ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
Bachelor Thesis Economics & Business

The effect of government spending on the stock market return during the Covid-19 crisis

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Finish date: 13-08-2023

ABSTRACT

This paper investigates the effect of government spending on the stock market return during the first two years of the Covid-19 crisis. The government spending in this paper is divided into the following two types, liquidity support (below-the-line measurements) and additional spending and foregone revenue (above-the-line measurements). Both government spending types are solely based on Covid-19 spendings, gathered from the database of fiscal policy responses to Covid-19 of the International Monetary Fund. The effect of the two government spending types will be tested on the yearly abnormal stock market return and on the yearly abnormal stock market return volatility of the years 2020 and 2021, based on the dataset of the WorldBank. The effect is measured by an OLS regression in which 84 countries are compared. Based on the results, government spending does show a positive effect on the abnormal stock market return. Liquidity support, shows mainly to be effective in 2020, while additional spending and foregone revenue shows to be effective in 2021. Government spending shows a positive effect on the abnormal stock market return volatility, meaning that government spending led to an increase in risk during the Covid-19 crisis. The results are however not significant, so all statements about the abnormal stock market return (volatility) cannot be stated with a degree of certainty. This paper helps to understand the effects of the two types of government spending during the Covid-19 crisis on the market return. The paper shows that the billions of dollars spent by the governments to limit the effects of the Covid-19 crisis financially had a positive effect on the stock market return, but a negative effect on the abnormal stock market return volatility of the 84 countries. However, due to the insignificance of the coefficients in the models, there is still room for future research on this topic in which this paper will form a good foundation for.

Keywords: Government spending, stock market returns, Covid-19 crisis.

JEL codes: C31, C33, E60, E62, F37, F38, G15, G17, H51, H53.

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CHAPTER 1 Introduction

When the government decides to increase government spending, the exaggerated demand will usually rise, which will lead to a rise in the companies' cash flows, which will lead eventually to a higher stock price. It has been known, that during the Covid-19 crisis governments spent a large amount of money to keep their economy running. So, you would therefore expect a positive response on the stock market return due to the increasing government spending. To see if this is indeed the case during the crisis, numerous countries' stock markets will be investigated. Based on previous published papers, it is also known that the response of every country differs during times of crisis. By investigating the response of the stock market return to government spending during the Covid-19 crisis across different countries and years, this paper will be able to determine if there is indeed a positive effect. By concluding that there is a positive effect or not, governments will know if it was worth the government spending or not during the crisis, and learn from it for future crises.

There have been papers published that investigated the response of investors on the stock market during the Covid-19 crisis. One of the papers is the paper of Fernandez-Perez et al. (2021). This paper investigated if the cultures of various countries played a role in the responses of investors to the stock markets. They defined the culture by two definitions, individualism and uncertainty avoidance. The paper conducted the research by doing a regression. Apart from the culture variable, they incorporated some other variables into the regression. Some variables they added were GDP per capita, the density of the country, the cumulative infected cases, market volatility, and the annual GDP growth in 2018. By adding these control variables, they concluded that countries with low individualistic behaviour and high uncertainty avoidance reacted more negatively to the Covid-19 crisis.

Governments all over the world have spent billions of dollars to support their economy during the Covid-19 crisis to limit bankruptcies and reduce the negative effects of the lockdowns in their economy. The paper by Makin and Layton (2021) made several conclusions about the government's support during the Covid-19 crisis. The paper showed that the amount of government spending and the type measures during the Covid-19 crisis differed tremendously across countries. The advanced economies mainly used loan support, while emerging economies used fiscal support. Government spending and the type of government spending affected the financial markets, as is shown in the article by Akitboy and Stratmann (2008). The paper of Belo et al. (2013) furthermore shows that government spending does indeed have a significant effect on the cash flows of companies, which will in the end also affect the stock market.

Previous papers will be used to replicate the methodology and for deciding which control variables should be used, to limit the risk of omitted variables. One paper that will be partly replicated is the paper of Fernandez-Perez et al. (2021). Their paper gives a good view of the effect of many different variables on the response of investors across various countries. However, what is also shown by the papers of Belo et al. (2013) and Akitboy and Stratmann (2008) is that government spending does play a role in the response of investors on the stock market values. So, that is why the two government spending variables will be added to the regression in this paper. There have already been some papers published which investigated the effects of government spending on the stock market, however, they did not come to a uniform conclusion. Furthermore, most papers based their research on day-to-day data, while this paper will use yearly data to determine the effect of government spending on the stock market. This will also be the first paper that uses the indices from the Oxford Covid-19 Response Tracker. These four indices will give a broad view of the individual countries Covid-19 policy, which will increase the explanatory power of the model in this paper. The four indices are stringency index, economic index, containment index, and government index. By adding these indices this paper will hopefully get to a conclusion, which will help governments in the future by deciding the amount and by which mechanism they want to support the economy. This will lead to the following research question:

How does government spending affect the stock market return across different countries during the first two years of the Covid-19 crisis?

The paper will examine the effect of government spending related to Covid-19 on the response of the stock market. This response, which is the dependent variable, will be divided into two sub-dependent variables, abnormal stock market return and abnormal stock market return volatility. The data is gathered from the WorldBank database. This database contains the yearly market return and volatility of over 225 countries. From the years 1984 to 2022. This paper will do research on the yearly data for 2020 and 2021, the years in which Covid-19 had the biggest effect on the economy. To measure the relationship with government spending, 84 countries will be used in an OLS regression model . To determine Covid-19-related government expenses, the dataset of the International Monetary Fund (IMF) will be used. This is a dataset of 167 countries, that gathered government expenses related to the Covid-19 pandemic during the years 2020 and 2021. The dataset divided the government expenses into two groups, liquidity support and additional spending and foregone revenues. To see the relative expenses IMF did also divide it by the country's GDP, these two variables divided by the GDP of the certain countries will be used throughout this paper. Apart from indices from the Oxford Covid-19 Response Tracker, some demographic variables will be used as control variables. These variables are based on previously published papers. Most variables are gathered from the Worldbank and based on the years 2019, 2020, and 2021. The demographic variables used are population, population density, GDP per capita, and the life expectancy. These variables are included because they may influence the severity of the crisis and the opportunities various governments have, which will in the end also affect the stock market response. The variables number of confirmed cases and confirmed deaths by the number of citizens will also be added as control variables. This will give a better understanding of how effective the health measures were against Covid-19. These two variables are gathered from the Oxford Covid-19 Response Tracker.

I expect that the abnormal stock market return will show a positive correlation with government spending. So, during the Covid-19 pandemic higher government spending will lead to higher market returns. There will be a negative correlation between abnormal stock market return volatility and government spending. More government spending will lead to lower abnormal market return volatility. This paper will help to get a better insight into the relationship between government spending and the results of it on the stock market across different countries during a crisis. Based on the results, governments can draw conclusions that might help them in the future to effectively fight a crisis. There will always be room for further investigation on this topic. For instance, by investigating in more detail the types of government spending, like fiscal or monetary measures, and the effectiveness of those measures.

The remainder of this paper is structured as follows: Section 2 discusses relevant literature and previous research on the effect of government spending on the stock market return. Section 3 discusses which data is taken and how it is gathered. Section 4 discusses the methodology. Section 5 presents and discusses the results. Section 6 discusses the similarities and differences between the results of this paper and the reviewed literature. Section 7 concludes the paper, names the limitations of the research done, and gives some recommendations for future research.

CHAPTER 2 Theoretical Framework

2.1 Covid-19 background

The Covid-19 crisis was a health crisis which was never seen before in recent centuries. The Covid-19 pandemic started in Wuhan, China in November 2019. Afterwards it rapidly spread around the world. On January 30, 2020, The International Health Regulations Emergency Committee of the World Health Organization declared the outbreak as a public health emergency of international concern. On march 11,2020, the WHO declared the Covid-19 crisis as a pandemic. The pandemic had a massive impact on the life of many citizens around the globe and the functioning of society. No part of society was spared, the crisis had consequences on the economy, social life, healthcare, travel industry, and on many more aspects of society.

The pandemic was foremost a health crisis, what in the end cost many people their life. In the end Covid- 19 resulted in 767.518.723 cumulative cases and 6.947.192 cumulative deaths reported by the World Health Organization at the 28^{th} of June 2023. (*WHO Coronavirus (COVID-19) Dashboard*, 2023). In reality this number will be even higher, due to the fact, not every death or case have been reported. The pandemic have been eventually stopped by the vaccination programmes. This resulted in the use of over 13 billion vaccinations to vaccinate more than 5 billion people.

Apart from the health effects, Covid-19 crisis resulted also in measures taken by governments which were never seen before. These measures caused changes in lifestyle, work, and social interactions across the countries. Social distancing and the closure of gathering and interaction centres, such as schools, sports facilities, pubs, etc. had large social consequences. Due to the psychological and economic distress, the number of domestic violences raised. Due to the closures of schools and universities many children, and students became depressed or encountered all kinds of mental problems. For children in less developed countries, who had no access to electrical devices at home got less or no education during the Covid-19 years, what resulted in major learning gaps. Some people did not agree with the government choices during the crisis, what led during to violence, bad temper, theft and other law-breaking actions. The way people travelled across the country changed also significantly, people were using less public transport and were relying more on cars. This caused an economic burden to keep the public transport still running. (Hosseinzadeh et al., 2022).

