets. Although the data is deidentified by encryption of business IDs, the statistical unit in the data is a single firm. This means that the data will describe heterogeneity among corporations to the highest extent. The main points of interest in the data are the firms' turnover figures and their different cost types, but in addition to these, I will also use data on assets and debt. The purpose of the data is to describe the pre-crisis state of corporate field in Finland and thus enable us to observe the change that occurs after the pandemic shock is implemented in the economy.[1]

Because the purpose of the data is to describe the nature of Finnish corporations before the Covid-19 pandemic, it is desirable that the financial statement data is as recent as possible. Hence, I have chosen to use data from the year 2019 which is the last full year not significantly affected by Covid-19. However, this also poses limitations to my analysis, as it means that very recently founded companies are not considered. Nevertheless, this deficiency of the data does not have significant implications to the simulation conducted in this thesis as a significant portion of new firms would not have been qualified for certain rounds of Business Cost Support and the Norwegian Compensation Scheme.

3.1.1 Limitations and deidentification

In total, the dataset covers over 300 000 Finnish businesses with a great variety in completeness of the data. To make our simulation study possible and to satisfy Statistics Finland's criteria on data anonymity, certain alternations to the data have to be made. Firstly, to crop out dormant companies, only businesses that had reported positive turnover and had labour costs higher than zero were included. Secondly, some firms had negative values for certain cost types or assets. These few cases were removed to prevent misleading and possibly perverse results. Thirdly, also the few firms which had unknown firm size classification were removed from the data set used in the simulation. Fourthly, to make sure that very large businesses would not be

[1] More information on the data set available at Statistics Finland's Taika – research data catalogue https://taika.stat.fi/fi/aineistokuvaus.html#!?dataid=FIRM_20132019_jua_FSS_001.xml

identifiable, and to counter possible outliers, the data was winsorized with respect to turnover. Winsorizing is a statistical procedure which replaces the most extreme values with less extreme ones. Additionally, certain industries were dropped from the simulation data set for not being subject to one of the support schemes. The Finnish Business Cost Support scheme as well as the Norwegian compensation scheme did not include the primary sector of the economy such as agriculture and fishing. In addition, the Norwegian scheme did not cover oil and gas production, the finance sector or the electricity sector. Finally, the turnover statistics of the year 2020 for certain industries were not available, most likely due to small sample sizes, and were thus dropped from the data set. These branches include the likes of manufacture of tobacco products as well as air transport, of which the latter was also not included in the Norwegian scheme. These alterations to the original data set allow for a focused simulation on the effects of the different support schemes on the economy hit by the shock of the pandemic.

3.1.2 Costs

For the analysis to succeed, cost variables had to be defined and derived from the raw data. In this section, I will define the contents of these variables and describe their qualities as well as some simplifications that were made during the data wrangling.

The total cost variable in this simulation is defined as turnover net of profit. The components of total costs were labour costs, material costs, fixed costs and other costs. By default, there also existed a ready variable for total costs in the raw data, but it did not consistently add up in the desired manner sometimes giving out results such as higher wage costs than total costs. Labour costs consist of single variable total personnel costs that include all wages subject to withholding and other wage derived costs such as social security and pension payments. It is noteworthy that here labour costs do not include private drawings practised by sole proprietorships. This anomaly will cause a minor inaccuracy in our simulation, as Finnish Business Cost Support did in fact also cover these costs, but this will not be the case in our simulation. Material costs is a summation of the value of sellable goods acquired and of materials and substances directly used in producing the final good. For example, in the case of a bread-baking company, material costs would include the flour and the bags in which they sell the bread, but not the oven they use in baking the bread.

Fixed costs is a variable constructed to define those costs that were coverable under the Finnish and the Norwegian support schemes and therefore, in this simulation, it is constructed accordingly to the rules of these programs. Luckily, the rules on coverable expenses are

remarkably similar between the two programs, as noted in chapter two. This similarity allows me to create a single variable to be used in the simulation with regard to both schemes. In Finland, the exact group of costs which have been viewed as fixed costs has varied during the four rounds of Business Cost Support and the list below will only provide an approximation of them. After all, the law on Business Cost Support is not definitive and almost every cost type can be viewed as fixed if a business has, for example, a long-term contract binding it to that expense. Also, the Norwegian law on the Compensation Scheme does not name exact cost types. As there is no data available on which costs are most often covered, I have used information published by State Treasury of Finland and Norwegian Tax Administration, the two authorities responsible of distributing the financial support, as well as my own expertise from working with the Business Cost Support, to gather a list of expense types available in the Statistics Finland dataset. As a result, the costs on the list below is used in the simulation and later referred to as fixed costs.

Costs considered fixed in the simulation:

- Rents of buildings, machinery, equipment etc.
- Rents of land and water areas
- Electricity
- Heating
- Leasing costs
- License and usage fees of software and patents
- Leased workforce
- Subtracting
- Outsourced IT services
- Interest payments from foreign capital[2]
- Other than previously mentioned costs[3]

3.1.3 Profitability, liquidity and solvency

To find out how well firms are coping with the pandemic shock, I measure their abilities to make profit and to pay their bills. Firstly, the profitability of a firm is measured by profit

[2] Business Cost Support covers only interest costs from real estate loans and loans for acquiring capital
[3] Variable in the micro data that contains both, coverable costs such as accounting and typically non-coverable costs such as postal fees but considered coverable in whole in the simulation.

margin. Secondly, there are two alternative measures for liquidity. Quick ratio measures short-term liquidity and debt ratio, also known as solvency, measures long-term ability of a firm to meet its obligations. In this simulation, it is not possible to measure changes of liquidity and solvency simultaneously. In order to do that, I would need to know how firms prefer to finance their losses, and that discussion is narrowed outside of the scope of this thesis.

To measure profitability, profit margin will be used. Here profit margin is defined as firm's profits divided by its turnover. A negative profit margin means that a firm is making a loss. It can also be noted that the higher profit margin a firm has, the better it usually is prepared to shock in turnover, such as the one in our simulation.

Liquidity, or firm short-term capability to pay its bills, is measured by a quick ratio, which are interpreted as financial assets added to profits and divided by current liabilities. Financial assets cover all liquid assets such as the cash, deposits, stocks and bonds that a company owns. Inventories are purposedly excluded due to their rather non-liquid nature in a pandemic. Adding profits means that current liabilities are measured before profitable firms invest the gained currency or hand it out as dividends. On the other hand, loss-making firms which have negative profits will finance their losses only by reducing financial assets. Thus, firms are not able to issue more debt. A quick ratio lower than one indicates that a firm might soon run out of liquid assets if it is not able to increase its cash reserves. If the quick ratio reaches zero, it indicates that a firm is not able to pay its bills and will face bankruptcy once the next bill arrives.

To measure solvency, I will use debt ratio which is defined as total debt net of profits over total assets. Here firms will finance their losses by issuing new debt, and profitable firms will use their profits to cut their existing debt. Unlike with quick ratio, there is no strict bound when a firm has too much debt compared to its assets. However, a debt ratio over 1 is often considered as a signal of a higher financial risk.

3.1.4 Qualities of the dataset

After making the necessary alterations to the data and constructing the needed variables as described earlier, we now turn to the dataset that will describe the universe of Finnish firms for our simulation.

