GOVERNMENT INTERVENTIONS DURING A CRISIS

AN EVENT STUDY OF THE EXTRAORDINARY BUDGET ANNOUNCEMENTS' EFFECT ON THE SWEDISH STOCK MARKET

HARIS BADAKHSH

JEAN-PIERRE SALIBA

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Abstract:

The impact of several stimulus packages implemented by the Swedish government during the COVID-19 pandemic on the Swedish stock market is studied in this paper. An event study methodology is used to investigate the abnormal returns of Swedish firms during four announcements related to the stimulus packages. We discovered no significant results on an aggregate level among three separate stimulus packages. Our findings, on the other hand, show that the stimulus package related to short-term layoffs had a significantly positive impact on returns of sectors affected severely in terms of lost net sales by the COVID-19. Furthermore, because we looked at fiscal policy changes in the context of a high degree of market uncertainty, our research is relevant to the literature on investor behavior during a period that featured a high level of uncertainty. Finally, our study provides a contribution to the literature focusing on the effect of fiscal policy changes on asset prices.

Keywords:
Fiscal policy, Stock market, COVID-19, Stimulus package, Event study

Authors:
Haris Badakhsh (24803)
Jean-Pierre Saliba (24738)

Tutors:
Christian Thomann, Researcher, Swedish House of Finance

Examiner:
Adrien d'Avernas, Assistant Professor, Department of Finance

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1. Introduction

The COVID-19[1] pandemic struck the world in 2020 and was declared an ongoing pandemic, and as of 2020, the pandemic had reached over 1.8 million fatalities (WHO, 2020). Even though the virus imposed severe health challenges, the consequences stemming from COVID-19 also affected the global macroeconomic landscape. Through constrained human interactions due to restrictions and lockdowns, most firms had to take actions such as reorganizing work, which led to substantial layoffs leading to an unstable labor market. Diminished consumer stability, together with the consequent trade difficulties, in turn, deteriorated the financial performance of firms in terms of revenue losses and organizational uncertainties (Altig et al., 2020).

The recession connected to the COVID-19 is estimated to be the most extraordinary recession since the Great Depression in 1929 (IMF, 2020). Increased volatility in the financial markets coupled with uncertainties sparked the market crash in March 2020 (Baker et al. 2020). In addition, Baker et al. (2020) associated nearly half of the forecasted contraction in production with COVID-induced volatility, implying that the COVID-19-related uncertainties highly influenced forecasters' beliefs regarding future economic growth. Consequently, the OMXS30 index declined by 30%, causing financial distress and increasing the probability of bankruptcy in different industries. In March 2020, the Swedish growth in bankruptcies compared to the previous year increased by 123% and 105%, respectively, for the restaurant and hotel, and the transportation industries (Statista, 2022). In order to cope with the destructive impacts stemming from the pandemic, the Swedish government responded with stimulus packages and other fiscal stabilization measures. The different government stabilization measures also aimed at targeting different areas that would help mitigate the experienced economic consequences of corporations (Reuters, 2020). One of the measures studied in this paper was set to contribute to strengthened liquidity among the affected firms (Anstand). The other measure was more focused on supporting short-term work (Korttidsarbete), and the last measure involved direct support for firms that experienced a significant decrease in revenue (Omstallningsstod). Although the stock market crash in March 2020 was estimated to be one of the most severe in history, a rapid recovery could be seen as the stock markets recovered in just a couple of months, with the OMX index rising by 16% from May 2020 to August 2020 (Gustafsson and Brömsen, 2021).

While many studies have focused on the effects of changes in monetary policy on stock markets (Thorbecke, 1997; Bernanke and Kuttner, 2005; Neuhierl and Weber, 2019), there seems to be a lack of literature focusing on effects that stems from fiscal policy measures. Therefore, we add to this literature by examining the Swedish stock market reaction to the fiscal stabilization measures undertaken during the COVID-19 pandemic in Sweden. The events analyzed in this study constitute four extraordinary budget announcements proposed by the Swedish government's financial department. Usually, budgets are proposed once a fiscal year and illustrate the expected distribution of the government expenditures, thus being less uncertain. However, the COVID-19 crisis overturned the usual order, which led to several so-called extra change budgets. Because investors were unable to predict the quantity and timing of these budget amendments in the same manner that they could with a standard budget, these budget adjustments were perceived as unexpected and unpredictable. Thus, it supports the unexpectedness, which is a vital assumption in the event study methodology when investigating the efficiency of the stock market reaction to events (Brown and Warner, 1980).

[1] The coronavirus pandemic will, in this paper, be denoted as COVID-19.

In this study, our research question predominantly concerns two issues.

1. What was the reaction of the Swedish equity market to the announcement of these stimulus packages?

2. Was there any heterogeneity in the impact of these stimulus packages on firms depending on whether they were in an unaffected, affected, or strongly affected sectors in terms of lost net sales?

We base our study on the Swedish stock market and use the market model, an event study methodology, to capture abnormal returns around the event dates on publicly traded Swedish firms. The abnormal returns represent the difference between a stock's realized return and the estimated expected return by the market model. By accumulating the abnormal returns and taking the average within an event window, we estimate the average abnormal returns and the cumulative average abnormal returns, which will be denoted CAAR henceforth. In order to examine the Swedish stock market reaction, we perform significance tests on each CAAR over the different event windows. Our results show significantly negative CAARs at the 5% level across three event windows on the announcement of 16 March 2020. However, due to the prevalence of information uncertainty and high financial market volatility around that event, we argue that external forces most likely influenced those results. Furthermore, our results on different sectors imply significantly positive CAARs for the strongly affected and affected sectors by the COVID-19 around the announcement on 14 April 2020, which primarily involved increased support for short-time work. Additionally, in our cross-sectional regression analysis, we discovered a significantly positive correlation between the dependent variable CAAR and the independent variable Korttidsarbete on the event of 14 April 2020. These findings initiate a discussion on how different government-financed stimulus packages are perceived by different firms' that operate in different sectors. Given that this study also is based on a time of a worldwide crisis studying abnormal returns around a time of crisis also contributes to the literature on how countercyclical fiscal policies affect asset prices, such as common stocks.

2. Literature Review

2.1 Previous Studies on Fiscal Policy

This study explicitly studies the implications of fiscal stabilization policy measures on asset prices. Hence our study is related to that of Croce et al. (2012), who studied the effects of fiscal policies on asset prices. They used a production-based general equilibrium model and modelled the taxation implications from fiscal stabilization policies. Their findings highlight that stimulus initiatives enacted in response to the financial crisis can generate concerns about future tax pressures, which can have a negative impact on the cost of equity. When studying whether countercyclical fiscal policies are effective, Gordon and Leeper (2005) highlight the long-term costs that come along with certain countercyclical fiscal policies. In that way, Gordon and Leeper conclude that the implemented policies have a counterproductive impact through, for instance, the implications of the future tax uncertainty on the equity cost of capital. Furthermore, Foresti and Napolitano (2017) investigated the effects of fiscal policies on stock market indices in the Eurozone. Their findings manifest that fiscal policy affects the stock market in that an increase in public deficit makes the stock market decline. Moreover, Gomes

et al. (2013) found that increases in public debt led to significant increases in the riskless rate and a reduction in the equity premium, while higher capital income tax rates led to a higher equity premium.

Our events surrounding changes in fiscal policy involve significant government expenditures; thus, it is also essential to understand the underlying economic implications. From the intertemporal government budget constraint, it is explained that tax and spending decisions are connected because increased spending must be matched by additional revenues; if not, a budget deficit will occur (Trehan et al.,1988). Due to decreasing tax revenue and increased spending, the Swedish government's budget surplus turned into a large budget deficit amidst COVID-19, which led to a substantial increase in the Swedish public debt (Riksgälden, 2021). As a result, we also contribute to the abovementioned literature by presenting evidence from the Swedish stock market's response to increased public debt due to COVID-19 stimulus packages.

Furthermore, as our study is directly linked to government spending, there are also earlier studies focused on the government spending's implications on the macroeconomic environment. Earlier research has, for instance, studied the relationship between government spending and the cross-section of stock returns (Belo et al., 2013). However, Belo et al. (2013) studied the average returns conditional on the presidential partisan cycle, based on the democratic and republican presidential terms, which differs from this study as it investigates the effects of increased government expenditures during the COVID-19 crisis. Since our study investigates implications on the financial markets and, more specifically, the Swedish stock market, it is important to focus on the reactions of common stocks. Da et al. (2018) studied the effects of fiscal policies on equity returns in different states in the US. Their first finding was that countercyclical fiscal policies decrease the consumption risk, and their second finding was that countercyclical states induce lower stock returns for investors.

As our study focuses on changes in government policies, one aspect to consider is the government policy uncertainty. Considering the implications on the overall economic activity, Kim (2019) instead examined how government spending policy uncertainty affects economic activity in terms of different transmission channels using US time series data. Kim's findings show that the adverse effects of the uncertainty involve prolonged negative effects on GDP, private consumption, and private investment. Brogaard and Detzel (2015) investigated the asset pricing implications of economic policy uncertainty. Their study found a negative correlation between simultaneous market returns and changes in economic policy uncertainty. Furthermore, they also found that economic policy uncertainty affects the discount rate. Boothe and Raid (1989) concluded that Canadian fiscal policy did not affect any excess holding period returns and, in that way, nor the interest rates. This study further contributes to the literature above in that the effects of fiscal stimulus packages on stock returns are investigated during a time of liquidity shortage, economic uncertainty, and high market volatility.

2.2 Previous Studies Regarding Announcements

Our study focuses on events surrounding the COVID-19 outbreak and, in that way, investigates the effects of the stimulus actions taken by the Swedish government on the Swedish stock market. More specifically, as our events constitute announcements that pertain to new information that is revealed to market participants, one theoretical framework that this study is based on is the efficient market hypothesis. According to the efficient market hypothesis (Fama, 1970), the financial markets are efficient, which means that the asset price should reflect all the available information and that the price is thus correct in the sense that it reflects the

collective analysis of all investors. However, the chosen events in this study can be categorized as "shocks" due to the unprecedented nature of COVID-19 and the uncertainty regarding the economic implications, which concretizes the then prevailing information uncertainty. Regarding information uncertainty, Zhang (2006) studied the relation between information uncertainty and stock returns. Zhang (2006) found evidence that bad news predicts relatively lower future returns and that good news instead predicts relatively higher future returns. Zhang (2006) also mentioned that when the market is influenced by higher information uncertainty, investors' reaction following bad news is greater than that to positive news, which can be observed in the increased level of errors involved in their forecasts. Furthermore, Nofsinger (2001) investigated the investor behavior of both institutional and individual investors around macroeconomic news and found an increased trading volume stemming from both the activity of institutional and individual investors. Most relevant to this study is the information uncertainty in combination with an increased trading activity of individual and institutional investors around macroeconomic news and the effects on asset prices in the aftermath of the COVID-19.

When examining the reaction of stocks', it is important to note that several determinants can be behind specific movements in stock prices, and multiple studies have examined what moves stock prices. When investigating the determinants of aggregate movements in stock prices, Cutler et al. (1988) found that one-third of the variation in stock returns induced by macroeconomic news is challenging to be explained. Other factors influencing the stock prices involved inflation, interest rates, volatility, and real money supply. Moreover, they also emphasized the effect of non-economic news in the study. Brogaard et al. (2022) also recently examined the determinants behind stock movements. They used a return variance model in order to examine the distinct roles of contrast types of information and noise in the movements of stock prices. They found that 31% of the return variance stems from noise, 37% comes from firm-specific public information, and 24% is explained by firm-specific private information.

Forasmuch as our study aims at examining the reaction of the Swedish equity market to changes in government policy, Pastor and Veronesi (2012) provide us with a theoretical framework regarding government policy uncertainty and asset prices. In their study, they analyzed how changes in government policy affect stock prices. Their model involves uncertainty about government policy, including decisions and announcements with economic motives. One of their findings was related to the degree to which a firm is exposed to the government policy announcement. Accordingly, the more a firm is exposed to the policy announcement, the higher future expected returns could be expected, conditional on the state of the economy. Pastor and Veronesi (2012) also argued that government policy affects stock prices through two channels: future cash flows and discount rates. While the cash flow effect can be positive if the government acts as a benevolent agent, the discount rate will still be negative due to the uncertainty involved in the policy change. Nevertheless, which factor will be dominating depends on the state of the economy. If the economy is in a deep downturn, the positive effect of the cash flow will dominate as the government will be providing the economy with put protection. Thus, their findings are relevant for our study as we are investigating the changes in policy during a significant downturn in the economy coupled with the government acting extensively as a benevolent agent to stimulate the economy. Hence, like Pastor and Veronesi (2012), we also focus on government policy announcements involving economic motives, while this event study is based on the COVID-19 pandemic.