The economy was also severely hurt by the Covid-19 crisis. The lockdowns enforced in many countries, slowed the global economy activity substantially down. Many companies reduced their operations, or completely stopped their production (Naseer et al., 2023).

To limit these effect, the governments decided to put many financial policies in place. These effects of financial policies will be investigated by looking at the stock market response.

2.2 Stock market impact

2.2.1 Stock market return

The stock market return is the first variable used to determine the stock market response. This variable is used in many papers to determine the effect of the stock market during a crisis. Like the paper of Ali and Afzal (2012), they especially looked at the effect on Pakistani and Indian stocks during the financial crisis. They came to the conclusion that during the crisis the stock market return decreased significantly. Another interesting conclusion made by their research, which is in line with the consensus within the Economic school, is the fact that negative shocks, like news about the number of new cases, have a far more pronounced effect on the stock market return compared to the positive news. They also found some discrepancies between India and Pakistan. The Indian stock market return was more affected by the worldwide crisis compared to the Pakistani stock market. A possible explanation for this is the size of the respective economies. India's economy is bigger and more open to the world trade, hence they are more vulnerable to a global crisis.

The paper of Baker et al. (2020) came to the conclusion that Covid-19 was a global health crisis with an economic impact which was never seen before. They gave three main reasons why the economic distress during the Covid-19 crisis was far more severe compared to the last global pandemic, the Spanish flu in 1918. First of all the Spanish flu overlapped with the First World War, which made it difficult to determine if the economic distress was caused by the war or by the pandemic. The second reason is the multimedia of today. News stations are now far more capable to spread the news at a rapid speed by using new technologies, which did not exist 100 years ago. The paper of Tuna (2021) investigates how stock market returns are affected by news articles. Their paper was mainly based on news about the number of cases and deaths due to Covid-19 in the Islamic world. The paper concludes that news announcements about Covid-19 deaths and Covid-19 cases have different results across the Islamic stock markets. Just as the work of Ali and Afzal (2012), they concluded, that negative news got a far greater impact on the stock market compared to the positive news.

The last reason they gave for the big economic effect during the Covid-19 is the size of the global trade nowadays. The interconnectedness of the world economy led to a negative domino effect. Meaning when one country was in a full lockdown and not able to produce certain products, other countries would encounter problems in their production process as well. Because of that other countries do also encounter problems and so forth. A good example is the lockdowns in major Chinese cities and the temporary closure of factories. This led to a massive shortage of computer chips, what afterwards led to production problems of all kinds of electronic devices all over the world. (Bakker, 2022)

The paper of He et al. (2021) did investigate the response of the Chinese stock market during the Covid-19 country. They came to the conclusion that stock market reactions differed across industries. According to their research especially, transportation, mining, electricity and heating, and environmental industries have been impacted badly by the pandemic. While some industries were not impacted, like the manufacturing, information technology, education, and healthcare industries.

2.2.2 Stock market return volatility

The second variable to determine the stock market response is the stock market return volatility. The literal definition of the stock market return volatility is: "Volatility is a statistical measure of the dispersion of returns for a given security or market index. In most cases, the higher the volatility, the riskier the security (Hayes, 2023). The stock market return volatility is influenced by political, industrial, and company actions. A crisis, like the Covid-19 crisis, had an effect on all of these three. Culture does also play a role on the stock market volatility as the paper of Engelhardt et al. (2021) suggests. They stated that during the Covid-19 crisis, the stock market volatility was influenced by the amount of trust the citizens had in each other and the government. The higher the trust among the citizens and in the government, the lower the volatility. They gave as a possible explanation, that trust among the citizens and in the government reduces the uncertainty among investors significantly and therefore lowers the volatility of the stock market return.

Luchtenberg and Truong (2015) came to an interesting conclusion about the volatility of the stock market returns. Countries, especially Western and developed countries, will be "contaminated" during a crisis. During the 2007 and 2008 financial crisis, the United States got an increasing volatility, which led to increased volatility in many Western countries. The developing countries were less affected by the high volatility of the United States. This is in line with the work of Ali and Afzal (2012). The more a country's stock market is incorporated into the global economy, the more vulnerable an economy is to a shock in a major global market, like the market of the United States.

2.3 The role of government spending on the economy

There have been many papers written about the effect of government spending on the economy. The paper of Lin (1994) concluded that government spending, especially in the short run, got a positive effect on the economic growth of countries. However, this did not apply in the long run, where he did not see any significant result. Christiano et al. (2011) investigated the results of government spending on the economy as well. They based their study on the government-spending multiplier, which means how much effect 1$ government spending has on the economy. So a multiplier of 1.2 is beneficial because the 1$ government spending results in a 1.2$ economic growth. While having a multiplier of below 1 is not beneficial. The paper concluded if the interest rate is close to zero, government spending does not have a big effect on the economy. As a result having a government-spending multiplier below one. This has mainly to do with monetary policy performed by the central banks of the countries. Before the Covid-19 crisis, a lot of countries had an interest rate close to zero. Based on the work of Christiano et al. government spending should therefore have no effect on the economy during the Covid-19 crisis.

The previous papers are more based on the effects of government spending on the general economy, the paper of Belo et al. (2013) focuses more on the effect of government spending on the cash flows of companies, which will in the end affect the stock market return. The paper concludes that presidential election cycles play a role in the market value of companies. Democrats and Republicans support different companies, what results in different market values of certain companies during the different presidencies. This proves that government spendings can certainly have an effect on the stock market value of companies, or even larger on certain industries.

In the economic world, there are still discussions on how effective government spending is to support or stimulate the economy. It still depends on which economic theory the economist bases their conclusions. There are three main streams in economics, namely Keynesian, Classical, and the Richardian stream. They all have their own view on the effects of government spending on the economy and which mechanism is best suited to reach the wanted outcome. Keynes theory suggests by influencing the production level the government can stabilize the economy. The easiest way for the government to do so is by decreasing or increasing the tax levels and public spendings. Richardian's theory on the other hand suggests that changing fiscal policies will not influence the economy. Namely, public borrowing will be offset by private savings. The classical theory states that government spending will reduce the activity of the private sector and therefore the effects of government spending will be limited (Prukumpai & Sethapramote, 2019). Later papers do also have different opinions about the effects of government spending on the economy. Like Ram (1986) suggests that government spending is mainly short-term effective in fighting depressions or recessions. Wang & Yao (2003) agree with this theory and give the positive externalities in the short-run as reason.

2.4 Role of government spending on the stock market

2.4.1 Effect of government spending on the stock market return (volatility) in general

Most papers, when discussing the effects of government spending on the stock market, talked about fiscal, and monetary policies, and the synergy between those two policies. But, because this paper is based on government spending and not really about actions undertaken by central banks, this paper will primarily focus on fiscal policies. The synergy between fiscal and monetary policies will lead to the discussion of some monetary policies.

The first question that should be asked is why it is important to know if the stock market reacts positively to government spending or not. According to Nwakoby and Alajekwu (2016), it is important to investigate the effects of government spending on the stock market return, because the stock market plays a vital role in the functioning of an economy. Nwakoby and Alajekwu gave two main reasons, the stock market mobilizes domestic resources and channels them to productive investments, which stimulates the growth of an economy. Stock markets also show the state of a countries economy, usually falling stock prices indicate an upcoming economic depression. While rising stock prices usually indicate possible economic growth. This is in line with the work of Akitboy and Stratmann

(2008).

Most papers written about the effect of government spending on the stock market return are single-country investigations over a couple of years. Like the paper of Scott & Oyuefeyen (2014), which had a look at the developing economy of Nigeria. They examined the effect of government expenditures on the economy and on the stock market from 1981 to 2012. They concluded, that government expenditures did not affect the economy and stock market returns in the short- and long-run. This conclusion is contradicting the work of Ram (1986) and Lin (1994), who stated that government spending did have a positive effect in the short-run. Bekhet & Othman (2012) performed a similar study to the study of Scott & Oyuefeyen, this study was however focused on the Malaysian economy and stock market. They performed a multi-year study as well, their study was based on the years 1999 to 2011. They came to the same conclusion as Scott & Oyuefeyen (2014), namely, there was no short- or long-run effect on the stock market. The article of Idowu et al. (2020) came to a conclusion which is not in line with the previously mentioned papers. Their paper investigated the Nigerian stock market as well. They based their study on the years 1985 to 2017. They concluded that there is a positive effect of government spending on the stock market return in the short- and long run. The work of Thanh et al. (2017) investigated the Vietnamese stock market returns during the period 2002 to 2017. They concluded that fiscal and monetary policies had a positive effect on the stock market return in the short-run, but got a negative effect in the long-run. Fear of growing inflation when performing fiscal and monetary policies among investors was the main reason for the negative return in the long-run. Ogbulu et al. (2015) gave as a reason for the different results among different markets the lag of news absorption by the markets. According to their paper, the Nigerian market showed a long reaction time on government spending. The lag of the market response results in flawed observations, what in the end will lead to flawed results and conclusions. The paper of Kuncoro(2017) did an event study on the Indonesian market, he investigated how the stock market return volatility was impacted by different types of fiscal stabilisation policies. He found out that the typical standard stabilisation fiscal policies induce the stock market return volatility, and are therefore not effective in reducing the risk of the stock market.