Table 2 Summary statistics		
	Mean	Standard deviation
Revenue	1 142 102	29 019 597
Total costs	1 076 550	25 161 236
Labour costs	220 872	1 687 318
Material costs	497 237	21 788 727
Fixed costs	253 360	3 105 070
Other costs	105 080	2 206 983
Firm profit	65 330	4 197 842
Profit margin	0,13	0,18
Quick ratio	17,9	389,73
Debt ratio	0,88	49,56
Number of firms	148 687	

Notes: All amounts are in euros. Profit margin, quick ratio and debt ratio are fractions. The number of firms in the simulation is stated in the bottom.

There were in total 148 687 firms that filled the requirements and had the required data available. This might not be a representative picture of the whole corporate field, but it most certainly covers the vast majority of active firms that were subject to the support schemes analysed in this thesis. These firms reported on average a little over one million euros in revenue while producing a mean profit of 65 000 euros. The standard deviation for almost each of the variables is noticeably large, which reflects the heterogeneous nature of the business field. However, we can conclude that Finnish firms were on average fairly profitable in the year 2019. The largest cost type was material costs, which made up roughly half of firms' total costs. Fixed costs and labour costs covered about 25 and 20 percent of the total costs respectively, leaving the remaining share of costs to the residual cost type "other costs". Material costs sported also the highest standard deviation among cost types. This is logical, considering that while the banking sector is excluded, many of the largest corporations in

Finland are manufacturers with supposedly very large material costs. On the other hand, while 70 percent of the Finnish GDP is generated by the service industry, many smaller corporations might have very small material costs. For example, barber shops whose costs are mainly wages and fixed costs such as rents.

3.2 The data on turnover loss by business sector

The financial statement micro data is an effective way to account for heterogeneity in the pre-crisis characteristics of Finnish firms, but I am required to take a broader view to heterogeneity when considering the effect of the pandemic on firms' turnover. Whereas each firm will have their unique starting position from 2019, for the purposes of this simulation, they will be assigned a drop in turnover based on their business sector. The data for the turnover drop is acquired from Statistics Finland using their working day adjusted turnover indices of construction, industry, retail and services. Here, turnover loss is the difference between March-June 2020 and March-June 2019. This generalization of the turnover shock is due to the nonavailability of microlevel data from 2020. Also, the distribution of Covid-19-induced benefits, such as the Business Cost Support, after June 2020 are assumed to have influenced the turnovers of the firms. For example, having some of their costs covered might have enabled firms to keep their doors open and create more revenue than without any support schemes. By using sectoral turnover from the very early months of the pandemic, we are able to set a cleaner slate for our simulation. The qualities of the turnover shock and its place in the simulation will be described in more detail in chapter four.

4 Building the simulation

The simulation of this thesis follows the simulation strategy of Alstadsæter et al. (2020). Firstly, it is built on the detailed micro data which models heterogeneity in firm qualities. Secondly, the simulation is run in five different scenarios, one baseline scenario without the Covid-19 shock, one with the shock but without any policy response and three with different policy responses.

The simulation was executed using statistical software R. Bachas and Brockmeyer (2020) and their work on using administrative data in understanding the implications of the Covid-19 shock provided me with the structure of the code. In order to make the comparison of support schemes possible, I made some additions and alternations. This chapter will describe the mechanics of the simulation and go into detail about the assumptions and simplifications that were made to construct the simulation.

4.1 Turnover shock

The central theme of this thesis are the reactions of the business sector to the shock of the pandemic and the response of national governments to remedy the sector. To consider this, we must first define the qualities of the pandemic-induced shock. Evidently, the Covid-19 pandemic has affected firms in many ways. Direct closing orders, shrinking of the customer base due to limitations on movement and voluntary social distancing, as well as supply chain problems all combined worsened the operating conditions of most firms. In our simulation, I will consider turnover as the measurement of the effect of these problems. This approach will not account for changes in input prices or any other change that the pandemic has brought with it, other than changes in sales.

The Covid-19 pandemic has hit firms differently depending, for example, on their field of business, their customer base, location, and a number of individual qualities such as their ability to digitalise their business. Thus, it is natural to consider some heterogeneity when it comes to the size of the pandemic-infused turnover shock. As mentioned before, the financial statement data used is not yet available for the year 2020. Additionally, comparing 2019 turnovers to the turnovers of the whole year 2020 would both, take into account early months without Covid-19, and produce skewed results as various support programs started during the spring and summer of 2020. In addition, the financial statement data is deidentified which prevents the usage of, for example, data from business cost support applications. Luckily, Statistics Finland

publishes industry-level turnover data which is available for public use. The industries are presented on a two-digit level which allows for a fairly heterogeneous view on the shock. Also, to minimise the effect of Covid-19 support programs, we only compare the spring months from March to June.

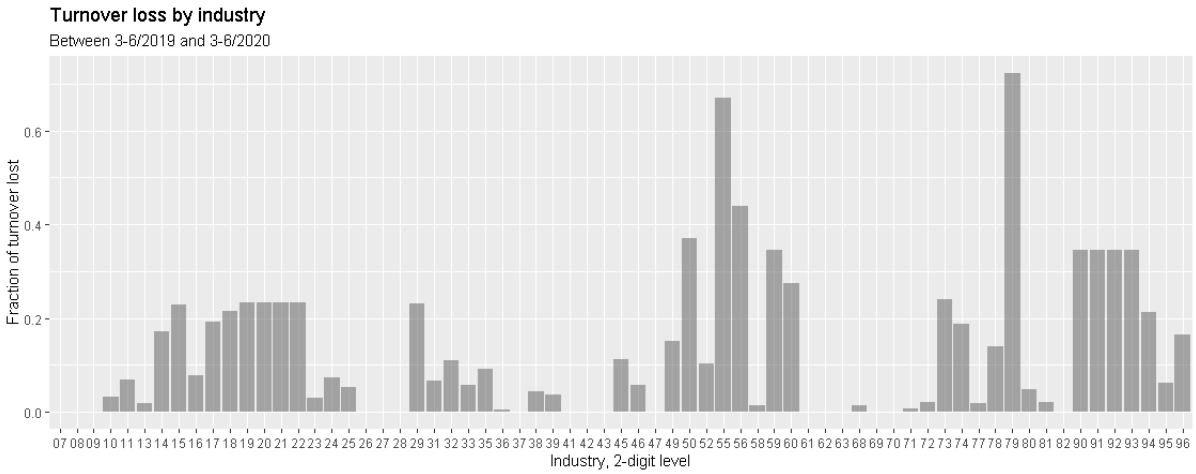
To measure the turnover loss, we compared the average turnovers between March and June of 2019 and 2020. As the pandemic and related restrictions were at their tightest in Finland during the spring of 2020, this comparison provides an exaggerated picture of how hard turnovers actually dropped during the whole pandemic. The months of March, April, May and June were chosen to simulate a shock that would be as clean as possible from pandemic support policies, but also to make the effect of support schemes visible. The effect of the pandemic was rather mellow during the summer and autumn months. As a sign of that, the second round of Business Cost Support was not considered until fall 2020, as the Covid-19 infections had risen again, and businesses were in trouble (TEM, 16.10.2021).

We consider the length of the shock to be one year. This means that the turnover loss factor described in the figure 2 below will be applied to the yearly turnover of the firm. This practice does not try to replicate the real world where the pandemic reached Europe in March 2020 and still continues to affect our daily lives at the time of writing in the end of 2021. Additionally, there has also been a great variation in the strictness of the restrictions between different countries, varying from closing borders to limits in restaurant opening hours. Hence, the constant one-year shock with the data from spring 2020 is a rough approximation. However, it still provides us the setting we need to compare the different support schemes. The results we obtain should lead to similar conclusions regardless of whether the shock is a constant one-year shock or would the turnovers be fluctuating monthly.