Regarding reactions to different fiscal policy announcements, Sahalia et al. (2012) investigated the effect of macroeconomic and financial policy-related announcements during the 2008-2009

crisis. They found results indicating that interest rate cuts and bank recapitalization was estimated to have the most significant effect on the market. Earlier literature has also extensively focused on a specific group when studying the effects of fiscal policy, namely financial institutions. Demirgüç et al. (2021) found that the effects of the COVID-19 shock were more long-lasting on banks in comparison to non-banks. Moreover, banks with lower liquidity before the crisis also experienced a more significant decline in stock returns. Furthermore, Demirgüc et al. (2021) also found that announcements surrounding liquidity support and borrower assistance most positively impacted the abnormal returns of banks. Norden et al. (2013) studied the influence of government interventions on the stock returns of financial institutions, such as banks. They found significant results in that government interventions during the 2008-2009 financial crisis positively affected the stock returns of financial corporations. Similarly, Pennathur et al. (2014) studied the stock market implications in connection to the government interventions on financial services industry groups during the financial crisis of 2008-2009. Their study manifests that firms with more leverage experience lower abnormal returns around the event period. However, in contrast to those studies, we include multiple non-financial industries in order to capture differences in reactions among the different industries. To that end , our second hypothesis in this study is formulated to investigate the differential reaction of different groups of sectors to the announced stimulus packages.

3. Hypotheses

We formulated the following three hypotheses after reviewing the literature on the influence of fiscal policy changes on the stock market, as well as the market's reaction to announcements. Our hypotheses are built in a systematic way to quantify the impact of stimulus packages on an aggregate level, which includes the full sample of firms, and then to see if there is a heterogeneous reaction across sectors based on how severely they were affected by the COVID-19. Finally, we examine whether the stimulus packages contained in the relevant announcements can account for the stock market's cumulative average abnormal returns in each event. In addition, we supplied pertinent literature that aided us in developing each hypothesis.

Hypothesis 1:
The extraordinary budget announcements had a statistically significant effect on the Swedish stock market returns $CAAR \neq 0$.

The underlying assumptions behind the first hypothesis are that the market is efficient and that the studied events are characterized as being unexpected. One aspect that supports the unexpectedness of the events can be allocated to the frequency because usually, budget announcements only occur once a fiscal year. However, during COVID-19, the Swedish government had to frequently change its budget in connection to the COVID-19 pandemic. Furthermore, considering the Economic Policy Uncertainty index in Sweden (Armelius et al., 2017), one can also witness the prevailing economic policy uncertainty during the period March 2020 – April 2020. Graph A.3 in the appendix illustrates this uncertainty, supporting the unexpectedness of the different events, which also is an essential assumption in the event study methodology (Brown and Warner, 1980). Furthermore, hypothesizing obtaining a significant reaction from the market upon announcement of these stimulus packages is based on the findings of Pastor and Veronesi (2012). COVID-19 can be seen as a deep downturn due to its severe economic consequences. According to Pastor and Veronesi (2012), in a deep bad state of the economy, government intervention can be perceived positively by the stock market as it will provide the market with a floor and stop the economy from descending deeper into

recession. Accordingly, we argue that there was a high degree of uncertainty in respect of the exact magnitude and timing of these interventions as well as the consequent impact thereof. As a result, we argue that based on the unexpectedness of the events and the government acting as a benevolent agent to maximize the utility of the market, the announcements could have induced a significant reaction in the stock market.

Hypothesis 2:
The extraordinary budget announcements had a different effect on the abnormal returns depending on whether the sector was strongly affected, affected, or unaffected by the COVID-19 pandemic, such that the cumulative average abnormal returns differed among the strongly affected, affected, and unaffected sectors.

Due to the nature of the COVID-19 pandemic, it is manifested that certain sectors were affected more in comparison to other sectors, and hence being more targeted by the extraordinary budget announcements. For instance, according to the Swedish Tax Agency, as seen in table A.7 in the appendix, sectors such as Accommodation and Food Services and Transportation and Storage received a significant percentage of the stimulus package relating to Omstallningsstod. As a result, we expect these sectors' reaction to the announcement associated with Omstallningssod to be more substantial than Construction, which received considerably less funding. The same reasoning is applied to other announcements. The findings from Pastor and Veronesi (2012) also show that the more a firm is exposed to the economic announcement, the stronger reaction in stock returns will be observed. Furthermore, as stated by the Swedish Financial Department (Regeringskansliet, 2020), only firms affected by COVID-19 to a certain degree are eligible to benefit from the government-financed stimulus packages. We also use Belo et al. (2013)'s findings, which indicate that companies' exposure to government expenditure has a heterogeneous impact on their return performance. Because the magnitude of the stimulus was distributed based on how severely a sector was affected by COVID-19, sectors severely affected benefited extensively from these packages. In that way, the second hypothesis is formulated because different sectors might have been more or less affected by the extraordinary budget announcements.

Hypothesis 3:
The independent variables that are related to the fiscal measures taken by the government can explain the cumulative average abnormal returns of stocks, such as Omstallningsstod, Anstand, and Korttidsarbete.

This hypothesis is formulated in accordance with the findings of Belo et al. (2013). According to their findings, increased government purchase from a specific industry will increase that industry's output, thereby impacting the cash flow of that industry and consequently affecting the returns. In the events of interest, according to the Swedish government and the Swedish Tax Agency, there were three main financial aid channels to mitigate the adverse economic effects of COVID-19 on the economic landscape: Omstallningstod, Anstand, and Korttidsarbete (Regeringskansliet, 2020; Skatteverket, 2020). These stimulus measures differ from those used by Belo et al. (2013) in that they are not related to output, but they are comparable because they indicate the inflow of funds into each industry. Swedish firms affected by COVID-19, for example, would be able to lower employee-related expenses by up to 70 percent through Korttidsarbete and get up to 75 percent of their fixed costs through Omstallningsstod. Finally, they would be able to obtain a temporary tax respite through Anstand. Insomuch as all of these measures will affect the corporation's cash flow, they might have affected their return performance. Bartlett and Morse (2021) also offered evidence for the

Paycheck Protection Program (PPP) impact on small enterprises in the U.S. They stated that as a consequence of this initiative, these businesses' survival capabilities grew by 20,5 percent, but that it also had a positive influence on larger businesses. Considering the potentially positive impact of these stimulus packages on the cash flow along with its improving effect on the survival capabilities of firms, we examine whether these independent variables may explain the CAAR's movement during the extraordinary budget announcements.

4. Data and Methodology

4.1 Data

The chosen daily stock price data was retrieved from Datastream, ranging from 1 January 2019 – 31 December 2020. We also made sure only to include trading days rather than calendar days to arrive at a correct estimation period. In the selection of specific stocks, we based our selection on stocks that, as of the end of 2020, had a market capitalization higher than 500 MKR. Bessembinder et al. (1996) found that the market-wide information is mostly reflected in the stock returns of larger firms. According to their presented evidence, larger firms generally are overtraded upon the release of market-related news, primarily because they are typically monitored by larger analysts and are more subject to news stories. Thus, based on these findings, the sample of firms is constrained to firms with relatively larger market capitalization. Furthermore, only common stocks that were traded on the Swedish stock exchange (Stockholm stock exchange, First North, and Spotlight) were selected.

Moreover, we excluded firms in sectors with insufficient data, such as sectors with only 1-2 listed firms except for affected sectors and pharmaceutical companies (NACE 72). After that, we merged the stock price data with each stock's specific nomenclature for economic activities (NACE), the classification of economic activities in the European Union, which was downloaded from Thomson Reuters. Regarding the sectoral distribution, a two-digit classification was used, which also is illustrated in table 1. Moreover, we also cleaned for stocks with missing data during the estimation period and the chosen event windows; for instance, these firms might have been newly listed stocks or delisted. Finally, our finished sample of stocks constituted 217 stocks that fulfilled all the criteria.

Regarding our regression variables, the market capitalization, leverage ratio, and price to book ratio were all retrieved from Thomson Reuters. Moreover, we also used industry-specific data provided by different public state authorities. The data on the financial aid distribution and the tax relief to different industries were collected through the Swedish Tax Agency (Skatteverket). Furthermore, the data surrounding the employment-related cost reduction was provided by the Swedish Agency for Economic and Regional Growth (Tillväxtverket). The industry classification used by the Swedish Public Agencies was based on "Svensk näringslivsindelning" (SNI), which is equivalent to the NACE classification, and thus explains the use of NACE classification when categorizing stocks in different sectors and industries. Since the data was only available at an industry level, we used the NACE classification to assign each stock the corresponding industry value used in our regression, which is illustrated in table 3.

Table 1: Sectoral Categorizaiton

NACE	Description	N	Change in Net Sales	Unaffected /Affected / Strongly affected
51	Air transport	1	-49%	A/SA
55	Accommodation	2	-40%	A/SA
29	Manufacture of motor vehicles, trailers, and semi-trailers	6	-15%	A/SA
24	Manufacture of basic metals	4	-12%	A/SA
50	Water transport	1	-10%	A/SA
93	Sports activities and amusement and recreation activities	1	-9%	A/SA
25	Manufacture of fabricated metal products, except machinery and equipment	7	-7%	A/SA
28	Manufacture of machinery and equipment	20	-7%	A/SA
30	Manufacture of other transport equipment	3	-7%	A/SA
32	Other manufacturing	9	-7%	A/SA
35	Electricity, gas, steam, and air conditioning supply	3	-6%	A
17	Manufacture of paper and paper products	6	-4%	A
31	Manufacture of furniture	3	-3%	A
22	Manufacture of rubber and plastic products	2	-2%	A
26	Manufacture of computer, electronic and optical products	33	-2%	A
27	Manufacture of electrical equipment	9	-1%	UA
45	Wholesale and retail trade and repair of motor vehicles and motorcycles	3	-1%	UA
46	Wholesale trade, except for motor vehicles and motorcycles	5	0%	UA
43	Specialized construction activities	4	1%	UA
61	Telecommunications	4	1%	UA
71	Engineering activities and related technical consultancy	4	1%	UA
10	Manufacture of food products	4	2%	UA
16	Manufacture of wood and of products of wood and cork, except furniture	2	2%	UA
20	Manufacture of chemicals and chemical products	6	3%	UA
62	Computer programming, consultancy, and related activities	16	3%	UA
68	Real estate activities	28	3%	UA
81	Services to buildings and landscape activities	1	3%	UA
41	Construction of buildings	9	4%	UA
42	Civil engineering	5	4%	UA
70	Activities of head offices; management consultancy activities	3	4%	UA
47	Retail trade, except of motor vehicles and motorcycles	10	5%	UA
80	Security and investigation activities	3	5%	UA

Table 1 reports the summary statistics of the different economic sectors. *NACE* represents the two-digit sectorial classification. The total amount of firms in the working sample (*N*) refers to the sector that each firm belongs to. *Change in net sales* is the median of the change in net sales between 2020-2019 for each sector. *Affected/Unaffected* refers to sectors that experienced a negative/positive change in net sales during year 2020. (*A)* stands for affected, (*SA)* stands for strongly affected and (*UA*) stands for unaffected.

Besides the industry and sectoral categorization, we also distinguished between each sector in terms of being strongly affected, affected, and unaffected by the COVID-19 pandemic, illustrated in table 1. In order to classify the sample of sectors as being strongly affected, affected, and unaffected, we conducted a boxplot analysis.

Table 2: Summary Statistics

	Sectors	Mean	SD	p25	Median	p75
Change in Net Sales	32	-.044	0.118	-.07	-.01	.03

Table 2 represents the summary statistics for the boxplot analysis regarding the change in net sales between 2020-2019 among all the 32 sectors included in the data sample.

Figure 1: Boxplot

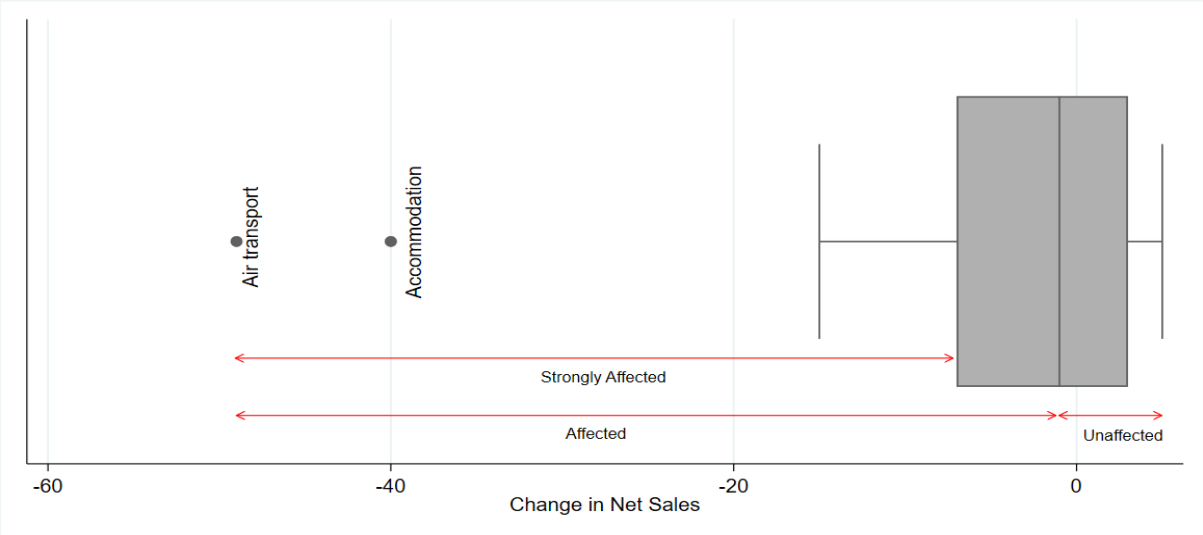


Figure 1 shows the boxplot of the change in net sales of each sector between 2020-2019 among the 32 sectors included in the data sample.