The previous articles are mainly based on developing or semi-developed economies. The Chinese market is, therefore, an interesting market to analyse, as this market went from a developing country to a developed country at a rapid pace. Hu et al. (2018) performed an analysis on the effects of government spending on the Chinese stock market return. They concluded that the fiscal and monetary policies have both a significant positive effect on the stock market performances. They furthermore stated that those two governmental measures played a significant role in the growth and development of the Chinese stock market.

Chatziantoniou et al. (2013) investigated the effects of monetary and fiscal policies on the European and United States stock market returns. They focused their investigation on monetary and fiscal policies and more importantly on the synergy between those two. According to their research, both policies affected the stock market. Fiscal policies showed a negative effect on the stock market returns, caused by negative effect it had on the interest rate. The paper of Anghelache et al. (2016) also investigated European stock market returns and came to another conclusion. By investigating 6 East-European countries between 2004 and 2015 they came not to one single conclusion. They concluded that 2 stock market returns showed a negative effect on government spending. However, 3 different stock market returns showed a positive effect on government spending. The multi-country paper of Suhaibu et al. (2017) focuses on 12 African countries. They concluded that monetary policies had a positive effect on the stock market return in those 12 countries and that fiscal policies did not show any significant effects on the stock market returns. They explained these results by the fact that stock markets are a good feedback hub for central banks and therefore central banks use them to perform monetary policies. While this does not apply for the use of fiscal policies.

2.4.2 Effect of government spending on the stock market return (volatility) during the Covid-19 crisis

This paragraph looks at the effect of government spending on the stock market return (volatility) solely during the Covid-19 crisis. The paper of Klose & Tillmann (2022) investigated the effect of the different government responses on the stock market return during the Covid-19 crisis of 29 European countries. The paper of them divided the government responses into 4 different sub-groups, fiscal policy, monetary policy, European policy and macroprudential policies. Apart from the sub-divisions, the paper of Klose & Tillmann incorporated all kinds of different control variables in their models, one of them the stringency effect. According to them and many other paper it is a good variable to include by determining the strictness of governments and the general Covid-19 policy of the various countries. By performing their analysis the paper of Klose & Tillman (2022) came to certain conclusions. Monetary and fiscal policies were both effective in stimulating economic activity during the Covid-19 crisis and had a positive effect on the stock prices. Surprisingly, the investigation showed that the European policy had a negative effect on the stock market prices. The paper of Makin & Layton (2021) found a positive effect of monetary and fiscal policies on the economy. However, they found out that different methods were used by developing and developed countries to support their economy. Developed countries supported their economy more with loans while developing countries would make more use of fiscal policies.

Just as the work of Makin & Layton the work of Capelle-Blancard & Desroziers (2020) is based on a wide range of countries, from all continents. The paper of Capelle-Blancard & Desroziers investigated the effect of government spending on the stock market return by looking at 74 countries. Their paper incorporated the number of infections into their model, to determine the severity of the Covid-19 crisis and the effectiveness of the measures taken by the government. The paper did incorporate the GDP per capita as well. The reason they gave for including GDP per capita is that the level of wealth can play a positive role in fighting effectively against Covid-19. The paper of Kumar (2023) investigated the effect of GDP per capita on the stock market return and the fiscal support. He discovered a huge disproportionality between low GDP per capita countries and high GDP per capita countries and the amount of fiscal support they could give. Pandey and Kumari (2021), performed an event study based on 23 developed countries and 26 emerging markets. They found out that the number of infected cases and the number of deaths played a large negative role on the market return, with the same effect for the developed and emerging market countries. The paper of Capelle-Blancard & Desroziers incorporated some more country descriptive variables like life expectancy, percentage of the population aged over 65 and the number of the urban population. All these variables influence how easily the pandemic can spread, and what will in the end have an effect on the stock market returns. The paper of Capelle-Blancard & Desroziers concludes their paper with two main statements. Their first conclusion is that the stock market did not incorporate all the available information during the Covid-19 crisis, which results in inconsistent results, which is in line with the work of Ogbulu et al. (2015). The second conclusion of the paper is that measures to limit the number of cases in a country and macroeconomic policies play the biggest role in limiting the stock market return losses, while government spending does not have a big effect on the stock market return. Apart from the paper of Capelle-Blancard & Desroziers, the paper of Fernandez-Perez et al. (2021) incorporated also some demographic control variables, like population density, GDP per capita and life expectancy, to improve the explanatory power of the model.

The paper of Heyden & Heyden (2021) made use of similar control variables. They investigated the day-to-day response of the stock market on announcements of government spending during the first months of the pandemic. They limited their research to the United States and European stock markets. By analysing the data, they concluded that the number of infections played a big role in the return of the stock market. Furthermore, they concluded that positive news about fiscal policies led to a negative effect on the stock market return and a positive effect on the stock market volatility. While, news about monetary policies had a positive effect on the stock market return and a negative effect on the stock market return volatility.

One problem with determining the effectiveness of the fiscal and monetary policies during the Covid-19 crisis is the fact that the macroeconomic indicators, like Consumer Price Index (CPI) and National Income, have a slow response rate. Governments use these indicators to determine their fiscal and monetary policy. So, because of the slow response rate of these indicators, governments make decisions on wrong or outdated data. Which got as an effect that governments do not act as they actually should. This leads to economic distress, and therefore into a negative stock market return according to Chen et al. (2020).

The paper of Feyen et al. (2021) investigated the effect of fiscal policies on the stock market return of developed and developing countries. Their first conclusion was that richer and more populous countries were more responsive in taking fiscal and monetary decisions during the Covid-19 crisis. Countries which belonged to a monetary union were even faster in introducing new policy measures to fight the effects of the Covid-19 crisis. Their second conclusion was that fiscal policies played a big role in preserving the stock market returns and limited the volatility during the Covid-19 crisis. Kapar et al. (2021) share this conclusion. According to their analysis, without the usage of fiscal and monetary policies during the Covid-19 crisis the stock market returns would have been showing even worse results.

The paper of Shafiullah (2021), agreed with the statement of Kapar et al. but stated that mainly monetary policy played a big role in preserving the stock market returns. The paper further stated that the stock market return and the government spendings are not just one way correlated. The stock market returns got also an effect on government spending. Large shifts in the stock market returns, will lead to a governmental intervention, by implementing fiscal or monetary policies.

By having analysed the papers in previous paragraphs certain conclusions can be conducted. The first conclusion which can be made is the fact that there is no consensus in the economic world on the effect of government spending on the stock market return. There are papers that suggest there is a positive effect, but there are certainly also papers that suggests there is a negative effect.

The pre-Covid-19 papers and Covid-19 related papers show some different results. The pre-Covid-19 papers suggests that monetary and fiscal policies have mainly in the short-run effect on the stock market return. Especially monetary policy has been proven to show a positive effect, although it does also some limitations, for instance when the interest rate is close to zero. Fiscal policies have shown sometimes positive effects and sometimes negative effects. It is often difficult to determine the effect, because stock markets usually respond with a certain lag.

The papers written during and after the Covid-19 crisis about government spending on measures to help the economy survive the Covid-19 crisis does also not give a singular conclusion. However, government spending shows in far more papers a positive effect on the stock market return. According to some papers without the government spending the stock market return (volatility) would have been far worse. The papers stated the importance of government spending, but they came also to the conclusion that certain variables, like the number of infections, do play a larger role on the effect of the stock market return (volatility). Many papers, pre-Covid-19 and during Covid-19, mentioned that negative news got a bigger effect on the stock market return (volatility) and could outweigh the good news. So, for certain countries where the number of Covid-19 cases and the amount of fiscal help are high, the “good” news (much fiscal help) can be outweighed by the “bad news” (large number of Covid-19 cases). However, taking all the papers into account and giving more weight to the papers which are written during or after the Covid-19 the following two hypotheses are formed.

The first hypothesis is based on the abnormal stock market return.

H_1: Government spending leads to an increase of the abnormal stock market return during the Covid-19 crisis.

The second hypothesis is based on the abnormal stock market return volatility.

H_2: Government spending leads to a decreasing result on the abnormal stock market return volatility during the Covid-19 crisis.

CHAPTER 3 Data

In this chapter, the variables used in the regressions will be explained. The data for all variables are gathered from 84 countries. The majority of the countries are from Asia and Europe, however, the other continents are also represented. To see the list of countries see Table B.1 and the number of countries per continent in Table B.2 at the appendix. The sample period is from the years 2020 and 2021. The data is gathered from the Oxford Covid-19 tracker, International Monetary Fund, and the WorldBank databases. Table A.1 gives an overview of all the variables. The variables depicted in italic is how they will be named in the rest of the paper, the abbreviations in parentheses is how the variables will be displayed in the tables.