The effects of the pandemic have not been equally felt across the different industries of the economy. The figure 2 below presents the distribution of turnover drops between the sectors. Firstly, we can see that the industries 55 and 79 have experienced the highest turnover losses of about 70 percent. These branches are the obvious losers of travel restrictions: accommodation and travel agencies. Secondly, certain industries have increased their turnover by a small percentage. These numbers have been rounded to zero for the sake of successful simulation. Although a single firm might be versatile enough to benefit from the hard restrictions on movement that were in place during the spring of 2020, this is unlikely to be

true for an entire industry. In the simulation, firms that are assigned a turnover loss of 0, will simply produce the same outcome for each variable before and after the shock.

Figure 2 – Turnover loss by industry



4.2 The possible reactions of the firms

As the previously defined turnover shock affects the turnover of the firms, the firms will then decide what sort of action to take. In our simulation, firms will automatically reduce their material costs in the same proportion as their turnover drops. This is rather intuitive as stores do not want to increase their stock if they are having trouble selling their existing items. Firms will reduce their material costs regardless of their after-shock profit level, meaning that profitable firms will reduce their material costs as well. This of course affects only those firms that did experience a turnover loss.

In addition to the automatic response, firms have two possible responses that depend on their profit level and the availability of support schemes. If there exists a support scheme in the scenario, firms will first recalculate their costs while taking account the scheme. For example, in the case of Norwegian Compensation Scheme for Businesses, firms that are eligible for the compensation will reduce their fixed costs by the compensation amount. In the scenario with PPP, labour costs will reduce by the support amount and in the Finnish scheme, both the fixed and labour costs will reduce for eligible firms.

The second response is possible only for those firms that are still unprofitable, meaning their costs are higher than their after-shock turnover. If a firm is making loss, it can reduce its labour costs at the same percentage as its turnover loss. However, in our simulation the target of each

loss-making firm is to reach zero profit or their initial profit level if it is below zero. This means that if a firm whose turnover has dropped by 34 percent, only a 10 percent cut in labour costs is required to reach that target, the firm will not cut labour costs by any more than 10 percent. This reflects the short-term nature of the Covid-19 crisis. Firms are expecting a recovery in sales and do not want to cut ties with employees if they are already able to pay their bills. The maximum percentage of labour cost reduction can be justified by the nature of the firm. If a firm is significantly unprofitable and has not experienced a significant loss in turnover during the simulation, it means that the firm has been operating in loss already before the pandemic. This means that the firm is unlikely to reduce employment in our simulation year if it hasn't already done it before. This firm might for example be a growing company building its product and operating on loss by choice.

4.3 Five different scenarios

We run the simulation under five different scenarios. One of them is the baseline scenario which describes the economy as of 2019, and the rest are different choices that governments could have made once the pandemic hit the economy.

No shock scenario or the baseline scenario happens without the Covid-19 shock and without policy interventions. Practically, this will be the same as our starting point in year 2019. In this scenario, there exists no turnover shock and every firm quality stays the same as they are in the Statistics Finland financial statement data. The purpose of the scenario is to provide a comparison point to other scenarios and highlight their differences towards the 2019 situation. The second scenario is the pure turnover shock scenario where there are no government interventions. Here the firm is only able to adjust its material and labour costs in proportion to the loss in turnover. Scenarios three, four and five are policy scenarios, one for each support scheme.

4.3.1 No support scenario

This scenario describes the situation where firms will carry the realisation of the pandemic risk entirely by their own. This means that there are no government policies that would affect them. Even though this policy route was not selected by any country in the EU or North America, it would have still been a possibility for them to choose. More importantly, no support scenario serves as a comparison point considering the effectiveness of the support schemes.

The post-pandemic profit of the firm in all scenarios is calculated by deducting all costs from after-shock turnover. After-shock turnover is the same in every scenario with a pandemic shock and thus the difference comes from costs. In no support scenario, the turnover of each company will be reduced by their sectoral turnover drop factor. Then, their material costs adjust at the same rate. Meanwhile, fixed costs stay unchanged because there are no support schemes to compensate them. Also, the residual other costs stay the same. Any unprofitable firm will then try to reduce its labour costs until profit reaches zero or matches its profit level from 2019, whichever is lower. However, firms cannot cut labour costs by a larger margin than their turnover drop. The new profit of a firm in no support scenario is calculated the following way.

$$New\ profit\ = Turnover\ after\ shock - material\ costs * \delta - fixed\ costs - other\ costs - labour\ costs * (1 - X)$$

, where δ stands for factor of loss and X equals the adjustment factor of labour costs. By setting new profit to equal zero or firm's previous year's profit, X can be solved. If X proves to be larger than factor of loss δ, X is set to be δ. For still profitable firms, X turns negative values which are set to equal zero, meaning no firm hires new labour.

Since there are no support schemes at place, this scenario will presumably produce the least desirable results when it comes to variables measuring firm well-being. Having no support scheme also give the highest aggregate payroll loss. On the other hand, when there is no government intervention, direct costs for the taxpayer will also be zero.

4.3.2 Implementing Finnish Business Cost Support

When inserting the Finnish business cost support to the simulation, we will utilise a simplified version of the rules introduced in chapter 2. The core mechanism that calculates the individual support sums is fairly simple. First, turnover drop first defines firms a compensation factor and then coverable fixed and labour costs are multiplied by that factor. Intuitively, non-eligible firms will have a compensation factor of 0 and eligible firms a factor between 0 and 0,7. Secondly, the support sum is deducted from labour and fixed costs. What share of the support is used to cut labour costs and what share is used to cut fixed costs is determined by the proportional sizes of the costs. Thus, if a company has 10000 euros of coverable expenses and 90% of them are fixed costs, then 90 percent of the support will also decrease the fixed costs. The formula to calculate the new profit of a firm under Business Cost Support is as follows.

$$New\ profit\ =\ Turnover\ after\ shock - material\ costs * \delta - \left(fixed\ costs - \frac{fixed\ costs}{fixed\ costs + labour\ costs} * support\ sum\right) - other\ costs - (labour\ costs - \frac{labour\ costs}{fixed\ costs + labour\ costs} * support\ sum) * (1 - X)$$

, where δ stands for factor of loss and X equals the adjustment factor of labour costs. Unprofitable firms are able to reduce their labour costs the same way as in the no support scheme.

Considering the support sum, the rule that the maximum payable amount is 1 000 000 euros will be imposed. Technically, the upper limit for a single company or business group to receive during all four rounds of Business Cost Support was 1.8 million. The first four rounds have lasted for 13 months and would otherwise suit well for our year-long simulation. However, that 1,8 million is defined by the State Aid Temporary Framework of the EU (European Commission) and serves as the ceiling for all Covid-19 inspired corporate subsidies. Since there is no way to define these business groups from the data or know how much other support the firms have gotten, we will instead limit the available support at one million. This limits to some extent the possible exaggeration of the total subsidies received by corporate groups. The lowest payable support sum is 2000 euros. As the law on Business Cost Support dictates, this sum is also paid to firms whose calculated support sum is under 2000 euros but they have had both, turnover drop of at least 30 percent and coverable costs of 2000 euros.

There are certain parts of the Business Cost Support that were not possible to insert into the simulation for either data reasons or due to their relative irrelevance considering the outcome of the simulation. The data does not allow us to observe which companies have been in difficulties according to the EU guidelines before 31.12.2019 and would thus be ineligible for the support. Likewise, the simulation does not take into account if a firm has neglected its tax duties or been subject to distraint.