According to figure 1, the affected sectors are the sectors with a change in net sales between the lowest value and the sample's median. The strongly affected sectors are identified to be sectors whose change in net sales varied between the lowest value and Q1 of the boxplot. Finally, unaffected sectors constitute the sectors that are positioned between the median and upper whisker. This categorization was done using the Swedish Central Bureau of Statistics database, which provided us with the change in net sales of each two-digit sector between 2020 and 2019. Moreover, as the database provides only constraints for the number of employees, it is assumed that firms recruiting over 50 employees are likely to be listed, and, therefore, only these firms' data was retrieved. The negative change in net sales represents a direct effect of COVID-19 on the sector. This relationship is also aligned with the state evaluation of the pandemic's impact on Swedish sectors by the Swedish Tax Agency (Skatteverket, 2020).

Furthermore, the Swedish Financial Department stated that only firms that had experienced a negative change in net sales would be able to receive reduced revenue-based financial aid. As for the tax deferment, the Swedish Tax Agency stated that only firms unable to make their payment due to uncontrollable circumstances are eligible to apply for tax deferment (Skatteverket, 2020). Another stimulus package that was included in the Swedish government's effort to mitigate the adverse consequences of COVID-19 on the Swedish market was employee-related cost reductions. This measure also targeted the firms that experienced temporary and serious financial problems because of COVID-19 (Regeringskansliet, 2020). There exists a consistent relationship between being eligible to receive financial aid and being affected by the COVID-19. Thus, the more COVID-19 impacted a firm, the more exposure it had to the extraordinary budget announcements. Additionally, sectors that were not eligible for these stimulus packages and sectors for which data was unavailable were omitted. For instance, the financial sector was not given funding from the stimulus package related to Omstallningsstod (Skatteverket, 2020), and there were also no available figures on the change in net sales for the sector. Because including these sectors will prevent us from grouping the

firms in strongly affected, affected, and unaffected sectors, we decided not to include them if data for a sector was missing for any of the government's fiscal measures.

4.2 Method

4.2.1 Choice of Events

The events of interest in this study are the Swedish government's extraordinary budget revisions to alleviate the impact of the COVID-19 on the Swedish economy. The study aims at investigating the effects of these measures on investors' reactions to their announcements. Four significant events were chosen from the lists of announcements published on the Swedish government's official website (Regeringskansliet, 2020).

- *16 March 2020*: The government proposed a crisis package for Swedish companies and jobs, and the proposal was based on an agreement between Socialdemokraterna, Centerpartiet, Liberalerna, and Miljöpartiet. This proposition mostly involved measures taken in order to strengthen the liquidity of Swedish corporations. The liquidity support meant that corporations could get a deferment of payments such as general payroll tax and value-added tax (Anstand). In this announcement, the government also introduced the support for short-term layoffs, in which the government announced that they would stand for the larger part of the employee-related costs (Korttidsarbete). In total, the proposed crisis package was estimated to involve 300 billion SEK in support, but not all of it constituting publicly financed expenditures.

- *25 March 2020*: Based on an agreement between Socialdemokraterna, Centerpartiet, Liberalerna, and Miljöpartiet, the government presented a government loan guarantee in order to make it easier for corporations to finance their operational activities. The government would guarantee corporations 70 percent of new loans from banks to corporations that had suffered economic difficulties due to the COVID-19. Moreover, firms affected financially by the COVID-19 were provided with the possibility to apply for temporary tax-payment respite (Anstand). According to this proposition, 100 percent of profit for 2019 could be set aside and then set off against losses incurred during 2020. This approach would enable firms to get back the preliminary taxes paid for 2019. The proposal is estimated to lead to a 13 billion increase in liquidity. However, the measures mainly targeted small to mid-cap firms, but there was no legal limit on firm size.

- *14 April 2020*: Together with Centerpartiet and Liberalerna, the government proposed further measures to mitigate the consequences of COVID-19 on jobs and the economy in Sweden. The new system would allow corporations to decrease employees' work time up to 80 percent, while the government would bear the largest part of the costs. As a result, companies would be able to decrease their costs of salaries by up to 70 percent, while the affected workers would still keep 90 percent of their salary. In total, the expected publicly financed expenditures related to this measure were estimated to be 49 billion SEK. This proposition was mainly associated with "Korttidsarbete".

- *30 April 2020*: The government, together with Centerpartiet and Liberalerna, presented a measure aimed at relieving the consequences of jobs and corporations. It involved adjustment support, and the object was to make it possible for corporations to overcome

their extreme losses in revenues. The criteria for being able to take advantage of this support was that the company had to experience revenue losses of at least 30 percent between March and April 2020. Furthermore, at most, the Swedish government can grant 75 percent of the percentage loss of revenue calculated on the fixed costs of operations. For instance, Firm A reported a reduction in sales of 30% and had fixed costs of 500 000 SEK. As a result of this program, the firm would be entitled to SEK 112 500 SEK (75% x 30% x 500 000 SEK). In the proposition, they estimated the government expenditures in connection to this announcement to correspond to 39 billion SEK. This proposition was primarily related to ”Omstallningsstod”.

These events were chosen based on their relevantly significant magnitude compared to other announcements that were either insignificant in terms of magnitude or mostly focused on unlisted firms. Hence, the list of events in this study includes only events that had the potential to induce a market reaction.

List of events

16 March 2020	Additional amending budget due to the coronavirus (Anstand and Korttidsarbete)
25 March 2020	Temporary tax-payment respite (Anstand)
14 April 2020	Scaling up crisis measures for jobs and businesses (Korttidsarbete)
30 April 2020	Businesses to receive support based on loss of turnover (Omstallningsstod)

Figure 2: OMXSPI Price Movement

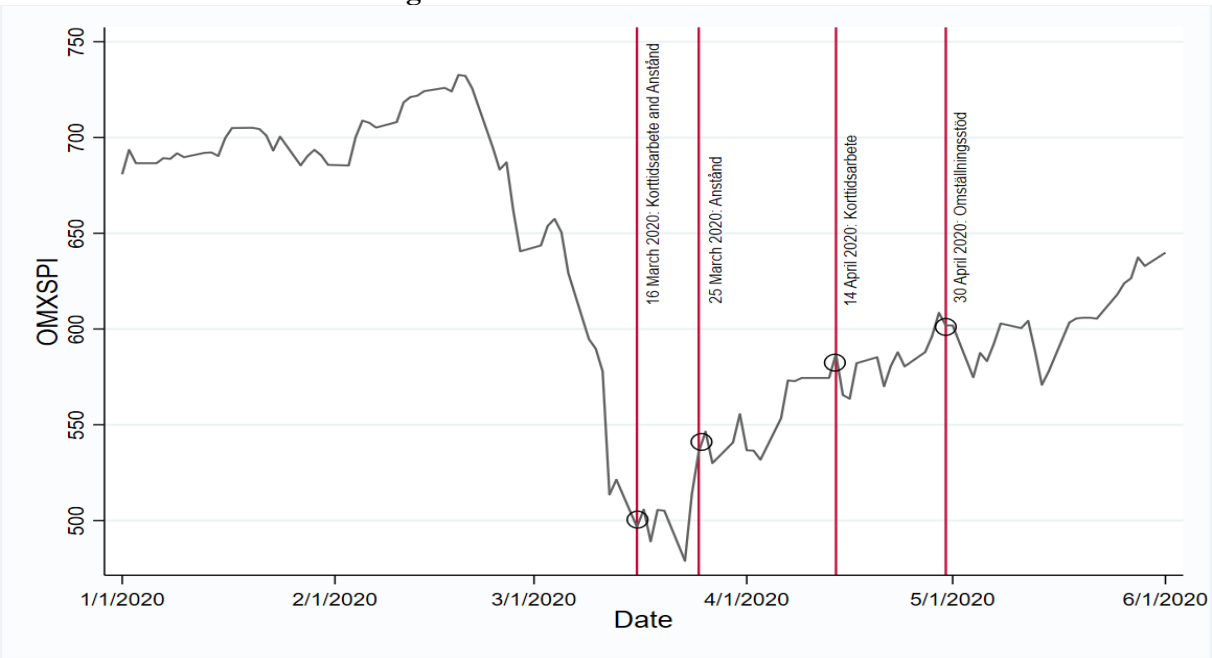


Figure 2 illustrates the OMXSPI price movements between 01-01-2020 and 01-06-2020. Moreover, the graph highlights four extraordinary budget announcements released on 16 March 2020, 25 March 2020, 14 April 2020, and 30 April 2020.

4.2.2 Event Study

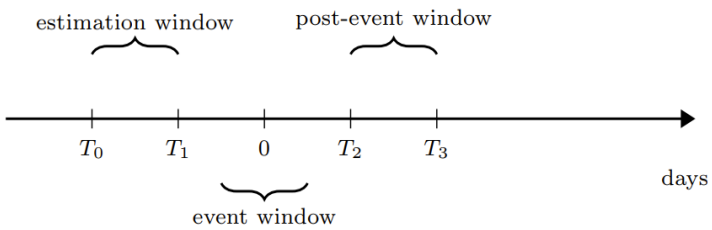
Following the event-study methodology proposed by MacKinlay (1997), this study aims to analyze the abnormal returns of Swedish listed firms during the relevant events. While different methodologies are available to separate the abnormal returns from the systematic market movements, this study utilizes the market model proposed by MacKinlay (1997). This approach is chosen partly due to the extensive usage of the market model in event studies (Ahern, 2009) and that, according to Campbell et al. (1998), the marginal explanatory power of other models, such as factor models, is minimal. However, Campbell et al. (1998) reason that factor models have the potential to reduce the variance of the abnormal returns by adding additional factors that provide further explanation for the systematic market movement. For example, Fama and French (1993) included, in the estimation of average stock returns, a factor related to the overall market and factors associated with the firm characteristics such as firm size and book-to-market equity. Because we were unable to use a multifactor model to further reduce the variance of the abnormal returns due to lack of data, this can be seen as a limitation of our study.

4.2.3 Market Model

We use in this study The Market Model methodology for event studies of Campbell et al. (1998). In the following sections, we first introduce the relevant intervals used in the market model and thereafter explain the procedures used in calculating cumulative average abnormal returns (CAAR), which are the main measures when investigating the reaction of the multiple firms to the events of interest. Finally, we provide the methodology used when testing for the significance of the obtained CAAR values.

4.2.3.1 Intervals

Relevant time intervals in this study are of three types: The estimation period, the event windows, and the events. The estimation period and the event windows are chosen in alignment with the proposed lengths in the event-study methodology of Campbell et al. (1998). The estimation period covers 120 trading days prior to the event date, consistent with MacKinlay (1997). More precisely, the cut-off of the estimation period is chosen to be two days before the event date. According to Jeng and Jau-Lian (2020), as the market incorporates new information sequentially, selecting a too distant estimation period from the event date runs the risk of not including enough information regarding the systematic risk of the market, which may consequently generate imprecise abnormal returns. Thus, the decided cut-off for the estimation period in our study is close enough to the event windows to include all prevailing systematic risks in the market.



The event windows are as follows: (-1,1), (-1,0), (0,1), (0,3). 0 denotes the event date, (-) refers to the dates before the event, and (+) shows the dates after the occurrence of the event of

interest. Additionally, the reason behind including one day of pre-event is to take into account the possibility of the information being leaked before the announcements. To consider the possibility of the market not being able to incorporate the information immediately, the upper bound of the event window is widened between 1 to 3 days. The chosen event windows are consistent with Bushnell et al. (2013).

Furthermore, during the COVID-19 period, various events occurred that may have influenced the market, including the increase in COVID-19 cases, a reduction in oil prices, and COVID-19 restrictions. Therefore, we use short event windows in order to minimize the risk of incorporating the reaction to other events and, in that way, only capture the true market reaction to the chosen events. We also based our shortened event windows on the findings of McWilliams and Siegel (1997). They argued that if other events emerge during the events of interest, it will give rise to confounding effects, consequently decreasing the precision of the results.