3.1 Dependent variables

Abnormal stock market return (AbStMR) and abnormal stock market return volatility (AbStMRV)

The dependent variables were introduced as stock market return and stock market return volatility, however, in this paper the *abnormal stock market return* and *abnormal stock market return volatility* will be used in the regressions. The data for both variables is gathered from the WorldBank database. This database contains the yearly market return and volatility of over 225 regions and countries. From the years 1984 to 2022. To see any effect on the yearly rate of 2020 and 2021 the abnormal rate will be taken. The *abnormal stock market return* and the *abnormal stock market return volatility* will be calculated by the following formula based on the work of Fernandez-Perez (2020) the same formula applies for the abnormal stock market return volatility:

$$abnormal\ stock\ market\ return = Market\ return_{t,i} - Market\ Return_{Avg,i}$$

With t being the years 2020 and 2021, Avg being the average of the years 1984 to 2019, and i representing the specific country. To determine the average some outliers have been removed. Outliers are determined by applying the 1.5 quartile method. This means values smaller than 1.5 inter quartile range below quartile 1 or larger than 1.5 inter quartile range above quartile 3 are being considered outliers. The market return history of all 84 countries did not start at a similar year, therefore some countries will have a longer history to take the average from compared to other countries. In total, there will be 168 data points for both dependent variables.

3.2 Independent variables

Liquidity support as a percentage of GDP (LiqSupGDPD) and additional spending and foregone revenues as a percentage of GDP (AdSpendingForeRevGDPD)

To investigate the impact of government spending on the stock market return, government spending will be the independent variable. In this paper the government spending will be divided into two types of government spending, namely *Liquidity Support as percentage of GDP* and *Additional Spending and Foregone Revenues as a percentage of GDP*, The data is extracted from the database of fiscal policy responses to Covid-19 of the International Monetary Fund, in which both government expenditures are expenditures solely related to Covid-19. *Additional spending and foregone revenue* are government spendings related to tax policies, that were introduced to make life easier during the Covid-19 crisis. These measures need often legislative approval and regular reporting. Another name for these measures is above-the-line measures.

Liquidity support measures during the Covid-19 pandemic were mainly equity injections, loans, and asset purchases to help companies survive the Covid-19-related restrictions. These measures are often called below-the-line measures. This means that the implemented government spendings are outside the regular budget process. This makes the measures less transparent and needs less political approval compared to the above-the-line measures. Both variables consist out of 168 data points, similar to the two dependent variables.

3.3 Control variables

To limit the omitted variable bias and improve the explanatory power of the models, control variables will be added to the regression. The control variables can be subdivided into two groups, government response variables, and Covid-19 related demographic variables. Based on the analysed literature, the following control variables are selected.

3.3.1 Government response variables

Governments installed many measures to limit Covid-19 cases, the Oxford Covid-19 Response Tracker is a database that gathered all these restrictions during the 3 years Covid-19 was active. This database is set up by the Blavatnik School of Government and the University of Oxford and tracks more than 180 countries. They track 23 different indicators, such as vaccination policy, school closures, and travel restrictions to determine the Covid-19 policy. By comparing and adding certain indicators they are able to produce four general indices. The indices which are used as control variables in this paper are the stringency, economic support, containment health, and government index. The indices reach from 0 to 100, in which a higher value means a stricter policy.

Average stringency index (AvgStringency)

The stringency index records the strictness of policies set by the governments. The strictness policies primarily restrict people's ability to go to social activities, like going to school, going to public events, or going on holidays abroad. It is calculated using all ordinal containment and closure policy indicators. The OxCGRT source keeps track of the stringency effect day by day. However, this paper is looking for the yearly results. To get the yearly stringency effect, the average of the stringency index throughout the year is taken. In 2020 stringency measures were not implemented at the beginning of the year and at the same time across countries, therefore the a*verage stringency index* of the year 2020 will be calculated since the first recording of a stringency index of that particular country. In the end, there will be 168 data points of the stringency index. To calculate the a*verage stringency index* for 2020 and 2021 58,555 datapoints are used.

Average economic support index (AvgEconomicSupport)

This index is mainly incorporated into the regression, to check if this variable got similar results compared to the independent variables taken from IMF. It would make sense if this variable is heavily correlated to the government spending variables. If this is the case the a*verage economic support index* will not be incorporated into the regression. The economic support index is just as the stringency index a summary variable of many different indicators. The index is formed by looking at indicators such as debt relief and income support. Just as for the stringency index, the economic index is also documented as a day-by-day measurement. To get the yearly results, the same steps for a*verage economic support index* are used as for a*verage stringency index*. This results in the end also in 168 variables. To determine the average of the two years 53,684 data points are used. There are fewer data points of a*verage economic support index* compared to the a*verage stringency index*, because governments decided to take economic measures later compared to the stringency measures.

Average containment health index (AvgContHealth)

The containment and health index is based on government measures related to limiting the number of new Covid-19 infections. This index, similar to the *average stringency index,* is also based on the lockdown restrictions and closures indicators, but also testing policies, contact tracing, and short-term healthcare investment indicators are used to determine this index. The same steps have been taken to get the variable a*verage containment health index* (average of 2020 and 2021) as with the variables a*verage economic support index* and a*verage stringency index*. 58,965 data points are used to form the variable a*verage containment health index* of the two years.

Average government response index (AvgGovRes)

The government response index is the most generic index compared to the other three indices explained in the previous three paragraphs. The past three indices are formed by using a couple of topic-related indicators, while the government response index is formed by using all 23 indicators. It is, therefore, a good index to show the overall government response of a certain country during the Covid-19 crisis. To get the average of this index, similar steps are followed as for the previous three indices. To get the a*verage government response index* 58,997 data points were used to give in the end again 168 a*verage government response index* datapoints.

3.3.2 Demographic variables

The following variables all have an effect on the stock market return (volatility) according to the reviewed literature. The variables say something about the severity of the crisis, the ease for the Covid-19 virus to spread, or how capable the government is to help their citizens financially. Most of the variables in the upcoming paragraphs are gathered from the World Bank or Statistictimes.com and are from the years 2019, 2020, and 2021.

Confirmed cases as a percentage of the population (ConCasesD), and Confirmed deaths as a percentage of the population (ConDeathD)

The first demographic control variables are the cumulative number of confirmed infected people and confirmed Covid-19 deaths. As the number of confirmed cases and confirmed deaths are recorded cumulative, the 31st of December of the years 2020 and 2021 will be used to determine the numbers of confirmed cases and deaths. The numbers of confirmed cases and deaths are gathered from the Oxford Covid-19 Response Tracker. To overcome the enormous difference in the population sizes of the 84 countries and as a results in the number of confirmed cases and deaths as well. Confirmed cases and confirmed deaths will be divided by the number of population size. The 2019 population size will be used and is taken from the World Bank.

Life expectancy (LifeExpectancy)

Life expectancy is a good variable to determine the overall health of the inhabitants and the quality of the health services in a certain country. The variable is the average age a person in that particular country is expected to reach. The variable is taken from the Worldbank dataset and is from the year 2020 and 2021. In total, there are therefore 168 observations. The data shows clearly, a high life expectancy for European and North-American countries while the *life expectancy* is lower in African countries.

GDP per capita (GDPPC)

Gross domestic product per capita is a global measure in determining the prosperity of countries. Statistictimes.com is used to get the total GDP of the 84 countries. The year 2020 and 2021 is used to determine this variable. GDP per capita, shares a similar trend compared with life expectancy.

The natural logarithm of population (lnPop)

Population is the number of people living in that specific country. The data is from 2020 and 2021 and is taken from the Worldbank database, what in the end results in 168 datapoints. This variable is incorporated to see if there is any difference across the different sizes of countries. In the models the natural logarithm is taken to make sure the variable is normally distributed.

The natural logarithm of population density (lnPopDen)

Population density tells how many people live on one square kilometre. This data is from 2020 and 2021 and is taken from the Worldbank database, it results in a total of 168 datapoints. Based on Covid-19 related articles, this control variable is incorporated into the regression. Just as with l*ife expectancy* the natural logarithm of populations density will be used make sure the variable is normally distributed. This variable says something about how much harm the virus can cause to the population, irrespective of the decisions made by the government.

To see the summary statistics of the variables of the years 2020, 2021 and the two years together see Table B.3-B.5.

CHAPTER 4 Methodology

To investigate the effect of government spending on the abnormal stock market return and on the abnormal stock market return volatility OLS regressions are used for the year 2020 and 2021. The reasons for using the OLS regression model are the following. The first reason is the fact that by analysing the data and previous papers, the relation between the abnormal stock market return (volatility) and government spending is expected to be linear. The second reason is by looking at the summary statistics of the tables B.3 and B.4 it is shown that there is a big difference among the variables of the two different years. 2020 is a year in which the average abnormal stock market return across the 84 countries showed a negative value of -12.661, while the abnormal stock market return showed in 2021 a positive value of 12.665. This large difference can partially be explained by the fact that the stock market return is calculated by subtracting the beginning value of the year from the end value of the year. 2020 got a complete different beginning value compared to the beginning value of 2021. The first days of 2020 were days in which the Covid-19 crisis was not yet on the world stage, while the first days of 2021 were days in the middle of the Covid-19 crisis. By having a much higher beginning value in the year 2020, it makes sense that the stock market return will be lower in 2020 compared to 2021, in which the starting value was lower. The same reasoning applies for the stock market return volatility.