After the costs of firms are deducted by their respective support sums, firms have the same order of action as when no support schemes are present. They will reduce material costs by their factor of loss and then choose whether they need to reduce payroll by some ratio between zero and their factor of loss. After all costs have adjusted, the key variables such as profit margin and liquidity are observable.

4.3.3 Implementing Compensation Scheme for Businesses

When implementing the Norwegian Compensation Scheme for Businesses, we will also utilise the support rules introduced in chapter 2.2.2. The support mechanism of the simulation is the same as with Business Cost Support earlier. The turnover loss percent is multiplied with the adjustment factor of 0,85 and that gives the percentage of costs compensated. As the only coverable expense in the Norwegian scheme are fixed costs, these costs are then multiplied by the compensation percent. The new profit of the firm is calculated followingly.

$$New\ profit\ = Turnover\ after\ shock - material\ costs * \delta - (fixed\ costs - support\ sum) - other\ costs - labour\ costs * (1 - X)$$

, where δ stands for factor of loss and X equals the adjustment factor of labour costs. Unprofitable firms are able to adjust their labour costs the way presented in chapter 4.3.1.

When calculating the support sum in the simulation, we also take into account the fact that profitable firms are not eligible for the support. This is calculated in the simulation before any of the costs adjust.

The Norwegian scheme had a bit more complex approach to the maximum payable support sum than its Finnish counterpart. The maximum support sum changed between every two-month support period. In this simulation the upper limit is set to be 10 million euros, converted from Norwegian crowns with a simple, yet accurate, 10:1 ratio. This comes from the latest version of the law that dictated the rules on support periods from March 2021 to October 2021. It states that the overall support sum during these support periods cannot exceed 100 million crowns. This limit is not entirely accurate as the sums could have exceeded that in the course of the whole 18 months that the support has been available. However, this decision is in line with the general idea to base this simulation on as recent version of the support schemes as possible.

4.3.4 Implementing the Paycheck Protection Program

The United States Paycheck Protection Program was based on forgivable loans conditional to maintaining at least 75% of its payroll. For the simulation, the nature of the PPP must be modified to match the other two business support schemes and the available data. Firstly, the PPP was said to cover up to 2,5 times the monthly payroll of the firm but it had to be used in the course of 24 weeks or six months. We will follow Alstadsæter et al. (2020) and interpret it

in the simulation so that the program covers 2,5/6 ≈ 0,4167 of monthly payroll. As firms must maintain minimum 75 percent of labour costs to be eligible, we will now also assume that firms which end up taking the PPP, will reduce their payroll costs by that 25 percent. This means that the PPP ends up covering about 66,67 percent of the labour costs. When simulation the PPP, firms now have a choice to take the PPP and get two thirds of their payroll compensated or lay off more than two thirds of their employees. The latter option is chosen by firms that have been severely hit by the pandemic and are still very unprofitable after adjusting material costs. The new profit formula for firms that do not take the PPP is identical to the on with no support scheme. Below is the formula of new profit for those firms that take the PPP.

$$New\ profit\ =\ Turnover\ after\ shock - material\ costs * \delta - fixed\ costs$$

$$- other\ costs -\ labour\ costs * 0{,}6667$$

, where δ stands for factor of loss and X equals the adjustment factor of labour costs.

The PPP was meant to small businesses of under 500 employees but I will not enforce this criterion due to two reasons. Firstly, larger enterprise chains were also eligible for PPP if they operated in food or accommodation industry. Secondly, according to Statistics Finland's structural business and financial statement statistics, there are only a total of 288 firms in Finland that would not meet that condition (Official Statistics of Finland). Also, the support sums will not skyrocket in the case of the bigger firms as there is a maximum support amount of 8,5 million euros. The first round of the PPP had no eligibility criteria on turnover drop. As this simulation is based on the most recent versions of the support schemes, we will enforce a 25 percent minimum on turnover drop, implemented on the second PPP round. Next, it is useful to assume that firms do not utilise the PPP as a loan but as a grant and do indeed keep their payroll costs as 75% of the original amount if they decide to take part to the PPP. According to the rules, firms could use a part of the PPP payment to cover fixed costs but I will follow Alstadsæter et al. (2020) and not see it as a significant factor as paying the mandatory 75 percent of the payroll costs exceeds 66,67 percent support. Finally, I will convert the maximum amount of 10 million USD to euro to equal 8,5 million euros.

4.4 Fiscal costs and effects on unemployment

To measure the public finance effects of the pandemic shock, we will naturally calculate the amount of euros spent in each scenario. In addition, the fraction of payroll lost will be measured

to construct an image of possible differences among support schemes to prevent unemployment.

Especially in the beginning of the Covid-19 pandemic, governments were eager to introduce sizeable support programs for citizens and businesses alike. Still, even during times of crisis, fiscal costs are an important dimension in government decision-making and hence they should be included into studies evaluating the success of these decisions. The goal of this paper is not only to compare how well support schemes have managed to mitigate harmful effects of the pandemic but also to measure how costly this mitigation has been to countries establishing these programs and combine these to measure effectiveness of the schemes.

As described earlier in chapter 4.2., all the support schemes had a cost-reducing effect to firms. This was introduced because to a firm it is irrelevant whether its costs are lower or someone else is paying for these same costs. Hence, the calculation of total amount support paid by states is a simple summation of costs that were covered by each support scheme respectively.

5 Results

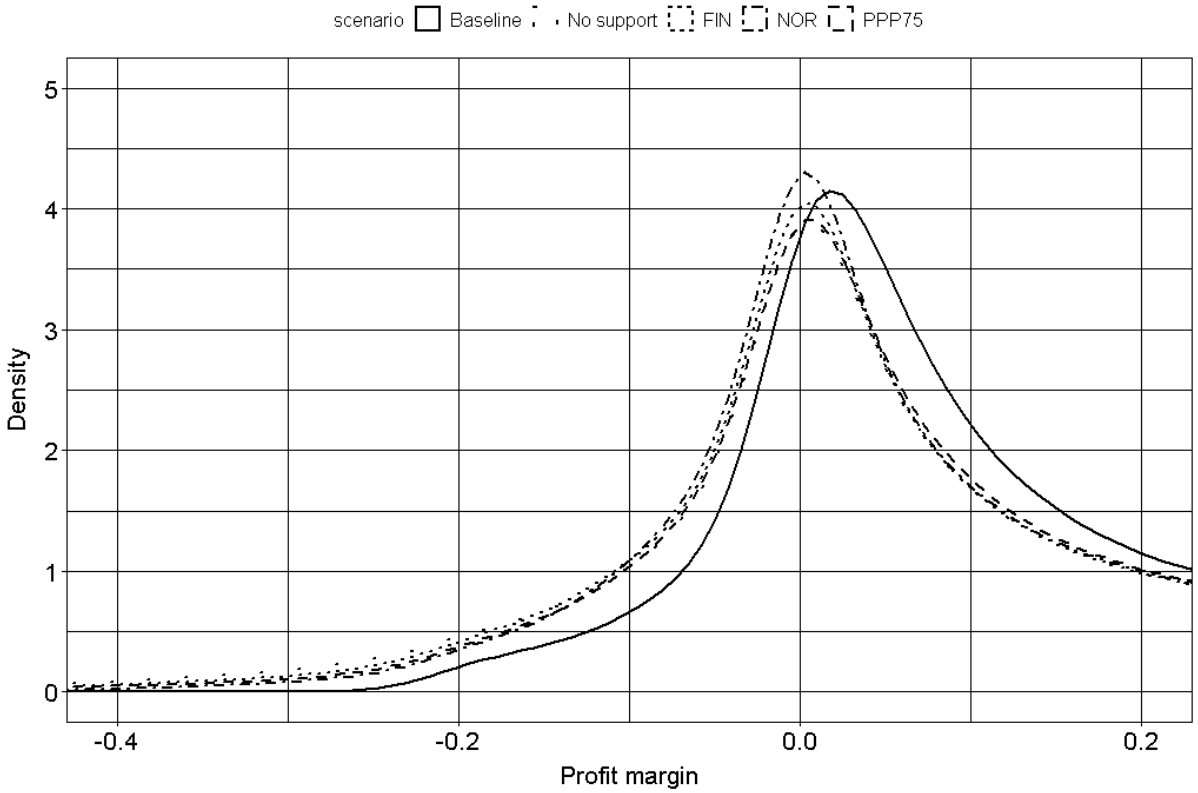
After going through the real-life setting, introducing the required data, and forming the simulation strategy, we can now turn to the results. As we have stated, there are five simulation scenarios which each produce an outcome for the observed variables.