4.2.3.2 Procedures Used in The Calculation of CAAR Values

In estimating the market model regression, we use the logarithmic returns of the stocks and the benchmark (OMXSPI index) as described in equation (1). OMXSPI includes all of the stocks listed on the OMX Nordic Exchange Stockholm, aiming to represent the Swedish market's overall state and fluctuations, thus being appropriate for our study as we focus on the Swedish equity market.

$$R_{(i,mkt),t} = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

Where $P_{t,t-1}$ denotes the stock price or the benchmark price, and $R_{(i,mkt),t}$ represents its logarithmic return. Moreover, in establishing a relationship between the firms' stock return and the benchmark market index, the following regression between the stock returns and the benchmark market index is conducted over the estimation window, as shown in equation (2).

$$R_{i,t} = \alpha_i + \beta_i * R_{mkt,t} + \varepsilon_{it} \quad (2)$$

R_{it} is the realized log return of stock i at day t, and R_{mkt} is the market log return at day t approximated by the OMXSPI index. Applying this regression model over the estimation period will generate the normal returns of the stocks. This expected normal returns of the stocks are based on the estimated α_i and β_i in this OLS regression model. β_i represents how responsive the stock is regarding changes in the market, and α_i shows the level of abnormal returns observed by the stock during the estimation period. Moreover, the error term in the equation is assumed to be an independent and identically distributed random variable.

Furthermore, through this model, the variation of the firms' stock return that stems from the market's movement will be removed, and thus the variance of the abnormal returns will be reduced. According to Campbell et al. (1998), this reduction in the variance of abnormal returns will make it more probable to detect the effects of events. Furthermore, there exists a linear relationship between the stock returns and the market returns. The estimated expected returns generated by this model are usually denoted as normal returns, which implies that in the absence of any significant event, the security of interest will generate a realized return approximately equal to the estimated expected return. In contrast, if securities realized returns are significantly different from the estimated expected returns, it shall indicate that a significant

event had occurred, which will be reflected by the difference between the actual return and the estimated expected return. Thus, in separating the normal returns from the abnormal returns, we deduct the estimated normal returns from realized returns, resulting in abnormal returns for the event windows.

$$AR_{it} = \underbrace{R_{it}}_{\text{Realized stock return}} - \underbrace{\left(\hat{a}_i + \hat{\beta}_i * R_{mkt}\right)}_{\text{Estimated expected return by the market model}} \quad (3)$$

Where AR_{it} is the abnormal return of stock *i* at day *t*, R_{it} is the realized log return of stock *i* at day *t*, and R_{mkt} is the market log return at day *t* approximated by the OMXSPI index. To the extent that the aim of this study is to provide evidence for the reaction of multiple firms to the events of interest, we subsequently calculate the average of the abnormal returns included in each sample using equation (4).

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \quad (4)$$

Where AAR_t stands for the average abnormal returns of the stocks included in the sample on date t and N represents the number of firms included in the sample. Finally, we calculate the cumulative average abnormal returns by aggregating the AARs over the specific event windows using the equation (5).

$$CAAR_{(t_1,t_2)} = \sum_{t=t_1}^{t_2} AAR_{i,t} \quad (5)$$

$CAAR_{(t_1,t_2)}$ denotes the cumulative average abnormal returns and $AAR_{i,t}$ shows the average abnormal returns. The firms that are included in this study comprise 217 Swedish firms that are listed on any of the following exchanges: Nasdaq, First North, or Spotlight. Moreover, aligned with Campbell et al. (1998) suggestions, the market index used in this study is based on where the firms studied are mostly traded. Both stock prices for the sample firms and data on the OMXSPI index were obtained from Datastream.

The calculations of cumulative average abnormal returns (CAAR) are done with the *estudy* command (Pacicco et al., 2018) in STATA. As a first step, the study analyzes the cumulative abnormal returns of all firms included in our sample test. Then, the sample test is divided into firms that operate in sectors most exposed to the COVID-19 pandemic and firms that operate in sectors not affected by the COVID-19. The cumulative average abnormal returns of these groups are analyzed with the aim of finding any existing disparity between gäroups regarding their reaction to the budget announcements.

4.2.3.3 Test for The Significance of The CAAR Values

Since the uncertainties stemming from the COVID-19 were largely prevalent during the events in March 2020 and April 2020, it is important to consider the volatility surrounding the events. Therefore, we use the generalized rank test (GRANK) by Kolari and Pynnönen (2011), a non-parametric test, when testing for the significance of each cumulative average abnormal return. Kolari and Pynönnen found that the GRANK test is superior to other rank tests when testing for CAARs and is robust to event-induced volatility as well as the serial correlation among abnormal returns. Kolari and Pynnönen (2010) highlighted that even minor cross-sectional

correlation could lead to over-rejection of the hypothesis due to overestimation of the test statistics. Therefore, due to the superiority of the GRANK test compared to popular parametric and other non-parametric tests, the use of the GRANK test will provide robust empirical results (Kolari and Pynönnen, 2011). Lastly, the calculation of the significance test is also done with the *estudy* command in STATA.

4.2.4 Cross-Sectional Regression Model

In order to capture the effect of Omstallningsstod, Anstand, and Korttidsarbete on the CAAR values of stocks, we regress each exposure variable that is included in the extraordinary budget announcement; hence we get the following equations for each event:

Event	Regression model	
16 March 2020	$\mathrm{CAAR}_{i,t} = \alpha + \beta_1 * \mathrm{Anstand}_{j,t} + \beta_2 * \mathrm{Korttidsarbete}_{j,t} + \beta_3 * \mathrm{Price\_to\_Book}_{i,t} + \beta_4 * \mathrm{Debt\_to\_Equity}_{i,t} + \beta_5 * \mathrm{Firm\_Size}_{i,t} + \varepsilon_{i,t}$	(6)
25 March 2020	$\mathrm{CAAR}_{i,t} = \alpha + \beta_1 * \mathrm{Anstand}_{j,t} + \beta_2 * \mathrm{Price\_to\_Book}_{i,t} + \beta_3 * \mathrm{Debt\_to\_Equity}_{i,t} + \beta_4 * \mathrm{Firm\_Size}_{i,t} + \varepsilon_{i,t}$	(7)
14 April 2020	$\mathrm{CAAR}_{i,t} = \alpha + \beta_1 * \mathrm{Korttidsarbete}_{j,t} + \beta_2 * \mathrm{Price\_to\_Book}_{i,t} + \beta_3 * \mathrm{Debt\_to\_Equity}_{i,t} + \beta_4 * \mathrm{Firm\_Size}_{i,t} + \varepsilon_{i,t}$	(8)
30 April 2020	$\mathrm{CAAR}_{i,t} = \alpha + \beta_1 * \mathrm{Omstallningsstod}_{j,t} + \beta_3 * \mathrm{Price\_to\_Book}_{i,t} + \beta_4 * \mathrm{Debt\_to\_Equity}_{i,t} + \beta_5 * \mathrm{Firm\_Size}_{i,t} + \varepsilon_{i,t}$	(9)

A cross-sectional regression model is a common econometrics methodology to estimate stock returns by including common factors across all stocks. Considering the firm control variables, Banz (1981) found that the firm's size has significant explanatory power in explaining stock returns; thus, Firm_Size, in terms of each firm's logarithmic market capitalization, is included as a control variable in the regression model. Debt_to_Equity is introduced as a control variable based on the findings of Bhandari (1988). The author found that firm leverage is associated with risk and expected returns; thus, it has the potential to explain the calculated CAARs of the stocks. Moreover, the relationship between the Price_to_Book and equity premium was established by Stattman (1980) and Rosenberg et al. (1985), thus making this variable important to be included as a control variable in our regression.

As illustrated by equations 6 - 9, not all of the independent variables Omstallningsstod, Anstand and Korttidsarbete are regressed at each event. The regression model includes an exposure variable only if it was mentioned in the announcement; otherwise, it will be excluded from the regression model. This method is analogous to using dummy variables in the regression model, which assigns a value of zero to an independent variable in order to remove it from the regression model and a value of one in order to include it. According to Greene (2012), including irrelevant variables will increase the estimator's variance and hence reduce the model's accuracy. In order to highlight the approach, it is essential to consider the different events that are studied in this paper. Following the event, on 16 March 2020, only tax relief and short-term layoffs were announced as stimulus measures. Similarly, only revenue-based aid was announced during the event on 30 April 2020. Therefore, we argue that including a measure as an independent variable when the measure has not yet been announced is equivalent to including an irrelevant variable. For instance, if the aim is to capture the explanatory value of a specific measure, hence it is important that the measure has been announced to the public

so that investors can process the related information. If not, there is no information on a specific measure for investors to react to because it has not yet been revealed.

4.2.5 Constructed Independent Variables

In constructing the exposure variable of firms to Omstallningsstod, Anstand, and Korttidsarbete, which constituted the three largest publicly financed aid channels (Regeringskanslier, 2020), we follow the methodology used in Perotti (2008) and Belo et al. (2013). The effect of government spending on industries was investigated by Perroti (2008), who defined the government demand variable as follows:

$$\frac{G_{it} - G_{i(t-1)}}{S_{i(t-1)}}$$

In the ratio, G_i stands for the total sales of a specific industry to the government, and S_i represents the total sales of the industry. While Perotti (2008) aimed to investigate the effect of changes in government spending on private consumption, the same methodology was used by Belo et al. (2013) in investigating the effect of government spending on asset prices. They used government spending and constructed industry exposure variables that, in turn, also represented the firm-level exposure to government spending. Replacing the government spending with the amount of stimulus package allocated to a specific industry and the total sales of industry with the total amount of stimulus package proposed, we constructed three ratios that represent the exposure of a specific industry to stimulus packages proposed by the Swedish government. Moreover, a larger ratio indicates that the industry received more aid than the one with a lower ratio. Thus, it is assumed that there exists a positive relationship between the ratio of this variable and the level of exposure to announcements related to this fiscal policy. As data for firm-level is not available, we base our exposure variable on industry-level data.

Table 3: Industry Exposure

Industry	NACE	Description	N	Omstallningsstod	Anstand	Korttidsarbete
C	10-33	Manufacturing	114	0.07462	0.18075	0.24854
D	35	Electricity, gas, steam, and air conditioning supply	3	0.00313	0.00229	0.00003
F	41-43	Construction	18	0.00997	0.19724	0.02864
G	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	18	0.11495	0.16008	0.16336
H	49-53	Transporting and storage	2	0.24359	0.09343	0.07474
I	55-56	Accommodation and food service activities	2	0.31526	0.05555	0.10969
J	58-63	Information and communication	20	0.01547	0.05349	0.06307
L	68	Real estate activities	28	0.02664	0.01295	0.00629
M	69-75	Professional, scientific, and technical activities	7	0.03309	0.06476	0.13874
N	77-82	Rental and leasing activities	4	0.06510	0.06610	0.06735
R	90-93	Creative, arts and entertainment activities	1	0.06432	0.00876	0.03537

Table 3 reports the summary statistics of the different economic sectors. *Industry* stands for the one-digit industry classification according to the nomenclature for economic activities. *NACE* represents the two-digit sectorial

classification. The total amount of firms in the working sample (*N*) refers to the sector to which each firm belongs. *Omstallningsstod* is the exposure to the financial aid provided by the government and represents the percentage each industry received of the total financial aid (over March 2020 – Oct 2020). *Anstand* is defined as the exposure to the total tax relief provided by the government and represents the percentage each industry received of the total tax relief (over March 2020 – Oct 2020). *Korttidsarbete* is the exposure to the total employment-related cost reduction and is expressed in terms of the total percentage each industry received of the total employment related cost reduction that was provided (over 2020).

Omstallningsstod

Bartlett and Morse (2021) studied the effect of fiscal programs during COVID-19 on small businesses. However, they concluded regarding large enterprises that programs providing aid to cover committed costs would increase the survival probabilities of these firms. Moreover, they related the survival probability of a firm to revenue grit, labor flexibility, and committed costs. According to the Swedish Finance Department, this stimulus package would enable Swedish companies to receive compensation for a large part of their fixed costs for the periods affected by the COVID-19 pandemic (Regeringskansliet, 2020). If the revenue loss of a firm is 100 percent, the company would be able to receive compensation for 75 percent of the fixed costs. Thus, the amount of aid received by a company is linear in relation to the percentage of the loss of revenue. Based on the findings of Bartlett and Morse (2021), we assume that this approach might have improved the survival probability of large enterprises and thus influenced their returns. In order to measure the exposure of a firm to this stimulus package, we constructed the following variable.

$$\text{Omstallningsstod} = \frac{\text{Financial aid received by the industy j (Mar 2020} - \text{Oct 2020)}}{\text{Total Financial aid provided by the government (Mar 2020} - \text{Oct 2020)}} \quad (6)$$

The amount of financial aid received by a specific industry is standardized by the total amount of aid provided by the government. In addition, the periods in the ratio consist of support periods for which a firm could apply for Omstallningsstod. The first support period was March-April 2020, but there have been more periods during the COVID-19's first wave, which ranged from March – to October 2020 (Socialstyrelsen, 2021). In order to capture the first wave of COVID-19's effect, we limit the support period to March - October 2020.