The variables confirmed cases and confirmed deaths show also big differences across the two years. In the year 2021 there were on average 3 times more confirmed cases compared to 2020, the same applies for confirmed deaths in which 2021 got on average twice as much compared to 2020. This difference got mainly to do with the fact of the amount in tests conducted, grew exponentially during the Covid-19 crisis, what can be seen in the database of Our world in Data (Total COVID-19 tests, 2023) as well. Lastly the liquidity support and additional spending and foregone revenue as percentage of GDP show some big differences across the two years. In 2020 the expenditures were larger compared to the expenditures compared to 2021. This will therefore lead to immediately a negative effect of government spending on the abnormal stock market return, when the two years are investigated in one model. Which is proven by the fixed-effect models shown in the Table D.17. Therefore, the choice of investigating the two years separately is made.

Furthermore by analysing the results of the two independent years, it gives the opportunity to see the similarities and the differences of the results between the two years.

The choice for using the two OLS regressions is due to the easiness of the interpretability of the coefficients given by the model. The coefficients can be read directly from the model, what makes the making of conclusions easier. Because, of the widely used method of the OLS regressions it can be said that it is also a proven and effective method for analysing linear data sets.

Apart from testing the effect of the two types of government spending on the abnormal stock market return (volatility), control variables will be added to the regressions as well. These control variables are added to the regression to account for the potential confounding factors, which might affect the independent and the dependent variable. Furthermore, does it also enhance the accuracy of the model, because these control variables are all factors that could have influenced the abnormal stock market return(volatility) during those two years. To make sure the control variables and the independent variables do not correlate with each other, a multicollinearity test will be performed. The variables that show multicollinearity will be dropped. Which variable will be dropped will be based on the effect it has on the dependent variable.

To check the two hypotheses, the same data is used, only the dependent variable differs. To answer the first hypothesis the following regression model is used:

$$\begin{aligned} Abnormal\ stock\ market\ return_{i,t}(\%) \\ &= \beta_0 + \beta_1 liquidity\ support_{i,t}(\%) \\ &+ \beta_2 additional\ spending\ and\ foregone\ revenues_{i,t}(\%) + \beta_2 Control\ variable + \epsilon_{i,t} \end{aligned}$$

i represents the country and t represents the year. The variables abnormal stock market return, liquidity support as a percentage of GDP, and additional spending and foregone revenues as a percentage of GDP are all measured in percentages. The specific control variables used in the model is based on the explanatory power and multicollinearity tests. The regression coefficients are symbolised by the β's, the $\epsilon_{i,t}$ represents the error term. Huber-White heteroskedasticity -robust standard errors are used in the analysis.

To answer the second hypothesis, the dependent variable abnormal stock market return volatility is used as the dependent variable. Apart from this, the regression with the abnormal stock market return volatility looks similar to the regression of the abnormal stock market return:

$$\begin{aligned} Abnormal\ stock\ market\ return\ volatility_{i,t}\ (\%) \\ &= \beta_0 + \beta_1 liquidity\ support_{i,t}(\%) \\ &+ \beta_2 additional\ spending\ and\ foregone\ revenues_{i,t}(\%) + \beta_3 Control\ variable + \epsilon_{i,t} \end{aligned}$$

i represents the country and t represents the year. The variables abnormal stock market return volatility, liquidity support as a percentage of GDP, and additional spending and foregone revenues as a percentage of GDP are all measured in percentages. The specific control variables used in the model is based on the explanatory power and multicollinearity tests. The regression coefficients are symbolised by the β's, the $\epsilon_{i,t}$ represents the error term. Huber-White heteroskedasticity -robust standard errors are used in the analysis.

CHAPTER 5 Results

5.1 Abnormal stock market return

To test the first hypothesis, Table 1, and Table 2 will be reviewed and analysed. To test the second hypothesis Table 3, and Table 4 will be analysed. The first two tables show the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return. The third and fourth table show the effect of the two similar independent variables on the abnormal stock market return volatility. The results of Table 1 and 3 are based on the year 2020 and the results of Table 2 and 4 are based on the year 2021. All four tables are based on the data of 84 countries. To see the effect of all independent variables and control variables on the two dependent variables see Table C.1 in the appendix. Abnormal stock market return and abnormal stock market return volatility are both given in percentages. The two dependent variables are given in percentages as well. A percentual change in the liquidity support or in the additional spending and foregone revenue will, therefore, result in the coefficients percentual change on the dependent variable. The Tables 1 till 4, present the results in which the two independent variables are both included into the regression. To see the effect solely of liquidity support as a percentage of GDP on abnormal stock market return, see the Tables D.1 and D.2 for 2020 and the Tables D.3 and D.4 for 2021. To see the effect solely of additional spending and foregone revenue as a percentage of GDP on abnormal stock market return volatility, see the Tables D.5 and D.6 for 2020 and the Tables D.7 and D.8 for 2021. After the examinations of Table 1 and 2, there will be a discussion about the differences and similarities in results over the two years, with some possible explanations. The same is done after the Tables 3 and 4.

Table 1: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return (2020)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	1.478*	1.654*	1.738**	1.423*	1.258
	(0.838)	(0.857)	(0.869)	(0.852)	(0.837)
AdSpendingForeRevGDPD	-0.079	0.092	0.122	-0.196	-0.420
	(0.321)	(0.357)	(0.361)	(0.368)	(0.376)
AvgEconomicSupport		-0.095	-0.100	-0.177**	-0.154*
		(0.083)	(0.084)	(0.087)	(0.086)
AvgContHealth			0.133	0.188	0.033
			(0.197)	(0.193)	(0.203)
ConDeathD				-37.131	-36.294
				(28.660)	(28.042)
LifeExpectancy				0.815***	1.019***
				(0.285)	(0.295)
lnPop					1.854**
					(0.093)
Constant	-13.673***	-8.781*	-15.873	-72.604***	-110.822***
	(2.278)	(4.928)	(11.601)	(22.110)	(28.283)

Observations	84	84	84	84	84
R-squared	0.037	0.053	0.058	0.163	0.209

*Note: This table shows the main results of the five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table 1 shows the result of five OLS regression models of the year 2020 with the dependent variable being abnormal stock market return. The results of model 1, show the effect of the two government spending variables on the abnormal stock market return. It shows a significant effect of liquidity support at a 10% significance level on the abnormal stock market return. Additional spending does not show a significant effect. The coefficients show that a percentual change of 1 in liquidity spending will result in a positive abnormal stock market return of 1.478%. Additional spending and foregone revenue shows a small negative effect of -0.079%. Because, the value of additional spending and foregone revenue is not significant, the value of the coefficient cannot be stated with a certain degree of certainty. The R-squared value of model 1 is small, with a R-squared value of 0.037 it means that 3.7% of the abnormal stock market return variance is explained by these two dependent variables. Tables D.1 and D.2 show that the variance explanation of 3.7% is generated by the variable liquidity support as a percentage of GDP.

Based on the literature reviewed, certain control variables will be added into the regression, to check for the external validity of the coefficients given in model 1, but also to improve the explanatory power of the models. First the control variables, based on government responses will be added into the regression models, to see what kind of effect this would have on the regression results compared to model 1.

Based on table C.2 the government variables average economic support index and the average containment index will be added into the regression. Table C.3 shows that there is no correlation between the variables average economic support index, liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP.

Model 2 shows the addition of the economic support index variable into the regression. This variable is not significant, the same applies for the variable additional spending and foregone revenue as a percentage of GDP. Liquidity support as a percentage of GDP remains significant at the 10% level. Additional spending switches now in sign and got a positive effect on the abnormal stock market return, because this variable is not significant it cannot be said with a certain degree of certainty. It is noteworthy that the two government spending coefficients now show a positive relation with the abnormal stock market return, while the average economic index shows a small negative effect on the abnormal stock market return. A possible explanation could be the different assumptions the average economic support index is based on compared to the values of liquidity support and additional spending and forgone revenue. The R-squared value of model 2 is slightly larger compared to model 1 with a R-squared value of 0.053.

Model 3 shows the effect of the addition of the variable average containment health index on the regression results. The variance explanation of the abnormal stock market return grows to 5.8%. With the addition of the average containment health index the variable liquidity support as a percentage of GDP remains significant, on a higher level now of 5%, while the other variables in the model remain insignificant. The coefficients of the variables in model 3 show some slight increases or decreases, which are not noteworthy to mention. The average containment health index shows a small positive effect on the abnormal stock market return, what would suggest an increase of the average containment health index of one will result in a positive increase of the abnormal stock market return of 0.133%.

Model 4 in Table 1, shows a larger explanatory power of the variance of the dependent variable. The variance of the abnormal stock market return is 16.3% explained by this model. This, is done by the addition of the variables confirmed deaths as a percentage of the population and life expectancy. The inclusion of these variables is based on the correlation tables C.4 and C.5 and on the effect the variables have on the model. By adding these two variables the explanatory power of the models 4 and 5 rise by almost 300%. Life expectancy shows a coefficient which is significant. The coefficient of life expectancy shows that a rise of 1 extra year on the life expectancy results in an increase of the abnormal stock market return of 0.815%. The coefficient of confirmed deaths as a percentage of GDP, although the coefficient is not significant, shows an effect of -37.131% on the abnormal stock market return when the death percentage rises by 1%. This seems a huge effect but by looking at the descriptive table B.3, with an average confirmed deaths as a percentage of 0.45%, a 1% rise in deaths would be enormous. Therefore, the huge effect seems legit.