5.1 Profit margin

First, we will glance at the profit margin distribution. As we can see from table 3 below, the Covid-19 induced turnover shock has caused a visible shift to the left in the profit margin curve, regardless of which support scheme has been in place. The difference between the baseline scenario and the closest support scheme is much larger in any point of the chart than the difference between different support schemes.

In the case of real-world with realistically behaving companies, some firms might possess too little information about the program rules and end up spending time or money for a non-successful application. However, our simulation is formed so that regardless of the firm qualities, each firm is either better off or equally well off, if there is a support scheme at place. Hence, the lowest profit margin figures are produced by the scenario with no support schemes. The difference is clearly visible when observing the density of profit margins lower than -0,15 but not visible at all when observing positive profit margins. This points to the direction that support schemes have generally made a larger difference for firms with relatively high losses. This is intuitive as the rules of all the programs preferred, although some more than others, firms that were in financial difficulties.

Figure 3 - Profit margin curves



When comparing the effectiveness of support schemes with the profit margin graphs below, we should pay attention to the difference that a scheme makes compared to the no support scenario. The Finnish Business Cost Support seems to produce the most highly unprofitable firms among support schemes as its line stays fairly close to the no support scenario in the left end of our graph. When moving closer to zero on the x-axis, it merges with the other scenarios and finally ends up producing the second highest density of zero-profits. It seems to have greatly increased the number of near-zero profits compared to the no support scenario as well as to the PPP. After 0,05, there is no visible difference between Business Cost Support and the no support scenario.

The Norwegian Business Compensation Scheme happens to greatly increase the number of firms close to the zero-profit mark. Meanwhile the left tail of the distribution is among the lowest in the simulation. As was the case with the Finnish scheme, neither the Business Compensation Scheme does make a significant difference to firms with high profitability. This is again intuitive as the rules of the program stated that profitable firms were not eligible for the support. Therefore, the appears to be clear evidence that the Norwegian scheme has been

able to significantly cut the losses of firms and to even lift some of them into profit-making territory. In this task, it has fared the best among our support scheme group.

The PPP does rather well in the low profitability class as its performance is identical with the Norwegian scheme. However, when moving closer to zero, it seems that there is far less firms with near-zero profits than with the Nordic systems. This is not necessary a bad sign as the PPP also has caused an increase in firms with higher than 0,05 profit margins. After that point, it is in fact the only support scheme that significantly differs from the distribution produced by the no support scenario.

Table 3

Profits and liquidity under different scenarios

	Baseline	No support	Business Cost Support (FIN)	Business Compensation Scheme (NOR)	Paycheck Protection Program (USA)
Average profit rate	0.13	0.076	0.091	0.097	0.087
Negative profits	0.181	0.317	0.307	0.297	0.299
Average quick ratio	17.904	16.343	16.479	16.492	16.51
Quick ratio < 1	0.189	0.323	0.313	0.305	0.311
Quick ratio = 0	0.034	0.082	0.066	0.054	0.068
Average debt ratio	0.882	1.007	0.978	0.956	0.978
Debt ratio > 1	0.108	0.155	0.145	0.137	0.145

Notes: The table shows five different scenarios described in the text: The baseline with no pandemic shock; the shock without support shemes; Finnish Business Cost Support; Norwegian Business Compensation Scheme and the Paycheck Protection Program of the United States.

Above we have an extensive chart about the results of the simulation. Considering profit margin differences in general, we can conclude that the shock was indeed severe and none of the support schemes were able to mitigate it completely. The average profitability dropped from 13% to 7,6% due to a decrease in turnover[4]. The Norwegian support program did the most good by keeping the average profit margin in 9,7%. This is an equivalent of restoring close to 39%

[4] Shares here should only be viewed in relation to other profit margin shares produced by this simulation and not as the true average profit margin of Finnish companies. When constructing the simulation some industries were discarded and multiple other modifications to the raw data were made. Statistics Finland reports the net profit margin of Finnish companies in industries B-S, excluding K, to be 5.2% (Official Statistics of Finland).

of the lost profits compared to the no support scenario. This rate is later referred as shock mitigation rate. It describes how much closer the support scheme's result is from the 2019 baseline compared to the result produced by no support scenario. Its purpose is to make comparing the effects of support schemes easier, especially when comparing the results of all the key variables at once. Finnish Business Cost Support had the second-best effect on average profits in the simulation. Maintaining a profit rate of 9,1% equals to mitigating about 28% of the shock. Finnish scheme was followed by the PPP which produced a profit rate of 8,7%. This would mean approximately 20% mitigation rate.

Meanwhile, the share of firms with negative profit margin in the no support scenario, went up from 18,1% to 31,7%. From this point of view the support schemes were not as effective. Even the Norwegian cost support, the best support scheme also in this regard, only managed to cut the share of loss-making firms by two percentage points, translating into 15% mitigation rate. From this point of view, the PPP fared better than the Finnish scheme by keeping the share of unprofitable firms just under 30%, cutting the effect of the pandemic by 13%. Business Cost Support was then the least effective by a relatively large margin, producing a 7% mitigation rate.

5.2 Liquidity

Even though the ability to generate profits does play a crucial role in running a company and employing personnel, none of these support programs were targeted to maintain firm profits per se. In Finland and Norway, the goal was to prevent otherwise profitable businesses, would it not had been the pandemic, going bankrupt. In this sense, profits are not a good indicator as firms are able to finance their losses by consuming their liquid reserves or by lending money from the financial markets. Neither of these is nonetheless an option firms can use indefinitely. At some point firms will either run out of liquid assets or become so heavily indebted that they are not able to lend at a feasible interest rate anymore. In both scenarios, firm's chances of bankruptcy are high, regardless of how bright their future might seem after the end of the pandemic. We will now describe the results considering liquidity and solvency in table 3 under the five scenarios.

The average quick ratio here in the simulation across the field rather large due to few very high observations. These high observations were produced by a small but significant number of firms reporting one or two-digit current liabilities while having relatively high current assets.

Hence, the overall effect of the pandemic seems mellow in relation to other variables. We can see from table 3 that the average drops from 17,904 to 16,343 when no support schemes are in place. Nevertheless, since these firms are similarly present for all the scenarios, nothing prevents us from conducting the bread and butter of this thesis, support scheme comparison.