Anstand

$$\text{Anstand} = \frac{\text{Tax relief received by the industy j (Mar 2020} - \text{Oct 2020)}}{\text{Total Tax relief provided by the government (Mar 2020} - \text{Oct 2020)}} \quad (7)$$

Another primary target of the stimulus packages announced in the extraordinary budget announcement was related to strengthening the liquidity of corporations (Regeringskansliet, 2020). It involved the possibility for firms to defer payments pertaining to the general payroll tax, preliminary tax on salary, and the value-added tax. In order to measure the effect of the exposure to the possibility of deferring tax payments, we use a variable that directly measures each industry's exposure to the announcement regarding the deferment of payments. The variable is constructed by dividing the tax relief received by each industry by the total tax relief that the government provided between the support periods of March 2020 - and October 2020, which covers the significant COVID-19 period.

Korttidsarbete

$$\text{Korttidsarbete} = \frac{\text{Employement related cost reduction received by the industy j (2020)}}{\text{Total Employement related cost reduction provided by the government (2020)}} \quad (8)$$

Since one of the targets of the extraordinary budget announcements regarded the increase in layoffs, hence one way to measure the exposure is to consider the employment-related cost reduction the government provided. In this case, we take inspiration from the findings of Kilic and Wachter (2018), which examined the existence of a relationship between unemployment and stock market valuation. Their model highlights the relation between labor markets and volatility in equity. Furthermore, according to the extraordinary budget announcements (Regerinskansliet, 2020), the main reason behind their proposal of support for short-time work (Korttidsarbete) was to save the Swedish jobs and thus decrease the unemployment rate in the Swedish labor market. Therefore, we construct an independent variable, Korttidsarbete, that will measure the exposure of each industry to total employment-related cost reduction that was provided by the government. Moreover, the support for short-term layoffs was the most extensive publicly financed measure when considering the estimated costs among the three chosen publicly financed aid channels in terms of budgetary impact.

5. Empirical Results and Analysis

5.1 Total Sample of Firms

In this section, the first hypothesis will be discussed and analyzed based on the results from the calculations of the cumulative average abnormal returns (equation 5). The results of the total sample of firms are further summarized in table 4 below.

Table 4: Cumulative Average Abnormal Returns for The Chosen Events
All The Firms

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(217 firms)	-5.19%**	-2.56%	-4.99%**	-5.69%**
		(0.0334)	(0.1053)	(0.0151)	(0.0222)
25 March 2020	(217 firms)	-2.06%	-1.77%	-0.96%	0.12%
		(0.2272)	(0.2409)	(0.4021)	(0.9692)
14 April 2020	(217 firms)	2.09%	1.77%	0.40%	-0.19%
		(0.1942)	(0.2331)	(0.9065)	(0.6191)
30 April 2020	(217 firms)	1.29%	0.72%	1.36%*	1.34%
		(0.1768)	(0.3366)	(0.0891)	(0.1441)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses
Table 4 reports the cumulative average abnormal returns for all the stocks included in the sample. The table represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event.

In this case, we hypothesized that the extraordinary budget announcements would have a statistically significant effect on the Swedish stock market, which involves all the firms included in our sample. Considering table 4, the CAARs for most of the event windows during 16 March 2020 are significantly negative at the 5% level. The results imply that the extraordinary budget announcement on 16 March 2020 had a statistically significant negative effect on the Swedish stock market returns. However, the CAARs for the event windows [-1,1], [-1,0], and [0,1] during the extraordinary budget announcement on 25 March 2020 are negative but not statistically significant, illustrating a non-significant effect at any level on the

total sample of firms combined. Moreover, during 14 April and 30 April 2020, the stock market reaction to the events seems to be different. Most of the CAARs during the event on 14 April 2020 were positive, except for the event window [0,3], but due to the non-significance of each CAAR, those results do not support the first hypothesis. Lastly, the CAARs for the event on 30 April 2020 were all positive for each event window, and interestingly, the event window [0,1] even turned out to be significantly positive at the 10% level.

When analyzing the results, it is important to note that the event on 16 March 2020 occurred when the Stock markets all over the world, including the Swedish stock market, were exposed to high uncertainties in terms of the COVID-19 outbreak, which in turn sparked the market crash in March 2020 (Baker et al., 2020). Those uncertainties can be manifested in the substantial increase in financial market volatility caused by the lack of knowledge regarding the infectiousness and lethality of the COVID-19 virus (Baker et al., 2020). In that way, it can be hard to capture the true effects of the extraordinary budget announcements on 16 March 2020 due to the market turmoil in March 2020. Even though the results from the GRANK test consider the event-induced volatility, it is not feasible to make any conclusions regarding the event on 16 March 2020 due to the external influences stemming from the COVID-19 pandemic. This is also in line with the findings of Brogaard et al. (2022), who found that a substantial part of the stock variance could be explained by noise. Therefore, due to the prevalence of noise on 16 March 2020, no concluding remarks can be made regarding that specific event.

Other than the event on 16 March 2020, the results from the three other events seem to highlight the quick stock market recovery (Gustafsson and Brömsen, 2021), which in turn reflects an increased market optimism. Since the extraordinary budget announcements can be categorized as positive announcements, it could be possible that a part of the increase in investor optimism can be explained by the constructive fiscal interventions introduced by the Swedish government. Nevertheless, since only the CAAR for the event window [0,1] on 30 April 2020 was significant at the 10% level, no such conclusions can be made. A plausible explanation can be that the investors expect long-term costs because of the countercyclical fiscal policies, such as a future tax uncertainty. As the increase in government expenditures will either be financed via debt or through an increase in future tax income, it will affect the firm value by impacting the equity cost of capital and the discount rate when discounting future cash flows (Gordon and Leeper, 2005; Brogaard and Detzel, 2015).

Overall, the empirical results from this study do not provide consistent evidence showing that the extraordinary budget announcements significantly affected the overall Swedish stock market returns, which in this study involves all the firms included in the sample. As explained earlier, the event on 16 March 2020 was most likely influenced by external noise due to the market turmoil closely around that date, and none of the other events provided sufficient statistical significance, other than the significant positive CAAR at the 10% level on 30 April 2020. In that way, the first hypothesis is rejected due to the ambiguity of the empirical results regarding the effect of the different extraordinary budget announcement events.

5.2 Differences among Different Groups (Unaffected, Affected and Strongly Affected)

Table 5: Cumulative Average Abnormal Returns for Different Groups of Sectors

Panel A: Unaffected Sectors

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(116 firms)	-6.54%**	-3.25%**	-6.11%***	-7.09%***
		(0.0137)	(0.0460)	(0.0056)	(0.0070)
25 March 2020	(116 firms)	-1.19%	-1.00%	-0.23%	1.27%
		(0.4457)	(0.5284)	(0.6434)	(0.6104)
14 April 2020	(116 firms)	1.56%	1.38%	-0.06%	-0.85%
		(0.5190)	(0.5057)	(0.7523)	(0.4264)
30 April 2020	(116 firms)	1.41%	0.74%	1.41%	1.70%
		(0.2035)	(0.5113)	(0.1025)	(0.1064)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses

Panel A reports the cumulative average abnormal returns for the unaffected sectors in the data sample. The panel represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event.

Panel B: Affected Sectors

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(101 firms)	-3.65%	-1.78%	-3.72%	-4.09%
		(0.2641)	(0.4775)	(0.1715)	(0.2007)
25 March 2020	(101 firms)	-3.07%	-2.66%*	-1.80%	-1.21%
		(0.1022)	(0.0820)	(0.2216)	(0.3520)
14 April 2020	(101 firms)	2.70%**	2.21%*	0.94%	0.57%
		(0.0430)	(0.0865)	(0.4358)	(0.9186)
30 April 2020	(101 firms)	1.16%	0.71%	1.30%	0.93%
		(0.2450)	(0.2258)	(0.1522)	(0.3585)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses

Panel B reports the cumulative average abnormal returns for the affected sectors in the data sample. The panel represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event.

Panel C: Strongly Affected Sectors

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(54 firms)	-5.33%	-2.95%	-4.81%	-6.47%*
		(0.1463)	(0.2185)	(0.1158)	(0.0694)
25 March 2020	(54 firms)	-2.06%	-1.76%	-1.65%	-2.25%
		(0.3989)	(0.4170)	(0.4814)	(0.3367)
14 April 2020	(54 firms)	2.09%	2.62%**	-0.34%	-0.54%
		(0.2327)	(0.0470)	(0.6765)	(0.6038)
30 April 2020	(54 firms)	1.09%	0.63%	1.28%	0.68%
		(0.4442)	(0.4762)	(0.3960)	(0.7488)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses

Panel C reports the cumulative average abnormal returns for the strongly affected sectors in the data sample. The panel represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event.

In investigating our second hypothesis, the cumulative average abnormal returns of our constructed groups of sectors will be analyzed in this part. We hypothesized that the extraordinary budget announcements had a different effect depending on whether the sector was strongly affected, affected, or unaffected by the COVID-19 pandemic, such that the cumulative average abnormal returns differed among the strongly affected, affected, and

unaffected sectors. In addition, the relationship between budget announcements exposure and returns was constructed using the amount of the stimulus package distributed to the sector in which the firm operates, also indicating the extent to which the firm would benefit from the stimulus package. As a result, the more a group is exposed to the announcement, the stronger the reaction is predicted.

Table 5 presents panels for the cumulative average abnormal returns of our constructed groups of sectors around different budget announcements. The cumulative average abnormal returns (CAARs) of our constructed groups are, across all event windows, negative for the announcement released on 16 March 2020. Nevertheless, the CAAR values for the affected and strongly affected sectors are contrary to the unaffected sector, non-significant. In this event, the Swedish government announced that the budget would be amended to mitigate the adverse effects of the COVID-19, and the inflow of the stimulus package would mainly target sectors impacted severely by the pandemic. Furthermore, as previously noted, these results are inconclusive since they were most likely impacted by external noise due to the predominance of uncertainty in March 2020.

The second announcement, released on 25 March 2020, informed the market that the government would guarantee 70 percent of new loans issued by financial institutions and the possibility of a temporary tax-payment respite. The approach aimed to mitigate the severe liquidity shortage prevailing in the Swedish market. Consequently, the reaction of all groups of sectors to the announcement was negative across all event windows apart from the event window [-1,0] for the affected sectors, which was significantly negative. Both the affected and strongly affected sectors that experienced a significant drop in net sales resulting in a substantial decrease in cash flows from operating activities were expected to be more likely to benefit from this stimulus package and, hence, overwintering the liquidity shortfall. Nevertheless, regardless of the exposure of the groups of sectors to the announcement, the CAAR values generated for this liquidity-enhancing announcement across all groups were homogenously not significant. Therefore, our findings also indicate that non-financial sectors did not react positively, which can be seen as a contribution to the findings of Demirgüç et al. (2021), who provided evidence for the positive reaction of financial sectors to liquidity-enhancing measures.

While these results decline the explanatory power of whether groups more exposed to the budget announcements incorporated better the content of these announcements (Pastor and Veronesi, 2012), it is important to mention that during March 2020, the financial markets were experiencing significant volatility (Baker et al., 2020). Furthermore, as previously said, the market was in turmoil. Consequently, it's reasonable to conclude that those results were skewed by external noise (Brogaard et al., 2022) and hence do not accurately reflect market participants' actual reaction to the announcement. Another plausible explanation can be attributed to the fact that the announcement of 25 March 2020 targeted small businesses to a larger extent. As a result, because we based our research on publicly traded companies, investors likely did not perceive the stimulus program to favor larger companies as much as smaller companies and hence did not exhibit a substantial reaction.