The variable average economic support index does show a negative significant coefficient at the 5% significance level, with a value of -0.177. A possible reason for the change in significance is the addition of those two control variables have explained more variance of the abnormal stock market return, reducing the residual variance. As a result, the standard errors of the average economic support index decreases, making it more likely for the variable average economic support index to explain the effect on the abnormal stock market return. The same argument can be used for the fact that additional spending and foregone revenue is now showing a negative effect on the abnormal stock market return.

Model 5, is the last and final model. This model explains the variance of the dependent variable best with a R-squared value of 0.209. This model have added the natural logarithm of population. It shows a significant result at a 5% level. The coefficient states that the increase of 1 in the natural logarithm of population will result in a 1.854% increase on the abnormal stock market return. The two government spending variables are both not significant anymore, what makes it not possible to make conclusions with a certain degree of certainty. However, liquidity support as a percentage of GDP has a positive effect of 1.258% with the rise of one percent extra spending on the abnormal stock market return.

While, additional spending and foregone revenue as a percentage of GDP got a negative effect of -0.420% with the increase of one percent on the abnormal stock market return.

After having analysed the five regression models of 2020, the five regression models of 2021 will be analysed. The models of 2021 are based on the performed models of 2020, however some control variables differentiates from the model of 2021. The correlations models C.2 till C.5 show that the changed variables of the models in 2021 are substitutes for the variables used in 2020. These changed variables are chosen over the variables of 2020, due to the better explanatory power it has on the differed data of 2021. The results of these five regression models of 2021 will be seen in Table 2.

Table 2: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return (2021)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	0.674	0.591	0.613	-0.555	-0.526
	(1.963)	(2.048)	(2.063)	(2.022)	(2.037)
AdSpendingForeRevGDPD	1.429*	1.465*	1.493*	0.693	0.629
	(0.820)	(0.857)	(0.872)	(0.882)	(0.915)
AvgEconomicSupport		-0.012	-0.010	-0.102	-0.100
		(0.078)	(0.079)	(0.082)	(0.083)
AvgContHealth			-0.046	0.028	0.019
			(0.213)	(0.207)	(0.210)
ConCasesD				0.997**	1.049**
				(0.419)	(0.459)
GDPPC				0.000	0.000
				(0.000)	(0.000)
lnPop					0.374
					(1.310)
Constant	9.761***	10.317**	12.970	4.543	-1.802
	(2.503)	(4.414)	(12.983)	(12.807)	(25.667)
Observations	84	84	84	84	84
R-squared	0.038	0.038	0.039	0.135	0.136

*Note: This table shows the main results of five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed cases as a percentage of the total population (4,5), GDP per capita (4,5), and the natural logarithm of the population (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table 2 shows the results of the five OLS regression models of the year 2021 with the dependent variable abnormal stock market return. The models 4 and 5 include confirmed cases and GDP per capita, while the model in 2020 included confirmed deaths and life expectancy. This should not cause any problems, based on results of the correlation Tables C.4 and C.8, which shows that there is a strong collinearity between confirmed deaths and confirmed cases. By incorporating both variables into the regression models of 2020 and 2021, confirmed deaths had a larger explanatory power in 2020, while confirmed cases got a larger explanatory power in 2021. The same applies for the variables GDP per capita and life expectancy. Life expectancy and GDP per capita do also show a high correlation with each other, what can be seen by the correlation Tables C.5 and C.9. By applying the same steps as the steps for confirmed deaths/cases, life expectancy is used in the model of 2020, while GDP per capita is used in the model of 2021.

In Table 2 the coefficient values of the variables liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP show resemblance across the first three models. In model 2 the average economic support index is added to the model, in model 3 the average containment health index is added to the model. The three models show a low explanatory power of 3.8%, 3.8%, and 3.9%. By the lack of increasement by the addition of the government responses, the conclusion can be made that they hardly have an effect on the abnormal stock market return. With taking Table D.3 and D.4 into account, the eventual conclusion can be made that additional spending and foregone revenue as a percentage of GDP is responsible for this explanatory power. With 1 percent additional spending and foregone revenue the abnormal stock market return will rise by about 1.5%, what can be stated with a 10% significant level. The other variables show no significance, so all the assumptions made about these variables cannot be stated with a degree of certainty. However, liquidity support as a percentage of GDP got a positive effect on the abnormal stock market return of about 0.6% in the first three models. While the average economic support index and the average containment health index got a marginal negative effect on the abnormal stock market return of -0.010 and -0.046. What will mean that one point increase in the two government variables will lead to a -0.010% and -0.046% decrease of the abnormal stock market return.

Model 4 and 5 of Table 2 show some different results compared to the first three models. With the addition of GDP per capita and confirmed cases as a percentage of the population the explanatory power of the model rises to almost 13.5% in model 4. This increase of explanatory power is mainly the result of the addition of confirmed cases. The variable confirmed cases show a significance level and surprisingly a positive effect on the abnormal stock market return. A one percent increase in the number of confirmed cases will lead to an increase of the abnormal stock market return of 0.997%. GDP per capita shows an insignificant coefficient of 0.000, so, GDP per capita does not play a big role on the effect of the abnormal stock market return. The addition of the two control variables changes the coefficient of liquidity support drastically. First liquidity support showed a positive effect on the abnormal stock market return, but with the addition of the two control variables it shows a negative effect of -0.555%. The same applies for the variable average containment health index, which changed from a negative value to a positive value of 0.028. The additional spending and foregone revenue as a percentage of GDP did turn insignificant and the coefficient decreased to a value of 0.693%. While the average economic support variable decreased to a value of -0.102. Model 5 shows no major changes compared to model 4, the addition of the natural logarithm of population, which shows a positive coefficient value of 0.374 does not change the other variables much. The coefficient is however not significant what makes it impossible to state the positive effect of population size with a degree of certainty.

Table B.3 and B.4 already showed a big difference in the means of abnormal stock market return and the other variables over the two years. Table 1 and 2 confirmed that the means were not only different, but also the effect of the two government spending types on the abnormal stock market return differs among the two years. Table 1, D.1 and D.2 show that liquidity support as a percentage of GDP has the biggest positive effect on the abnormal stock market return in 2020, while in 2021 additional spending and foregone revenue as a percentage of GDP has the biggest effect on the abnormal stock market return. In 2021 liquidity support does in model 4 and 5 even lead to a negative effect on the abnormal stock market return. The same applies for additional spending and foregone revenue as a percentage of GDP in 2020, when it shows in model 1,4 and 5 a negative effect on the abnormal stock market return. Based on the results of Table 1 and 2 and the Tables D.1 till D.4 in the statement can be made that government spending does indeed show a positive effect on the abnormal stock market return, however the type of government spending does matter. In the early stages, mainly below-the-line measures give positive results, while in the long term mainly above-the-line measures give a positive result.

Above-the line measures need time to be implemented, due to legislative rules, what partly can explain the larger and more significant effect in 2021. Liquidity support showed some significant effects at a 10% level in four out of the five models in 2020, while additional spending and foregone revenue showed significant coefficients in three out of the five models in 2021.

The other variables show pretty consistent coefficients among the two years. Only the size of the population did in 2020 play a larger positive role compared to 2021. The government response variables did have in both years almost the same coefficient. Therefore, without a degree of certainty the claim can be made that a stricter average containment health policy will lead to slightly higher abnormal stock market return, while the average economic support index will lead surprisingly to a negative abnormal stock market return.

5.2 Abnormal stock market return volatility

Table 3: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return volatility (2020)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
LiqSupGDPD	0.451	0.211	0.232	0.170	0.221
	(0.538)	(0.560)	(0.563)	(0.566)	(0.570)
AdSpendingForeRevGDPD	0.357*	0.239	0.266	0.306	0.319
	(0.206)	(0.221)	(0.235)	(0.238)	(0.239)
GDPPC		0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			0.000	-0.005	-0.010
			(0.054)	(0.055)	(0.055)
ConCasesD				0.518	0.513
				(0.510)	(0.511)
lnPopDen					0.498
					(0.571)
Constant	-1.598	-2.787	-3.302	-3.716	-5.571
	(1.460)	(1.676)	(3.134)	(3.159)	(3.812)
Observations	84	84	84	84	84
R-squared	0.046	0.069	0.083	0.095	0.104

*Note: This table shows the main results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), GDP per capita (2,3,4,5), average economic support index (3,4,5), confirmed cases as a percentage of the total population (4,5), and the natural logarithm of the population density(5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table 3 shows the result of five OLS regression models of the year 2020 with the dependent variable being the abnormal stock market return volatility. Of all the models, only model 1 shows a variable being significant. The other models do not show any significant variables, therefore all the conclusions and assumptions being made cannot be stated with a degree of certainty. The first model explains the variance of the abnormal stock market return volatility by 4.6%, what is not much, so the largest part of the variance is determined by other omitted variables. The variable additional spending and foregone revenue as a percentage of GDP shows a positive effect of 0.357 on the abnormal stock market return volatility, with a significance level of 10%. Liquidity support does also show a positive effect, with a coefficient value of 0.451, however because this value is not significant it cannot be stated with a degree of certainty. Model 2 and model 3 of Table 3 show a small increase of the explanatory power of the model with a R-square of 0.069 and 0.083. Although the addition of GDP per capita got an effect on the R-square value, the coefficient does not say much. The value is 0.000 and is insignificant. The same applies for the control variable average economic support index, which also shows a value of 0.000. The coefficients of liquidity support as a percentage of GDP and additional spending and foregone revenue as percentage of GDP decreased in model 2 a bit to the values 0.211 and 0.239. In model 3 they retained almost the same value compared to model 2. The variable additional spending and foregone revenue as a percentage of GDP turned with the adding of GDP per capita insignificant and remained insignificant with the adding of the variable average economic support index.