Support scheme maintaining the highest average quick ratio is the Paycheck Protection Program. It yields an average of 16,51 which turns into a 10,7% mitigation rate. The second-best scheme is the Norwegian one with an average of 16,492. The Finnish Business Cost Support comes third creating an average of 16,479. The mitigation rates of the last two schemes are then 9,5% and 8,7%.

Quick ratio is an indicator that most importantly describes the ability of a firm to pay its short-term obligations. Thus, having a low quick ratio, lays a business open to a risk of going under. As bankruptcies were the main concern behind imposing Covid-related compensation programs in especially Finland and Norway, the number of firms with low quick ratios should be an important variable in determining, how well these support programs have succeeded. As table 3 points out, the Norwegian compensation scheme for businesses in our simulation did the best in this regard. It kept both, the share of firms with quick ratio below one and the share of firms that completely ran out of quick assets, the lowest among our selected support schemes. Covid-19 pandemic caused a rise in firms with low quick ratio from 18,9% to 32,3% with no support schemes. The Norwegian support scheme was able to mitigate 13,4% of the effect which was noticeably more than 8,9% of the PPP. The least successful was once again the Business Cost Support with a 7,4% mitigation rate.

All the support schemes were greatly more effective when supporting liquidity among the worst-performed companies than bettering average liquidity. Unmitigated effect of the pandemic was that the number of firms with zero liquid assets rose by a sizeable 141% from the 2019 baseline situation. Even though many firms are in a case of emergency suddenly able to find funds outside their reported quick assets, this would have caused a great number of companies to be at risk of bankruptcy. These firms were the firms that caused governments the most grey hair. Once again, in this simulation, the Norwegian compensation scheme was in a class of its own by lowering the number of illiquid firms by a staggering 58,3%. This result beat other support schemes by a vast distance as Finnish scheme sported a 33,3% mitigation rate and the PPP was left last with a rate of 29,1%. Considering the importance of the measure and the great margin between the Norwegian Compensation Scheme for Businesses and its

competitors, we hold that this is a convincing proof of the effectiveness of the Norwegian scheme.

Finally, we will examine the results in view of longer-term liquidity, or solvency. Solvency is here measured by debt ratio, a ratio of company's long-term debt over its long-term assets. After the pandemic shock, loss-making firms can issue more debt and thus increase their debt ratio. As discussed in chapter 3.1.3, debt ratio over unity is often considered to be a risk factor for defaults as the company has more debt than assets. This might not lead to immediate bankruptcies but especially a lengthened crisis, as the pandemic proved out to be for certain industries, could increase debt levels to unfeasible heights. In our pandemic simulator, the average debt level is troubled by same problems as the average quick ratio earlier. Averages are in every scenario unrealistically high but it doesn't affect the comparison we conduct between the support schemes. The Norwegian Compensation Scheme for Businesses can mitigate 40,8% of the debt ratio increase. Finnish and the American schemes now provide practically the same mitigation rate of 23,2%. More interesting is once again the share of firms whose debt has surpassed their asset value, giving debt ratio over one. Table 3 shows that pre-pandemic only one in ten firms have debt ratio higher than one. While no support schemes at place, the share rises to 15,5%. In the simulation, the Finnish scheme and the PPP yet again produce very close to identical results, as around 14,5% of the firms end up with a higher than one debt ratio. This equals to a 21,3% mitigation rate. The Norwegian scheme is still the most effective scheme granting a mitigation rate of 38,2%.

5.3 Employment effects and fiscal costs

As the last possible way of cost adjustment, firms were able to reduce their payroll costs. The Norwegian compensation scheme for businesses only covered fixed costs but the support schemes of Finland and the United States both covered a share of wage costs. However, no matter what the support was based on, in our simulation just receiving a support cheque would reduce the payroll cutting needs of an unprofitable business. Thus, in the process of supporting firms' profitability and liquidity, all support schemes also altered the incentives of maintaining employment. Now we will inspect the effect of the pandemic and the effect of our support schemes on overall payroll size of the economy. Payroll is here calculated by simply summing the wage costs of each firm and it doesn't provide information whether the reduction in payroll was executed by permanent layoffs, furloughing or pay cuts. However, in the context of the

Finnish labour market, wages do not usually adjust downwards, even less so in the short run. Also, in the beginning of the pandemic, the Finnish government loosened the terms on furloughing by reducing the warning period of a furlough, time employer still has to pay employee's salary, from 15 to just five days. Also, in the real world, the start of the pandemic caused a sharp increase in the number of furloughs. Thus, it should be safe to say that most part of the payroll cut would occur in temporary layoffs. In our simulation's no support scenario, the payroll loss is slightly over 6,2 percent. According to Statistics Finland's data on payroll, the payroll of the private sector reduced by 6,4 percent on the second quarter of 2020 compared to 2019.

The Paycheck Protection Program was designed, as its name discloses, to avoid mass layoffs and it ended up succeeding the best out of the three schemes. In this simulation, under the PPP, only 5.4 percent of the payroll was cut, translating to a 13,5 percent mitigation rate. This is not an enormous change to no support scenario but better than the outcomes of the two Nordic schemes. The Business Compensation scheme of Norway prevented barely over 2 percent of the payroll cuts and the Finnish scheme had a mitigation rate of only 1,3 percent.

Table 4

Fiscal and employment effects of the schemes

	Baseline	No support	Business Cost Support (FIN)	Business Compensation Scheme (NOR)	Paycheck Protection Program (USA)
Cost of the program	0	0	630,823,977	1,032,346,083	1,446,181,826
Payroll loss	0	0.0624	0.0616	0.0611	0.054

Notes: Costs of the programs are in euros and they equal the sum of the support received by firms under each scheme. Payroll loss indicates the share of payroll costs cut by firms compared to pre-crisis payroll.

For a cost support scheme to achieve great outcomes in the light of our metrics, fundamentally two factors matter. The first one is the targeting of the support package and the second one is the size of that package. Essentially, paying all the costs of all the businesses would have erased the effect of the pandemic in whole and made all the firms extremely profitable. Even though many governments have increased their spending in the course of this pandemic, countries are

still interested in how much bang for the buck they are getting. Thus, when measuring the success of our three schemes, it is crucial to take a look at their fiscal costs.

As we can see from the table 4 above, the Finnish program bore the lowest cost to the taxpayer in our simulation, covering 631 million euros worth of fixed and labour costs. The second largest was the Norwegian program with a price tag of 1 032 million euros. The PPP was by far the most expensive of the schemes, costing total of 1 446 million euros. As all the schemes are simulated on Finnish businesses, we also assume that the tax-payer base is the same. Thus the U.S. having a lot more citizens does not factor in the comparison of simulated program costs.

The cost of the Finnish program in the real world has been rather close to that produced by our simulation. By 4th of October 2021, State Treasury of Finland had paid out 705 million euros worth of Business Cost Support. The support periods have now covered months from April 2020 to May 2021, approximately a one year of pandemic. In Norway, the support periods span from March 2020 to August 2021. So far, Business Compensation Scheme has paid out 13 billion crowns, or 1,3 billion euros. Naturally, this is not comparable with our Finland-based simulation. In the United States, PPP loans have been forgiven for the amount of 530 billion dollars or 457 billion euros.