Contrary to the first and second announcements, the government fiscal policy announcement on 14 April 2020 introduced a system of it bearing the largest part of the employee-related cost generated statistically significant CAAR values for the event window [-1,1] and [-1,0] for the affected sectors and only for the event window [-1,0] for the strongly affected sectors. The CAAR values for the unaffected sectors are positive across event windows [-1,1] and [-1,0]

and negative for the event windows [0,1] and [0,3]. However, these values are not statistically significant. In addition, it is interesting to observe that sectors strongly affected and affected by the COVID-19 reacted positively to this announcement. As strongly affected and affected sectors are expected to be more exposed to the budget announcements, these findings are in line with the findings of Pastor and Veronesi (2012), who found that the more exposed a firm is to an announcement, the stronger reaction will be observed. Additionally, it is important to point out that the nature of this stimulus package differs from that of the 16 March 2020 and 25 March 2020 announcements. The former informed the market in general terms that the government would take several measures to stimulate the market. The latter communicated the government's preparedness to guarantee newly issued loans as well as the possibility of temporary tax-payment respite. While understanding the economic consequences of these announcements from a firm-level perspective could be ambiguous, the 14 April 2020 announcement's economic consequence for a firm was more straightforward since it only focused on one measure compared to the earlier announcements (16 March 2020 and 25 March 2020). In addition, according to Zhang (2006), analysts walk up to their projections for good news as more information becomes available; thus, with more precise information, the forecasts of analysts might have impacted positively regarding the prospects of the future during this event. Furthermore, the announcement regarding support for short-term layoffs was also estimated to be the largest in terms of government expenditures (Regeringskansliet, 2020), which also can explain the positive stock market reaction surrounding that event. Overall, the affected and strongly affected sectors reacted more positively compared to the unaffected sectors around the announcement released on 14 April 2020. For example, the CAAR values obtained for the event window [-1,0] for this event are as follows: 1,38% (unaffected sectors), 2,21% (affected sectors), and 2,62% (strongly affected sectors). The differential reaction of each sector to this announcement illustrates that market participants viewed this announcement as good news for all sectors but more in favor of the affected and strongly affected sectors.

Regarding the last event on 30 April 2020, the CAARs for all groups are non-significantly positive across all event windows, indicating that investors perceived the effects of the adjustment support on affected, strongly affected, and unaffected sectors as the same as on the overall Swedish equity market.

Lastly, the difference between the affected and strongly affected sectors in CAAR values was not substantial. While the strongly affected sector shows more positive values than the affected sectors for the event window [-1,0] on 14 April 2020, the inequality sign is reversed for all CAAR values during the 30 April 2020 event. For example, in the event window [0,1], affected sectors and strongly affected sectors generated 1,30% versus 1,28%, respectively. It implies that while the spread in exposure was large between the affected and strongly affected, the differential impact of the budget announcement on these groups is not substantial. Consequently, the attribution of CAAR values to the difference in the exposure of each sector to the stimulus packages can be observed only between the unaffected sectors and (affected and strongly affected sectors). But the same conclusion cannot be drawn when comparing the affected sectors with only the strongly affected sectors. Nevertheless, even though the results do not provide overall evidence for our hypothesis of obtaining a heterogeneous reaction across the groups of sectors, statistically significant results for the affected and strongly affected sectors could still be seen around the 14 April 2020 event. Considering the magnitude of that measure compared to the other measures, one can conclude that the support for short-term layoffs on 14 April 2020 was perceived positively by the affected and strongly affected sectors due to the positive significance of the generated CAAR values.

5.3 Cross-Sectional Regression Results

Table 6: Cross Sectional Regression Results

VARIABLES	Panel A: 16 March 2020			
	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
Anstand	0.209	0.160	0.0903	-0.0293
	(0.158)	(0.111)	(0.133)	(0.188)
Korttidsarbete	0.0727	-0.0031	0.0967	0.0736
	(0.107)	(0.0747)	(0.0901)	(0.127)
Firm_Size	0.00577	0.00458	0.00817**	0.00560
	(0.00430)	(0.00301)	(0.00363)	(0.00511)
Price_to_Book	0.000421	2.75e-05	0.000627	0.00314***
	(0.000914)	(0.000640)	(0.000771)	(0.00109)
Debt_to_Equity	-0.0232***	-0.0128***	-0.0176***	-0.0286***
	(0.00618)	(0.00433)	(0.00521)	(0.00735)
Observations	217	217	217	217
R-squared	0.131	0.083	0.122	0.130

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel A in Table 6 reports the correlation coefficients obtained using Equation 6 for the event on 16 March 2020. The dependent variables are different cumulative average abnormal returns (CAAR) for the entire sample, including 217 firms. The independent variables are stimulus package-related variables announced on this date and measured by the ratio of the amount of financial aid received by the industry and the total amount of the financial aid provided: Anstand and Korttidsarbete. The independent variables also include control variables which are Price_to_Book, Debt_to_Equity, and Firm_Size.

VARIABLES	Panel B: 25 March 2020			
	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
Anstand	-0.0905	0.0126	-0.104*	-0.107
	(0.0709)	(0.0629)	(0.0571)	(0.0753)
Firm_Size	0.0146***	0.0125***	0.00637***	0.00425
	(0.00287)	(0.00255)	(0.00231)	(0.00305)
Price_to_Book	-0.00105*	-0.000216	-0.000446	0.000768
	(0.000612)	(0.000543)	(0.000493)	(0.000650)
Debt_to_Equity	0.00284	0.00461	0.00118	-0.00884**
	(0.00414)	(0.00367)	(0.00333)	(0.00440)
Observations	217	217	217	217
R-squared	0.141	0.115	0.060	0.037

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B in Table 6 reports the correlation coefficients obtained using Equation 7 for the event on 25 March 2020. The dependent variables are different cumulative average abnormal returns (CAAR) for the entire sample, including 217 firms. The independent variables are stimulus package-related variables announced on this date and measured by the ratio of the amount of financial aid received by the industry and the total amount of the financial aid provided: Anstand. The independent variables also include control variables which are Price_to_Book, Debt_to_Equity, and Firm_Size.

VARIABLES	Panel C: 14 April 2020			
	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
Korttidsarbete	0.0932**	0.0606*	0.0777*	0.124**
	(0.0471)	(0.0366)	(0.0416)	(0.0486)
Firm_Size	-0.0112***	-0.00883***	-0.00559**	-0.00501*
	(0.00283)	(0.00220)	(0.00250)	(0.00292)
Price_to_Book	0.000162	0.000370	0.000233	0.000349
	(0.000602)	(0.000468)	(0.000532)	(0.000622)
Debt_to_Equity	-0.00129	0.00123	-0.0107***	-0.0131***
	(0.00405)	(0.00315)	(0.00358)	(0.00419)
Observations	217	217	217	217
R-squared	0.086	0.084	0.096	0.109

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel C in Table 6 reports the correlation coefficients obtained using Equation 8 for the event on 14 April 2020. The dependent variables are different cumulative average abnormal returns (CAAR) for the entire sample, including 217 firms. The independent variables are stimulus package-related variables announced on this date and measured by the ratio of the amount of financial aid received by the industry and the total amount of the financial aid provided: Korttidsarbete. The independent variables also include control variables which are Price_to_Book, Debt_to_Equity, and Firm_Size.

VARIABLES	Panel D: 30 April 2020			
	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
Omstallningsstod	0.0513	0.0673	0.0301	-0.00257
	(0.0749)	(0.0642)	(0.0607)	(0.0872)
Firm_Size	-0.00236	-0.00155	-0.00308**	-0.000308
	(0.00186)	(0.00160)	(0.00151)	(0.00217)
Price_to_Book	-0.000151	-0.000803**	0.000831**	0.000949**
	(0.000395)	(0.000339)	(0.000321)	(0.000461)
Debt_to_Equity	0.00149	0.00387	0.00452**	0.00188
	(0.00279)	(0.00239)	(0.00226)	(0.00325)
Observations	217	217	217	217
R-squared	0.013	0.059	0.066	0.020

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel D in Table 6 reports the correlation coefficients obtained using Equation 9 for the event on 30 April 2020. The dependent variables are different cumulative average abnormal returns (CAAR) for the entire sample, including 217 firms. The independent variables are stimulus package-related variables announced on this date and measured by the ratio of the amount of financial aid received by the industry and the total amount of the financial aid provided: Omstallningsstod. The independent variables also include control variables which are Price_to_Book, Debt_to_Equity, and Firm_Size.

In regressing the CAAR values of all firms on independent variables, stimulus package related variables, and control variables, we intended to capture the effects of Omstallningsstod, Anstand, and Korttidsarbete on CAAR values. Table 6 presents panels for the coefficient values generated from the OLS regression model.

Regarding Anstand, the correlation between CAAR values and this independent variable is positive for all the event windows except for [0,3] on 16 March 2020 and negative for all the

event windows except for [0,1] on 25 March 2020. However, the β coefficients for the independent variable Anstand are not statistically significant, except for [0,1] on 25 March 2020 at the 10 % level. The mixed results of this exposure variable can be explained by two factors. The first factor relates to the prevalent economic policy uncertainty around the events of March 2020 (Brogaard and Detzel, 2015). The other explanation relates to that this stimulus initiative involved the possibility of temporary tax respite, which in turn can generate concerns about the future tax pressure (Croce et al., 2012). Even though firms taking advantage of this stimulus initiative will be temporarily free from paying taxes, the government still emphasized that the possibility of temporary tax respite only extends until corporations show an improved ability to pay. Moreover, the resulted negative correlation can also be related to the theoretical framework provided by Pastor and Veronesi (2012). They mentioned that the stock market could be influenced through two channels, the cash flow channel, and the discount rate channel. If the economy is in a deep bad state, the cash flow channel will dominate, consequently affecting returns positively. In contrast, our finding illustrates that despite the economy being in a deep downturn on 25 March 2020, the discounting rate with its ill-effect on the returns was the dominating force.

As for the Korttidsarbete, this independent variable, apart from the event window [1,0] on 16 March 2020, is consistently positively correlated with the CAAR values. These values are also significant at the 10% level for [1,0] and [0,1] and significant at the 5% level for [-1,1] and [0,3] for the 14 April 2020 event. During this event, the government mentioned that it would extend its proposition of bearing a substantial portion of the employee-related costs and, at the same time, save the Swedish jobs by letting workers keep 90% of their salary. Thus, obtaining a significantly positive correlation between CAAR values and Korttidsarbete illustrates the positive impact of Korttidsarbete on CAAR values. The positive correlation is also aligned with the findings of Kilic and Wachter (2018), who also found a positive correlation between stock market valuation and labor market tightness, i.e., the balance between labor demand and supply. Furthermore, another plausible explanation behind the significant positive correlation of the independent variable Korttidsarbete can also be manifested in the presentational material of the Swedish financial department. According to the presentation of the financial department, the support for short-term layoffs was the largest publicly financed measure in magnitude among all the fiscal measures in terms of the budgetary impact measured in government expenditures. Relieving firms from substantial employee-related costs can significantly reduce firms' operating costs. This is plausibly the reason behind why the affected and strongly affected sectors also reacted positively upon the announcement of this stimulus package since it would imply an increased operating margin for these sectors. Also, relating our results to Pastor and Veronesi (2012), may explain the driving force behind this positive reaction as the dominating effect of the cash flow channel.

Finally, the β coefficient values of Omstallningsstod for the event windows around the announcement released on 30 April 2020 are positive but are not statistically significant. The stimulus package in terms of Omstallningsstod was also the only fiscal measure announced on 30 April 2020, involving the second largest publicly financed measure. Additionally, due to the non-significant value of the β coefficient of the independent variable Omstallningsstod, the result does not support our third hypothesis that higher exposure to the Omstallningsstod would significantly explain the CAARs for this event.

5.4 Robustness Tests

To provide more robustness to our empirical findings, we repeat the calculations of the CAARs for the total stock sample by prolonging the estimation period. This is in line with (Ahern, 2009), who found that the choice of estimation period is important since the choice of estimation period will influence the regressed parameters that underline the calculations of the abnormal returns. Therefore, in our robustness test, we prolong the estimation period by 110 days so that the estimation period instead constitutes 230 days prior to the event. The choice depends on our stock sample since one of the stocks in our sample only has stock returns 230 days prior to the events; therefore, our estimation period is limited to 230 days prior to the event.

As seen in the appendix (Section A.4), the results manifest robust results since the CAARs for each event and event window only differ slightly, which is expected due to the inclusion of additional data points in the model. The small deviations between the two results can be seen in that the significance of the event window [0,1] on 30 April 2020 turns insignificant, as well as an increase in significance for three event windows on 16 March 2020, which can be expected due to the existence of noise during that event.

Another aspect that highlights the robustness of our empirical results constitutes the use of the GRANK test in the initial analysis. As explained earlier, the GRANK test considers the event-induced volatility as well as the serial correlation among the abnormal returns, which provides superior empirical robustness in comparison to other parametric tests. Hence, it is plausible to conclude that the empirical results in terms of the CAARs are robust, considering both the use of the GRANK test and the change in the estimation period.

Lastly, the cross-sectional regression model was also tested for the existence of multicollinearity among our independent variables. The applied technique was based on the variance inflation factor (VIF), which generated VIF values for all independent variables, with the highest value being 2.39 (see A.1). According to Shrestha (2020), when the VIF value is 5 <VIF<10, there exists a problematic level of multicollinearity among the independent variables. Therefore, our regression model does not suffer from the issue of multicollinearity.