With the adding of the variables confirmed cases as a percentage of the inhabitants in model 4, and the natural logarithm of population density in model 5 the coefficient values stay pretty similar. The R-squared value increases slightly to a value of 0.104, what still implies that a great deal of the variance is explained by other factors which are not being incorporated into the model. Both added variables in model 4 and 5 do not show a significant coefficient value. The natural logarithm of population density and confirmed cases as a percentage of the population show, however, both a positive effect of 0.498 and 0.513 on the abnormal stock market return volatility. For the natural logarithm of population density, this means an increase of the country's natural logarithm of population density of one, results in a higher abnormal stock market return volatility of 0.498%. For confirmed cases it means one percent increase in confirmed cases will result in a 0.513% increase of abnormal stock market return volatility. The two government spending variables remain with the addition of the two control variables relatively stable, the same applies for the two control variables GDP per capita and average economic support index.

Table 4: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return volatility (2021)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
LiqSupGDPD	-0.148	-0.175	-0.252	-0.056	-0.124
	(0.833)	(0.817)	(0.856)	(0.863)	(0.867)
AdSpendingForeRevGDPD	0.212	0.040	0.064	0.193	0.226
	(0.348)	(0.351)	(0.361)	(0.371)	(0.373)
GDPPC		0.000**	0.000**	0.000**	0.000**
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			-0.011	0.001	-0.007
			(0.034)	(0.035)	(0.036)
ConCasesD				-0.244	-0.214
				(0.178)	(0.181)
lnPopDen					0.491
					(0.521)
Constant	-0.126	-2.089	-1.680	-1.182	-3.064
	(1.063)	(1.415)	(1.915)	(1.938)	(2.782)
Observations	84	84	84	84	84
R-squared	0.005	0.055	0.056	0.078	0.089

Note: This table shows the main results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), GDP per capita (2,3,4,5), average economic support index (3,4,5), confirmed cases as a percentage of the total *population (4,5), and the natural logarithm of the population density(5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table 4 shows the result of the five OLS regression models of the year 2021 with the dependent variable abnormal stock market return volatility. The first thing all those models in Table 4 got in common with each other, is the insignificance of almost all coefficients. Only the variable GDP per capita has shown a significant coefficient in every model. However, by having a coefficient value of 0.000, the conclusion can be made that GDP per capita does not play a role in the height of abnormal stock market return volatility. Similar to the results in Table 3, due to the insignificance of the other variables coefficients, no conclusions can be made with a degree of certainty.

Model 1, shows the negative coefficient of liquidity support as a percentage of GDP of -0.148, while the variable additional spending and foregone revenue as a percentage of GDP shows a positive coefficient of 0.212. Model 1 does only explain 0.5% of the variance of the abnormal stock market return volatility.

By adding the variable GDP per capita, the explanatory power rises to 5.5% as can be seen in model 2. Liquidity support as a percentage of GDP gets a slightly more negative coefficient value of -0.175. The coefficient of additional spending and foregone revenue decreases to a value of 0.040. With the addition of the variable average economic support index in model 3 the variance explanation of abnormal stock market return volatility increases by 0.001. The coefficients of the government spending variables get slightly larger, what insinuates a slightly larger effect on the abnormal stock market return. The variable average economic support index has a small negative effect of -0.011 on the abnormal stock market return volatility.

The addition of the variables confirmed cases as percentage of the population and the natural logarithm of population density results in model 4 and 5. The explanatory power of both models increase a bit compared to model 3. Model 4 explains 7.8% of the variance while model 5 explains 8.9% of the variance of the abnormal stock market return volatility. The addition of the two variables lead to an increase of the coefficient of the variable additional spending and foregone revenue as a percentage of GDP, to a value of 0.193 in model 4 and 0.226 in model 5. The coefficient of liquidity support increases to a value of -0.056 in model 4, in model 5 the effect on the abnormal stock market return volatility gets larger with a value of -0.124. The natural logarithm of population density shows a positive effect on the abnormal stock market return volatility with a coefficient of 0.491. The effect of confirmed cases on the abnormal stock market return volatility gets more negative with a value of -0.244 in model 4 and -0.214 in model 5.

The two Tables 3 and 4 show a difference in the effect of the variables on the abnormal stock market return volatility among the two years. Liquidity support as a percentage of GDP has in 2020 a positive effect on the abnormal stock market return volatility, while in 2021 it got a negative effect. Additional spending got a positive effect in both years although the effect in 2021 is slightly larger compared to

the effect in 2020. Based on the hypothesis the results are not as expected.
Additional spending and foregone revenue as a percentage of GDP shows in both years a positive effect on the abnormal stock market volatility, while liquidity support as a percentage of GDP does only show in 2021 a negative effect on the abnormal stock market return volatility. Also, none of the coefficients of liquidity support as a percentage of GDP, and only one out of the ten coefficients of additional spending and foregone revenue as a percentage of GDP is significant at the 10% significance level.
The other variables show more or less similar results among the two years. Confirmed cases does show the largest difference, in 2021 it showed a negative effect while in 2020 it showed a positive effect on the abnormal stock market return volatility.

5.3 Robustness checks

To check the validity of the results, some robustness checks have been carried out. The first robustness check is checking the effect of the two government spendings separately from each other, what can be seen by the Tables D.1 and D.8. There are some slight differences among the coefficients but no big differences. It gives a better insight in which individual government spending method is more effective. More conclusions made based on the Tables D.1 and D.8 can be read in the appendix. The second robustness check is based on the same dataset as Tables 1 till 4, however now regressions have been performed with different control variables. These regressions can be seen at the appendix in the Tables D.9 till D.12. What can be seen by these tables is the fact that the coefficient of the liquidity support and additional spending and foregone revenue as a percentage of GDP give similar results as the results given in Table 1 till 4. Table D.9 till D.12 give also some insights on other control variables. Average government response index for instance proves in most cases to be a good substitute for the average economic support index and average containment health index, what was already suggested by the correlation tables. The natural logarithm of population density tends to have a negative effect on the abnormal stock market return and a positive relation with the abnormal stock market return volatility, what cannot be stated with a degree of certainty due to the lack of significance.
Thirdly to check for the models validity the models of table 1 till 4 have been applied on the dataset of only European countries, the results of this regression can be seen in the Tables D.13 till D.16. The results show some differences compared to the results in Tables 1 till 4. Especially liquidity support seems to have a larger positive effect on the abnormal stock market return, and a larger negative effect on the abnormal stock market return volatility. The R-squared values of the European dataset is also larger compared to the R-squared values shown in Table 1 till 4, what means the variance of the abnormal stock market return and abnormal stock market return volatility is better explained by the variables in the European dataset. For the full conclusions and observations see the appendix.
By taking all results into consideration both hypothesis cannot be proven. The first hypothesis cannot

be proven due to the fact that additional spending and foregone revenue as a percentage of GDP does not show significant results in 2020. Liquidity support as a percentage of GDP does not show significant coefficients in the year 2021. Furthermore, does liquidity support as a percentage of GDP also show some negative effects in 2021, the same applies for additional spending and foregone revenue as percentage of GDP in 2020.

The second hypothesis cannot be proven, based on the insignificance of the variables liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDO in almost all models. Furthermore, based on the results government spending tends to have a positive effect on the abnormal stock market return volatility. Because, only liquidity support as a percentage of GDP shows a negative effect in the models of 2021.

Table D.17, shows the effect of combining the two years into one model. The fixed-effect model is used to check the data. The results show that the fixed-effect model in not suitable to check the data, due to the large differences of the coefficients between the two years.

CHAPTER 6 Discussion

In this part, the similarities and differences between the obtained results and the reviewed literature will be discussed. The conclusion of the reviewed literature was that there was no consensus on the effect of government spending on the stock market return. The same conclusion can be made based on this paper. The paper shows some mixed results across the government spending types and years. Liquidity support as a percentage of GDP shows a positive effect on the abnormal stock market return in the year 2020, while in 2021 it shows with the addition of certain control variables a negative effect. The same applies for the variable additional spendings and foregone revenue as a percentage of GDP, it shows a positive effect on the abnormal stock market return in the year 2021, while showing a negative effect in 2020. However, by seeing the results of the Tables D.1 till D.4 the governmental expenses with the positive effect showed a larger explanatory power compared to the negative effect. The effect of the two government spending variables has a more uniform effect on the abnormal stock market return volatility. The variable additional spending and foregone revenue as percentage of GDP shows in both years a positive effect on the abnormal stock market return volatility. Liquidity support as a percentage of GDP shows only in 2020 a positive effect, while showing in 2021 a negative effect. The positive effect of the government spendings on the abnormal stock market volatility, therefore, suggests that these government spendings enlarge the riskiness of the stock market returns.