6 Conclusion

The goal of this thesis was to compare the effects of the three different policy choices to Finnish businesses through a simulation model. Previous chapters have tried to build this simulation and interpret the outcome it produced. We found out that all three support schemes were generally helpful in mitigating the negative effects of the pandemic. There were however differences in performance as we noticed in the previous chapter. Additionally, there were significant differences in price. To answer the question, which support scheme provided, according to aforementioned metrics, the most efficient support for companies, we need to combine the differences in results and price. Later in this chapter, the reasons behind the observed differences are discussed.

6.1 Bang for the buck

Table below lists the mitigation rates and ranks them from one to three. Looking at the table, it is clear that the Norwegian scheme has bettered the conditions of the companies the most. It reaches the number one spot in all but one measure. The US scheme performs the best in average quick ratio but fares the worst in average profit margin and in minimising the share of zero-valued quick ratios. Finnish Business Cost Support then falls third the most times and has arguably the worst performance among these schemes.

The last row of the table represents the payroll loss that schemes were able to mitigate. As the PPP was the only scheme that was especially designed to minimise layoffs, it performs the best by a large margin. The Finnish or the Norwegian scheme had very little effect to the payroll loss, whereas the PPP managed to mitigate 13,5 percent of the shock's effect.

Table 5 Mitigation rates			
	FIN	NOR	USA
Average profit margin	2. 27,8 %	1. 38,9 %	3. 20,4 %
Negative Profits	3. 7,4 %	1. 14,7 %	2. 13,2 %
Average quick ratio	3. 8,7 %	2. 9,5 %	1. 10,7 %
Quick ratio < 1	3. 7,5 %	1. 13,4 %	2. 9,0 %
Quick ratio = 0	2. 33,3 %	1. 58,3 %	3. 29,2 %
Average debt ratio	2. 23,2 %	1. 40,8 %	2. 23,2 %
Debt ratio > 1	2. 21,3 %	1. 38,3 %	2. 21,3 %
Payroll loss	3. 1,3 %	2. 2,1 %	1. 13,5 %

However, as the costs of the schemes were drastically different, we should acclimate the results to their price. Here we use a straight-forward multiplier system. As the most expensive scheme, the PPP gets a multiplier of 1. The price off the Norwegian compensation scheme was cheaper and thus gets a multiplier of 1,4. This is the number the cost of the Norwegian scheme should be multiplied in order to match its price tag with the U.S. scheme. Accordingly, the multiplier for Business Cost Support is approximately 2,3. Multiplying their produced mitigation rates with the values seen above we get the following table.

Table 6 Mitigation rates, cost-adjusted			
	FIN	NOR	USA
Profit margin	1. 63,7 %	2. 54,5 %	3. 20,4 %
Negative Profits	2. 16,9 %	1. 20,6 %	3. 13,2 %
Average quick ratio	1. 20,0 %	2. 13,4 %	3. 10,7 %
Quick ratio < 1	2. 17,1 %	1. 18,8 %	3. 9,0 %
Quick ratio = 0	2. 76,4 %	1. 81,7 %	3. 29,2 %
Average debt ratio	2. 53,2 %	1. 57,2 %	3. 23,2 %
Debt ratio > 1	2. 48,8 %	1. 53,7 %	3. 21,3 %
Payroll loss	2. 2,9 %	2. 2,9 %	1. 13,5 %

With this simple multiplier mechanism, it is assumed that every additional euro spent on a scheme increases its performance at the same amount. So, if one million euros produces 1% mitigation rate, 2 million would produce a 2% mitigation rate. However, this approximation is not entirely accurate as we cannot know how the additional euros would be spent. For example, it is not certain if an increase in Business Cost Support budget would lead to higher support sums or more enterprises being eligible for the support. Thus, the table above is to only demonstrate the scale of price difference and performance difference between the schemes. As we can see, the price difference between Business Cost Support and the PPP is much wider than the performance difference.

Being the cheapest of the schemes, the position of Business Cost Support improved greatly, especially compared to the PPP. The PPP now ranks last in all the variables measuring firm well-being. Business Cost Support managed to reach the top spot in average profit margin and average quick ratio. However, the Norwegian Compensation Scheme holds its number one spot in minimising the number of unprofitable firms and firms with quick ratio below 1. It also seems to be the most effective scheme limiting the number of firms which run out of liquid assets. In addition, it fares the best in average debt ratio and "debt ratio below one" variables. Thus, it seems to be that the Norwegian Compensation Scheme for Businesses is not only the most effective scheme in the original simulation but also the most efficient considering in relation to costs. The difference to Business Cost Support is however not very large in any of the measures. It can also be stated that according to our simulation, the PPP clearly provided the least "bang for the buck", meaning the least impact per euro spent.

Considering the targets of the Nordic schemes, the variables with the utmost importance are those that measure the share of companies at a risk of default. In our simulation this means share of firms with negative profits, quick ratio equalling zero or below one, or debt ratio over one. Thus, mitigating the number of firms with zero quick ratio should be considered more important than maintaining a high average quick ratio. As Business Cost Support only outperformed the Norwegian system in less important average quick ratio, this further solidifies Compensation Scheme for Businesses as the best scheme in the simulation.

Payroll loss is not directly a measure of firm well-being and it is not in the spotlight of this thesis. However, the simulation finds that the Finnish and the Norwegian schemes only barely had any impact to the layoff needs of the firms. Unlike the Nordic countries, the US had stated countering layoffs as the main policy goal for the PPP. The results of the simulation show that

the PPP's layoff-reducing performance was on a class of its own. Hence, we can conclude that should a government have wanted to reduce layoffs, temporary or final, it should have compensated labour costs more generously.

6.2 Reasons behind the performance differences

All the support schemes had their own specific rules which eventually led to differences in simulation performance. In this section we will inspect these rules and try to gain insight on why the systems performed as they did.

On average, the Finnish Business Cost Support fared slightly worse than the Norwegian Compensation Scheme in the simulation. The differences between these to support schemes stem from three rules. First, the Norwegian support schemes allowed for larger single support payments but also for smaller payments than its Finnish counterpart. This has probably affected those large firms which ended up being very unprofitable but also very small firms that only needed a support sum between 500 and 2000 euros to become profitable or for example, have quick ratio over 0. Secondly, the Norwegian scheme only covered fixed costs. This limitation proved to not have damaged the Norwegian scheme's ability to produce good results. Either firms had enough fixed costs to receive a helpful compensation or they were able to lay off enough workers instead of receiving compensation for their wages. Thirdly, in the Norwegian scheme only unprofitable firms were able to receive a compensation. It seems that this rule made the scheme more efficient. As we can see from the table below, despite being financially larger than the Finnish scheme, the Norwegian one had almost 10 percent less recipients. This implies that some of the money distributed by the Business Cost Support program went to companies which were not experiencing profitability or liquidity problems.

Table 7

Share of firms which received support

	Baseline	No support	Business Cost Support (FIN)	Business Compensation Scheme (NOR)	Paycheck Protection Program (USA)
Received support	0	0	0,0975	0,0896	0,0979

The efficiency problems that Business Cost Support seemingly experienced were however not very large compared to those of the PPP. Adding to the worst outcomes in every corporate well-being measure, the scheme also had the most recipients. On the other hand, this does not imply that the support scheme was a failure. While its publicly stated goal was to reduce layoffs, it managed the best in that regard. We can however conclude that compensating exclusively labour costs is not an efficient way to support firms as long as they are also able to lay off workers.