5.5 Limitations

We discovered certain constraints when doing this event study, which might have enhanced our results in their absence. One limitation was the lack of data for the Fama and French model components for the period being studied. According to Campbell et al. (1998), including more factors could have decreased the variance of the abnormal returns, thereby rendering the estimated α_i and β_i for the firms more precise and subsequently improving the CAAR values obtained. Moreover, the market was in upheaval during the events of interest owing to the repeated emergence of covid-related news and a significant drop in oil prices (Reuters, 2020). Although we attempted to mitigate the influence of these events by shortening the event windows, it is still possible that they might have influenced to some degree the abnormal returns.

Furthermore, we were unable to collect data on the firm level for computing the independent variables in our regression models, so we utilized industry-level data instead. As a result of the data limitations, our independent variable is less precise. Therefore, future researchers are encouraged, conditional on the availability of data, to use firm-level data to get more definitive

conclusions. In addition, R2 values in the OLS regression aiming at investigating the effect of independent variables on the CAAR values are low. For instance, Korttidsarbete on the event 14 April 2020 provided significant positive coefficient values, but R2 values throughout the event windows range from 10,9% and 8,4%. Thus, we raise a cautious note when interpreting the obtained results.

Finally, we discovered heteroskedasticity in the OLS regression model while testing it for heteroskedasticity (see A.2). However, while conducting cross-sectional regression, the problem of heteroscedasticity usually emerges, and according to Mankiw et al. (1990), heteroskedasticity should not be a cause to abandon a regression model.

6. Conclusion

The aim of this thesis was to investigate the reaction of the Swedish stock market to the extraordinary announcements that involved specific stimulus initiatives in order to help affected corporations as well as affected workers. As a first stage, we used the event study approach to capture any abnormal returns for the entire sample of firms, followed by a sector-specific analysis and a cross-sectional regression analysis to offer evidence for the drivers of CAAR values.

Considering our first hypothesis, we could observe significantly negative CAAR values at the 5% level around the first event of 16 March 2020 across three event windows. However, during that event, the market was in turmoil, influenced by high uncertainties and high financial market volatility. Even though the results showed statistical significance, we found that it is more likely that those results were influenced by external noise. Other than the event of 16 March 2020, we could not find any statistically significant results except for one positively significant CAAR value on the event of 30 April 2020. One plausible argument behind the ambiguous results is that market participants may expect long-term costs that come along with the stimulus initiatives, as it will lead to a government budget deficit. The budget deficit will, in turn, have to be financed via either debt or future taxes, which raises uncertainty about the future taxes, affecting the firm valuation through the discount rate channel. Hence, the results did not support the hypothesis of detecting a significant reaction to the events across all the stocks in our sample.

Regarding our sector-specific study, we found significantly negative CAARs on the event of 16 March 2020 for the unaffected groups of sectors, i.e., sectors that we argue were not affected by the COVID-19 pandemic. On the contrary, no significant results were observed for the affected and strongly affected sectors around that event. As stated before, due to the prevalence of uncertainties during March 2020, those results are inconclusive as they most likely were influenced by external noise.

However, during the event of 14 April 2020, we found positively significant CAARs for the affected and strongly affected groups of sectors, respectively. The results from the event of 14 April 2020 imply two things; (1) The more exposed the sector was to the announcement, measured in change in net sales, the stronger reaction the sector showed, and (2) affected and strongly affected sectors reacted positively to the announcement regarding support for short-term layoffs, which would allow corporations to substantially decrease the staff costs while allowing the workers to keep most part of their salary.

When conducting our cross-sectional regression, we aimed at capturing significant correlations between the CAAR values and the independent exposure variables Omstallningsstod, Anstand, and Korttidsarbete. Considering our exposure variables of Omstallningsstod and Anstand, we could not find any significant correlation except for one significant negative coefficient for Anstand at the 10% level. As the exposure variable Anstand represents the exposure to the announcement regarding Temporary tax respite, we argue that one of the reasons behind the negatively insignificant result can be attributed to the concerns about the future tax pressure. Nevertheless, our cross-sectional regression showed a significant positive correlation at the 10% and the 5% level across all event windows on the event of 14 April 2020. One of the reasons behind the significant positive correlation is that the stimulus initiative regarding support for short-term layoffs was the largest publicly financed measure. Additionally, as the measure would decrease firms' staff costs, it is also likely that the positive effect stems from the contribution to an increase in firms' cash flows, thus relating it to the cash flow channel. Lastly, the cross-sectional analysis is also consistent with the significantly positive CAAR values for the Affected and Strongly Affected sectors. Thus, the Korttidsarbete-related stimulus package can be identified as a driving force behind the positive movement returns of these sectors on the event of 14 April 2020.

6.1 Future Research

As this study only was based on the Swedish stock market, hence our results are limited to Sweden. Meanwhile, as the COVID-19 pandemic had a global impact, several other countries also introduced similar stimulus packages that aimed at relieving firms from the destructive effects of COVID-19. In that way, one proposition for future research would be to investigate how different countries' stock markets reacted to the announcements of different stimulus initiatives. By doing that, one would get a broader perspective regarding how fiscal measures introduced in different countries affect stock markets.

Moreover, in measuring the exposure variables, we used the industry-level data. Therefore, to obtain more conclusive results, future researchers can improve the precision of the results by conducting their analysis with firm-level data. Finally, we estimated the beta values of the firms using the market model. Therefore, we recommend that future researchers calculate abnormal returns by including other models to confirm the obtained results; for instance, the generalized autoregressive conditional heteroskedasticity model (GARCH) can generate different beta for the firms.

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Appendix:

A.1: Table over the variance inflation factor test for multicollinearity

Variance inflation factor – Test for multicollinearity

16 March 2020	VIF	1/VIF
Anstand	2.39	.4186
Korttidsarbete	2.38	.4205
Debt_to_Equity	1.09	.9166
Price_to_Book	1.05	.9565
Firm_Size	1.02	.9808
Mean VIF	1.58	.

25 March 2020	VIF	1/VIF
Anstand	1.07	.9368
Debt_to_Equity	1.09	.9193
Price_to_Book	1.04	.9582
Firm_Size	1.01	.9876
Mean VIF	1.05	.

14 April 2020	VIF	1/VIF
Korttidsarbete	1.06	.9408
Debt_to_Equity	1.08	.9269
Price_to_Book	1.04	.9574
Firm_Size	1.02	.9819
Mean VIF	1.05	.

30 April 2020	VIF	1/VIF
Omstallningsstod	1.14	.8741
Debt_to_Equity	1.18	.8480
Price_to_Book	1.04	.9636
Firm_Size	1.01	.9870
Mean VIF	1.09	.

Table A.1 reports the multicollinearity among variables for all regression models used in the study. Moreover, a high value for vif shows a significant level of multicollinearity between variables.

A.2: Summary of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of CAARs
H0: Constant variance

16 March 2020	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
chi2(1)	0.12	0.18	0.97	0.33
Prob > chi2	0.7281	0.6735	0.3242	0.5629

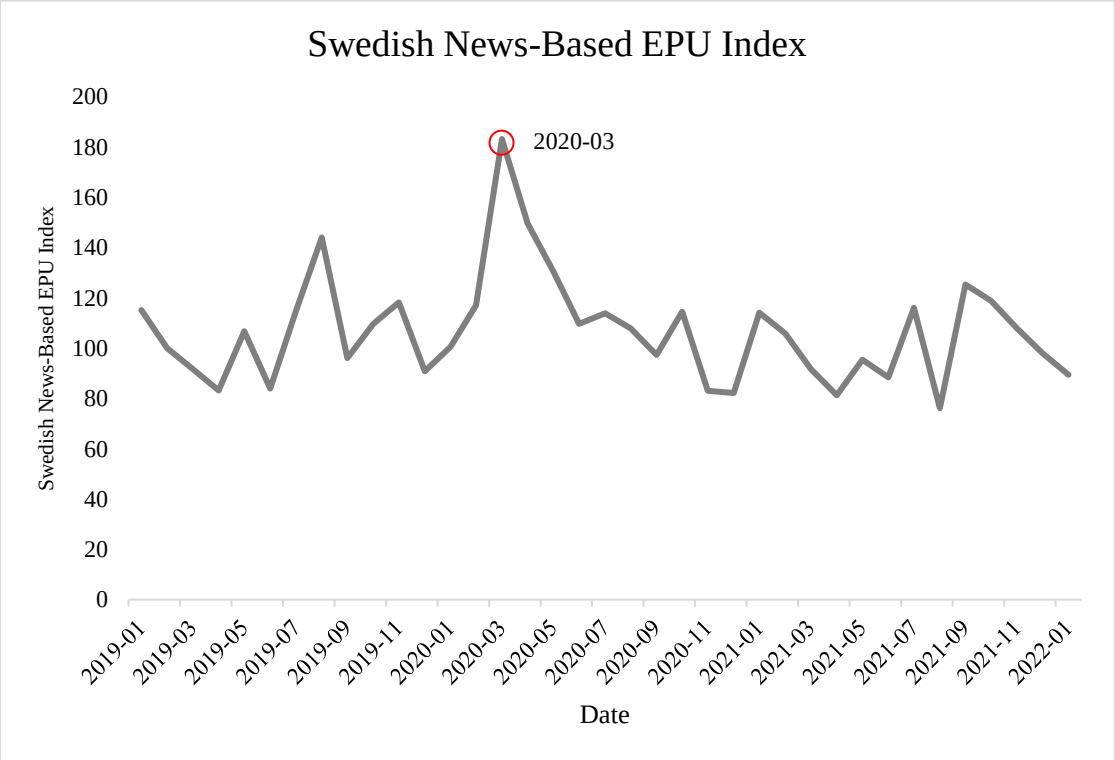
25 March 2020	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
chi2(1)	10.80	9.45	8.74	5.87
Prob > chi2	0.0010	0.0021	0.0031	0.0154

14 April 2020	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
chi2(1)	62.07	51.45	20.80	13.31
Prob > chi2	0.0000	0.0000	0.0000	0.0003

30 April 2020	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
chi2(1)	1.06	1.81	3.03	0.75
Prob > chi2	0.3021	0.1785	0.0819	0.3864

Table A.2 reports the Breuch-Pagan/Cook-Weisberg test for heteroscedasticity among variables for all regression models across each event window. Moreover, a probability value of less than 5% indicates a high level of heteroscedasticity between variables in the regression model.

A.3: Graph illustrating the Swedish Economic Policy Uncertainty index (EPU)



This figure illustrates the Economic Policy Uncertantiy index and ranges between January 2019 – January 2022. (www.policyuncertainty.com)

A.4: These tables illustrate the robustness tests when changing the estimation periods

Robustness test

Panel A: (Estimation window = 120 days)

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(217 firms)	-5.19%**	-2.56%	-4.99%**	-5.69%**
		(0.0334)	(0.1053)	(0.0151)	(0.0222)
25 March 2020	(217 firms)	-2.06%	-1.77%	-0.96%	0.12%
		(0.2272)	(0.2409)	(0.4021)	(0.9692)
14 April 2020	(217 firms)	2.09%	1.77%	0.40%	-0.19%
		(0.1942)	(0.2331)	(0.9065)	(0.6191)
30 April 2020	(217 firms)	1.29%	0.72%	1.36%*	1.34%
		(0.1768)	(0.3366)	(0.0891)	(0.1441)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses

Panel A reports the cumulative average abnormal returns for all the stocks included in the sample. The table represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event. The estimation window ranges 120 days.

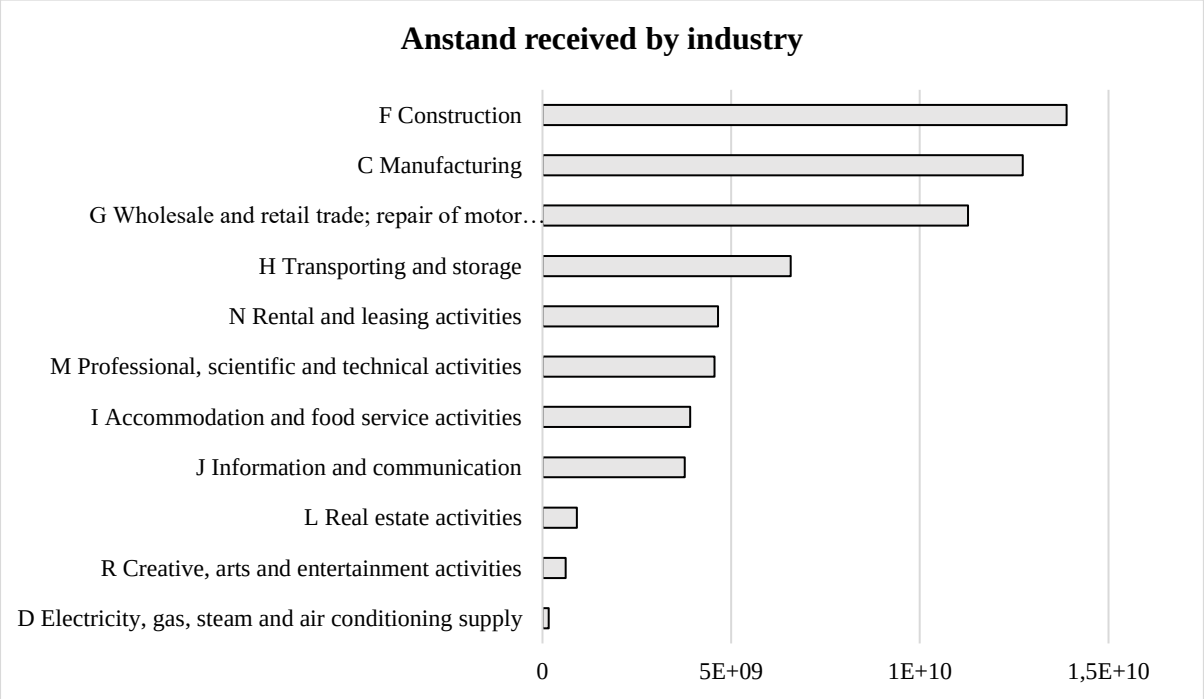
Panel B: (Estimation window = 230 days)

Events	N	CAAR [-1,1]	CAAR [-1,0]	CAAR [0,1]	CAAR [0,3]
16 March 2020	(217 firms)	-5.27%**	-2.78%*	-5.19%***	-5.87%***
		(0.0161)	(0.0514)	(0.0056)	(0.0082)
25 March 2020	(217 firms)	-1.26%	-1.07%	-0.59%	0.39%
		(0.4172)	(0.4539)	(0.5645)	(0.9191)
14 April 2020	(217 firms)	2.01%	1.87%	0.31%	-0.15%
		(0.2114)	(0.1861)	(0.9805)	(0.6028)
30 April 2020	(217 firms)	1.20%	0.80%	1.17%	1.25%
		(0.2122)	(0.2771)	(0.1215)	(0.1489)

*** p-value < .01, ** p-value <.05, * p-value <.1
p-values in parentheses

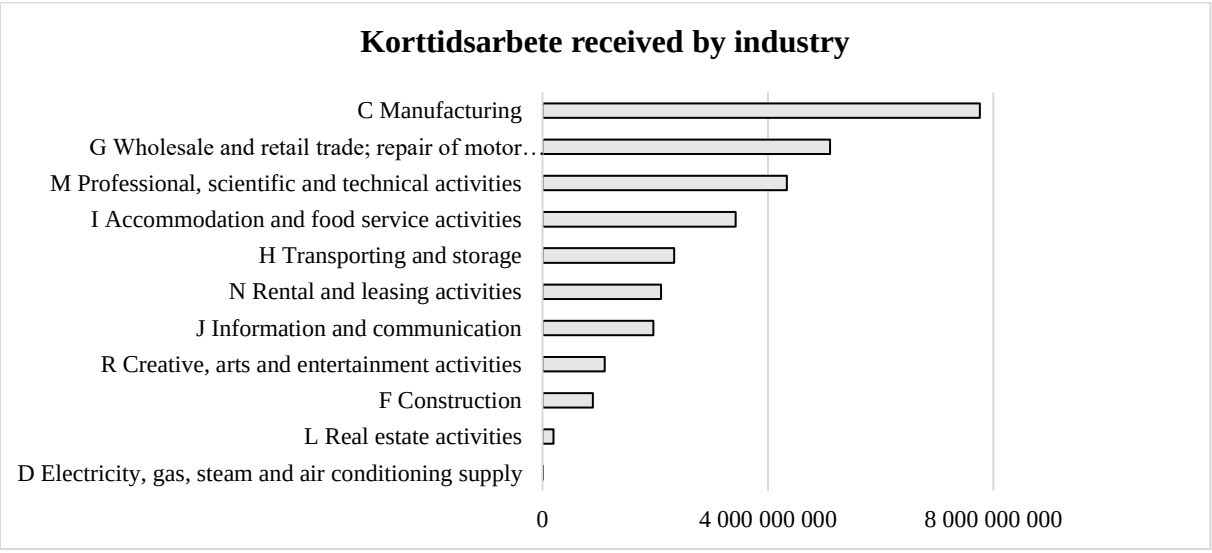
Panel B reports the cumulative average abnormal returns for all the stocks included in the sample. The table represents each CAAR over a specific event window for each event, where 0 constitutes the day of the event. The estimation window ranges 230 days.

A.5: Summary over the industrial proportion of the total tax relief that was provided by the government (Anstand)



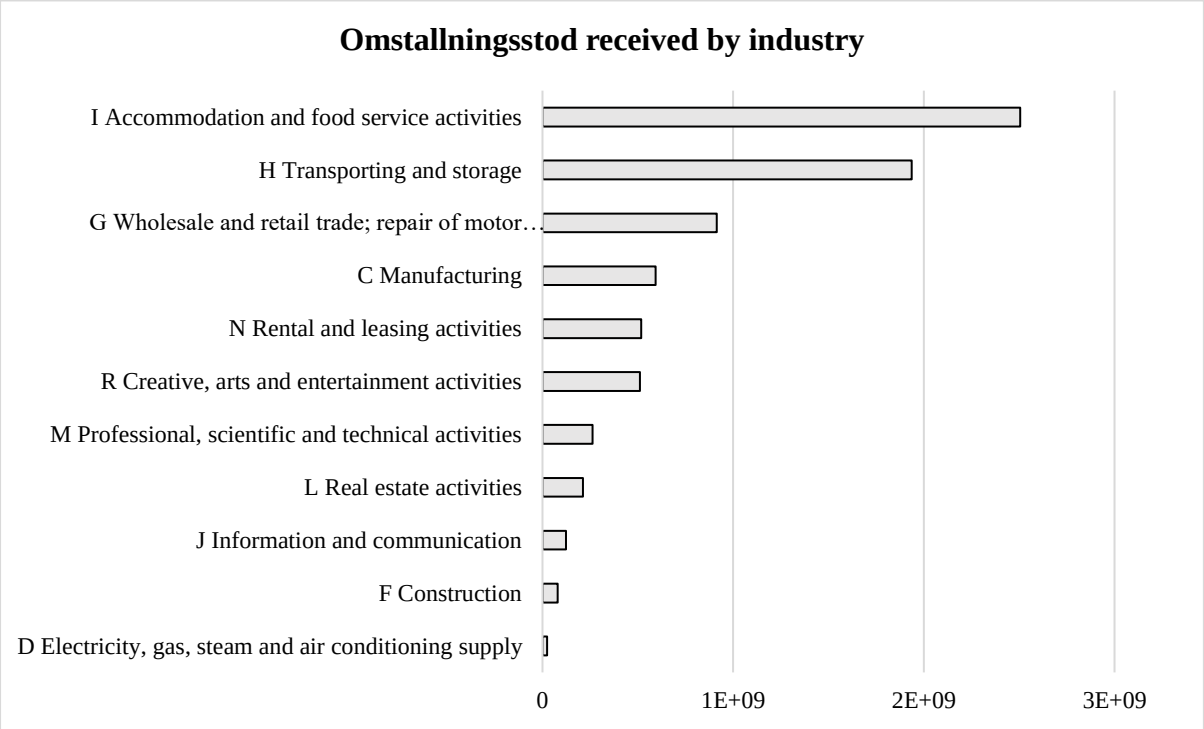
This bar chart represents the absolute value of the temporary tax respite (Anstand) each industry received from the government and is expressed in SEK. The data was retreived from Skatteverket March 15, 2022. https://www.skatteverket.se/omoss/varverksamhet/statistikochhistorik/stodatgardercovid19.4.3152d9ac158968eb8fd1d40.html

A.6: Summary of the industrial proportion of the employment related cost reduction that was provided by the government (Korttidsarbete)



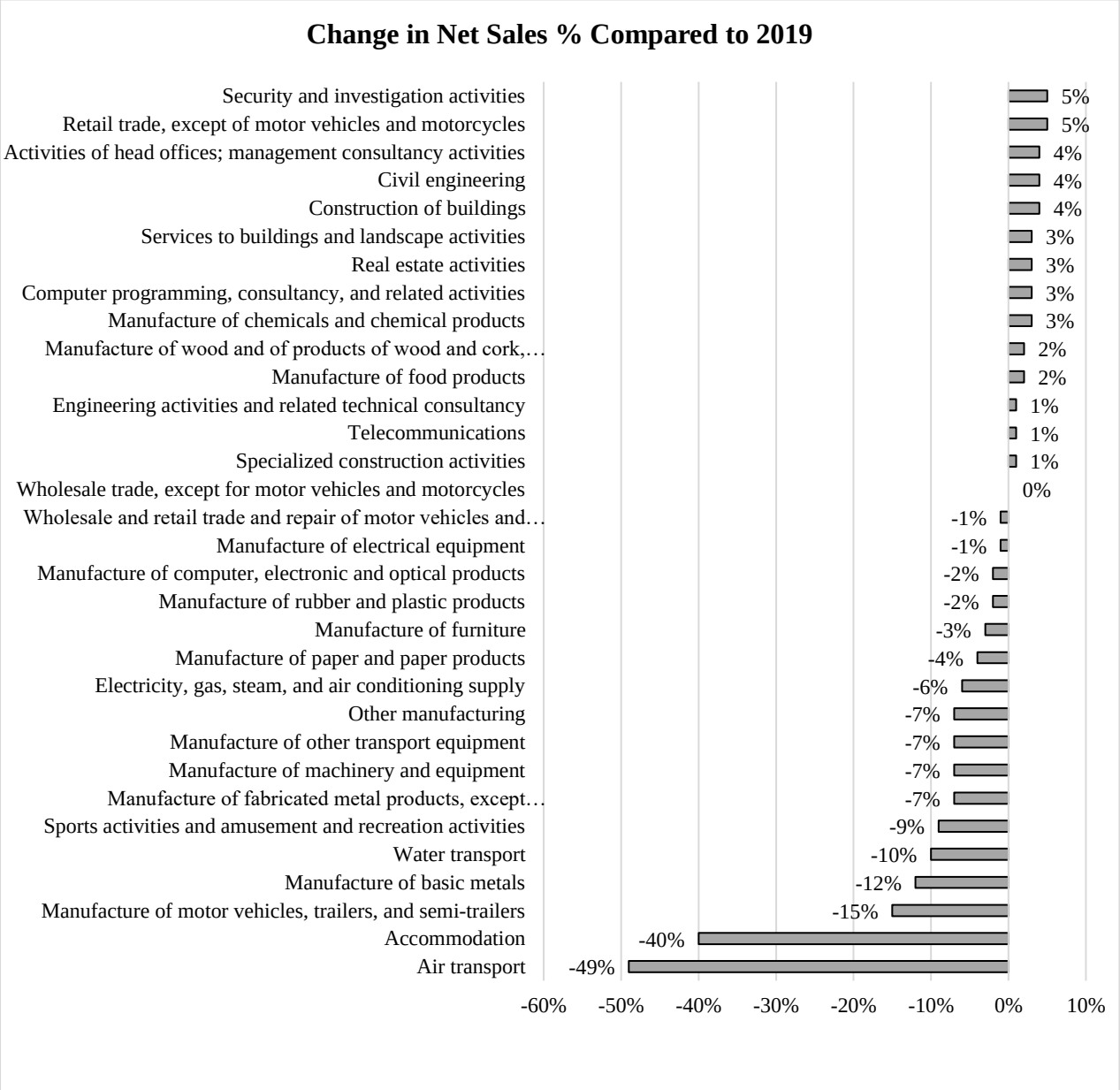
This bar chart represents the absolute value of the employment related cost reduction (Korttidsarbete) each industry received from the government and is expressed in SEK. The data was retreived from Tillväxtverket March 15, 2022. https://tillvaxtverket.se/om-tillvaxtverket/information-och-stod-kring-coronakrisen/statistik-om-korttidsarbete.html

A.7: Summary of the industrial proportion of the total financial aid that was provided by the government (Omstallningsstod)



This bar chart represents the absolute value of the revenue based financial aid (Omstallningsstod) each industry received from the government and is expressed in SEK. The data was retreived from Skatteverket March 15, 2022. https://www.skatteverket.se/omoss/varverksamhet/statistikochhistorik/stodatgardercovid19.4.3152d9ac158968eb8fd1d40.html

A.8: Summary of the change in net sales for each sector in our data sample



This bar chart represents the change in net sales between 2020-2019 among all the sectors included in our data sample. The data was retrieved from Statistiskacentralbyrån March 10, 2022. https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__NV__NV0109__NV0109O/BNTT01/table/tableViewLayout1/