References:

Alstadsæter, A., Bjørkheim, J.B., Kopczuk, W. & Økland, A. 2020, Norwegian and US policies alleviate business vulnerability due to the Covid-19 shock equally well, Working Paper 27637, National Bureau of Economic Research

Bachas, P. & Brockmeyer A., 15.04.2020, Using administrative tax data to understand the implications of COVID-19 (coronavirus) for formal firms, Blog, The World Bank, Retrieved 27.11.2020 from https://blogs.worldbank.org/developmenttalk/using-administrative-tax-data-understand-implications-covid-19-coronavirus-formal

Der Spiegel, 08.07.2021, Wo der Kampf gegen die Pandemie gelingt, Retrieved 8.11.2021 from https://www.spiegel.de/ausland/corona-laendervergleich-wo-der-kampf-gegen-die-pandemie-gelingt-a-b253bbd9-fe9b-4d5e-9169-63b57d771216

Google Trends, retrieved 16.10.2021 from https://trends.google.com/trends/explore?date=2020-01-01%202020-03-31&geo=FI&q=korona,j%C3%A4%C3%A4kiekko,%2Fm%2F071k0

Hallituksen esitys 26/2020, 2020, Hallituksen esitys eduskunnalle laeiksi työsopimuslain, merityösopimuslain ja yhteistoiminnasta yrityksissä annetun lain 51 §:n väliaikaisesta muuttamisesta, Retrieved on 27.11.2020 from https://www.eduskunta.fi/FI/vaski/HallituksenEsitys/Sivut/HE_26+2020.aspx

Hallituksen esitys 97/2020, 2020, Hallituksen esitys eduskunnalle laiksi yritysten määräaikaisesta kustannustuesta, Retrieved on 27th of November 2020 from https://www.finlex.fi/fi/esitykset/he/2020/20200091#idp447428896

HS, 16.3.2020, Tässä ovat kaikki hallituksen poikkeukselliset toimet koronaviruksen hillitsemiseksi, vaikuttavat lähes jokaisen kansalaisen arkeen – tiedotustilaisuus katsottavissa kokonaisuudessaan, Retrieved 2.11.2021 from https://www.hs.fi/politiikka/art-2000006441020.html

HS, 27.3.2020, Uudenmaan rajat sulkeutuivat ja poliisi aloitti tarkastukset – Näissä kolmessa-kymmenessä paikassa liikkumista valvotaan, Retrieved 2.11.2021 from https://www.hs.fi/kotimaa/art-2000006454717.html

European Comission, The State Aid Temporary Framework, Retrieved 8.11.2021 from https://ec.europa.eu/competition-policy/state-aid/coronavirus/temporary-framework_en

Laki yritysten määräaikaisesta kustannustuesta 508/2020

Lov om midlertidig tilskuddsordning for foretak med stort omsetningsfall, 2020, Retrieved on 27.11.2020 from https://lovdata.no/dokument/LTI/lov/2020-04-17-23

Lov om midlertidig tilskuddsordning for foretak med stort omsetningsfall etter august 2020, Retrieved on 8.11.2021 from https://lovdata.no/dokument/NL/lov/2020-12-18-156

Official Statistics of Finland (OSF): Structural business and financial statement statistics [e-publication]. ISSN=2342-6233. Helsinki: Statistics Finland [referred: 30.11.2020]. Access method: http://www.stat.fi/til/yrti/yrti_2019-12-19_uut_001_en.html

Regjeringen, 02.04.2020, Foretak med minst 30 % omsetningsfall kan få kompensasjon, Retrieved on 27.11.2020, from https://www.regjeringen.no/aktuelt/foretak-med-minst-30--omsetningsfall-kan-fa-kompensasjon/id2696396/

Regjeringen, 06.04.2020, Economic measures in Norway in response to COVID-19, Retrieved 27.11.2020 from https://www.regjeringen.no/en/aktuelt/economic-measures-in-norway-in-response-to-covid-19/id2696858/

Regjeringen, 15.5.2020, Flere vil få kompensasjon, Retrieved on 27.11.2020 from https://www.regjeringen.no/no/aktuelt/flere-vil-fa-kompensasjon/id2702881/

Regjeringen, 10.11.2020, Legger frem ny kompensasjonsordning, Retrieved 2.11.2021 from https://www.regjeotringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/nfd/pressemeldinger/2020/legger-frem-ny-kompensasjonsordning/id2784471/

TEM, 20.3.2020, Hallitukselta mittava paketti yritysten tueksi – Finnveran kautta 10 miljardin euron lisärahoitus yrityksille, Retrieved 2.11.2021 from https://tem.fi/-/hallitukselta-mittava-paketti-yritysten-tueksi-finnveran-kautta-10-miljardin-euron-lisarahoitus-yrityksille

TEM, 16.10.2021, Kustannustuki yrityksille otetaan uudelleen käyttöön – lakiluonnos lausunnoille, Retrieved 5.11.2021 from https://tem.fi/-/kustannustuki-yrityksille-otetaan-uudelleen-kayttoon-lakiluonnos-lausunnoille

TEM, 4.3.2021, Lakiesitys eduskuntaan: Kustannustuen kolmas hakukierros alkaa huhtikuussa, yksinyrittäjät mukana tuessa, Retrieved 2.11.2021 from https://tem.fi/-/lakiesitys-eduskuntaan-kustannustuen-kolmas-hakukierros-alkaa-huhtikuussa-yksinyrittajat-mukana-tuessa

TEM, (n.d.), Koronaviruksen vaikutukset työllisyystilanteeseen, Retrieved 27.11.2020 from https://tem.fi/koronaviruksen-vaikutukset-tyollisyystilanteeseen

Tiirinki, H. , Tynkkynen, L., Sovala, M., Atkins, S., Rautiainen, P., Jormanainen, V., Keskimäki, I.B, 2020, COVID-19 pandemic in Finland – Preliminary analysis on health system response and economic consequences, Health, Policy and Technology, Volume 9, issue 4

Ulkoministeriö, 6.3.2020, Koronavirus Kiinassa: päivitystä talous- ja kauppavaikutuksista sekä Kiinan elvytystoimista, Retrieved 8.11.2021 from https://um.fi/edustustojen-raportit/-/asset_publisher/W41AhLdTjdag/content/koronavirus-kiinassa-p-c3-a4ivityst-c3-a4-talous-ja-kauppavaikutuksista-sek-c3-a4-kiinan-elvytystoimista/384951

US department of the Treasury, 2020, Paycheck Protection Program, Retrieved 2.11.2020 from https://home.treasury.gov/policy-issues/coronavirus/assistance-for-small-businesses/paycheck-protection-program

Valtioneuvosto, 14.5.2020, Hallitus linjasi: Yrityksille uusi kustannustuki koronaviruksen vuoksi, Retrieved 2.11.2021 from https://valtioneuvosto.fi/-/1410877/hallitus-linjasi-yrityksille-uusi-kustannustuki-koronaviruksen-vuoksi

Valtionvarainministeriö, Talousarvioesitys HE 29/2019, Osasto 15 Lainat

YLE, 23.4.2020, Analyysi: Miksi Business Finlandin koronarahoituksesta nousi niin suuri kohu? Tämä sinunkin on hyvä ymmärtää tästä kaikesta, Retrieved 27.11.2020 from https://yle.fi/uutiset/3-11319616

YLE, 14.5.2020, Tältä näytti ensimmäinen koulupäivä eri puolilla Suomea – 7.-luokkalainen Elli Hirvonen: "Turvavälit täytyy pitää eikä kavereihin saa koskea", Retrieved 2.11.2021 from https://yle.fi/uutiset/3-11350582