The positive view of government spending on the abnormal stock market return is mainly shared by the papers that based their research on the Covid-19 period. The work of Kaper et al. (2021) investigated the effect of government spending on the stock market and concluded that government spending and mainly fiscal policies help the economy running during a crisis. This paper will investigate this even further and divides the fiscal policy into two different types of government spending. In which the findings of this paper are partly similar to the findings of Kaper et al. depending on the year and the type of government spending you are looking at.

The paper of Feyen et al. (2021) based their research on the effect of government spending during the Covid-19 crisis, and found out that the fiscal policies played a significant large role in preserving the stock market returns and limited the stock market return volatility during the Covid-19 crisis. This paper did not show a significant positive effect on the stock market returns, and furthermore government spending showed an enlargement of the stock market return volatility. This paper further differed on the effect of GDP per capita on the stock market return compared to the paper of Feyen et al. Feyen et al. stated that richer countries showed better results on the stock market return during the Covid-19 crisis, while this paper does not show any effect of GDP on the abnormal stock market return (volatility).

The inclusion of control variables played in many papers a large role in determining the effect of government spending on the stock market returns. The papers of Pandey and Kumari (2021) and Capelle-Blancard & Desroziers (2020) did add multiple control variables and found out that especially the number of confirmed cases played a large negative role on the stock market returns. This is not proven by this paper. The paper shows there is a negative effect with the number of confirmed deaths as a percentage of the population on the abnormal stock market return in 2020. However in 2021 the number of cases as a percentage of the population shows a positive relation with the abnormal stock market return. The effect on the abnormal stock market return volatility shows it the other way around, in 2020 the number of cases increases the stock market risk, while in 2021 the number of cases reduces the stock market risk. Apart from the fact of not having a uniform negative effect of the number of confirmed cases and deaths as a percentage of the population on the abnormal stock market return, the variables do also not show an extremely large effect compared to the other variables. The same applies for the stringency effect, the paper of Klose & Tilmann (2022) stated that the stringency effect had a major effect on the stock market return and stock market volatility. The volatility index is replaced in this paper often by the average health containment index. Although, the coefficient of this index is in the year 2021 negative it does not play a significant large role as have been stated by the paper of Klose & Tilmann.

Makin and Layton (2021) stated there was a difference among the rich and poor countries in the way they supported their economies. The rich countries relied more on loan support (liquidity support as a percentage of GDP), while the poor countries used more fiscal support (additional spending and foregone revenue as a percentage of GDP). Based on the European based results (Table D.13 till D.16), which can be considered as countries with a high GDP per capita, does the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP not tremendously differ compared to the models in Table 1 till 4. What contradicts the findings of Makin and Layton. Not only the level of wealth got an effect on the effectiveness of government spending on the stock market return. According to Luchtenberg and Truong (2015) the bigger economies would be more vulnerable to a crisis. A crisis would affect the stock market return volatility of a large country more. According to this paper this is not the case, the number of inhabitants does not play a large role on the stock market return. How the number of inhabitants did affect the government spendings is not investigated by this paper. However, what could have be seen that the addition of the population variable did not affect the two government spending variables, what would suggest that the size of the population does not influence government spendings much.

Many papers have stated that government spending is mainly effective in the short-run, like the papers of Wang & Yao (2003) and Thanh et al. (2017). They based their research on only the Chinese and Vietnamese market, while this paper investigated many more countries. However, this paper did also find different results among the two years. In which the results of 2020 can be seen as short-run effect while the effects in 2021 can be seen as long-run effects. This paper showed by investigating the effect on abnormal stock market return, that liquidity support is only effective in the short-run.

CHAPTER 7 Conclusions

7.1 Conclusion

This paper have investigated the effect of government spending on the stock market return and stock market return volatility during the first two years of the Covid-19 crisis. The government spending was in this paper divided into two subgroups, namely liquidity support as a percentage of GDP, what are above-the-line measures (need legislative approval), and additional spendings and foregone revenue as a percentage of GDP what are below-the-line measures (need less legislative approval). To measure the effect of those two measures on the stock market results the abnormal stock market return and the abnormal stock market return volatility is selected.

Although, some research about this topic did already exists there was not one main consensus in the economic world on the role of government spending on the stock market returns during the Covid-19 crisis. Furthermore, most papers focused their research on one country or one region. This paper widened the scope and investigated 84 countries all over the world. This research did also take the Oxford Covid-19 tracker indices into account, for a better understanding of the effects. Lastly, by not taking the first months but the full two years it will help to understand the broader effect of the Covid-19 crisis on the economy and not only investigates the short-run but also the long-run effect.

With the lack of consensus in the economic world and the lack of the effects investigated by year in the literature, the following research question is formed: How does government spending affect the stock market return across different countries during the first two years of the Covid-19 crisis?

To answer this question, 84 countries have been investigated. The data gathered came from the Worldbank, International Monetary Fund, and the Oxford Coivd-19 Response Tracker.

To test the two hypotheses the OLS regression method is used. The models brought some interesting conclusions to the light. The first conclusion is that the abnormal stock market return and the liquidity support as a percentage of GDP and the additional spending and foregone revenue as a percentage of GDP show different results among the two years. In 2020 liquidity support as a percentage of GDP had a positive effect on the abnormal stock market return, while in 2021 additional spending and foregone revenue as percentage of GDP had a positive effect on the abnormal stock market return. Additional spending and foregone revenue as a percentage of GDP had in 2020 a negative effect on the abnormal stock market return with the addition of certain control variables. The same applies for liquidity support as a percentage of GDP in the year 2021. So, based on these results it can be stated that by using the right type of government spending during the two years of crisis can lead to a positive effect on the abnormal stock market return. However, when the wrong policy is implemented it can also lead to a negative effect. Based on the results under-the-line measurements at the beginning of a crisis show to be more effective. A possible reason is under-the-line measures need less political approval, therefore governments are able to install these measures faster and more effectively to help individuals and companies. When there is more time involved to deal with the crisis, above-the line measurements show more effectiveness of raising the stock market returns. A possible explanation for this is that with more time laws can be passed through for instance parliament, what enables governments to use more law based measures, like tax reductions. Due to the lack of significance of the coefficients of the two government spending variables and the differences of the coefficient values among the two years, the conclusion cannot be made that government spending has a positive effect on the abnormal stock market return.

The second hypothesis investigated the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return volatility. Similar to the results of abnormal stock market return, the effect of government spending does not show similar results among the two years. Additional spending and foregone revenue as a percentage of GDP shows in both years a positive effect on the abnormal stock market volatility. What would suggest that the additional spending and foregone revenue as a percentage of GDP increases the riskiness of the stock market. Liquidity support does also show in 2020 a positive effect on the abnormal stock market return volatility, in 2021 it shows a negative effect. Based on the results and the lack of significance in the models of the coefficients. The conclusion cannot be made that government spending leads to a decrease of the abnormal stock market volatility. It is even more appropriate to make the conclusion that government spending will lead to an increase of the abnormal stock market volatility.

To summarize everything based on the regressions, there cannot be conclusions drawn with a degree of certainty. However, government spending can lead, when the right type of government spending is applied to a higher abnormal stock market return. The two types of government spending does mainly show a positive effect on the abnormal stock market volatility, and therefore government spending is not limiting the riskiness of the stock market return during the Covid-19 crisis.

7.2 Limitations and recommendations

The results have been showing some inconsistencies compared to the reviewed literature, or expected results. These inconsistent could have arisen due to the special circumstance of the Covid-19 crisis, but also due to the limitations of this research. The low R-squared values of all models throughout the results section suggest there are some omitted variables in the models which should be included. This is especially the case with the effect of government spending on the abnormal stock market return volatility, where the R-squared value does not reach a higher score than 10.4%. This model only incorporated six variables, while the stock market of the various countries is a far more complex mechanism which cannot be explained by just six variables. Therefore, a recommendation would be to incorporate more variables into the models what reflects the broad variety of variables better. Some market sentiment variables are suggested to incorporate in a future research. Because, the stock market returns are not solely based on pure reasoning.

Another recommendation is to cluster certain types of countries. Tables D.13 till D.16 at the appendix show the regression results of solely European countries. The R-squared values of these models are significantly larger compared to the variables of the complete dataset showed in the Tables 1 till 4. By clustering developed countries and developing countries it would help to create more applicable and explanatory models. The clustering should not necessarily be only based on economic characteristics, it can also be based on the number of Covid-19 cases or on the stringency levels across the countries for example.

Another limitation of the investigation done is the existence of only two datapoints for every country, one datapoint for every year. Due to the way of calculating the abnormal stock market return (volatility) it made incorporating both years into one model difficult. To tackle this problem and give a better overview of the effect of government spending on the abnormal stock market return (volatility) is to shorten the beginning and end date of the calculation of the abnormal stock market return. What is in line with the work of Fernandez-Perez (2021) who took a seven and seventeen day window to see the effect of the abnormal stock market return. Other papers did even take it to a smaller period and used a day-to-day measurement like the work of Heyden and Heyden (2021). The believe is that shortening the time period of calculating the abnormal stock market return (volatility) will make it possible to incorporate the results of both two years in one model

Another recommendation for future research is based on the simultaneity bias. Based on the results there is the believe that this research did not exclude the simultaneity bias in its totality, what can especially be reasoned by the results shown by the effect of the government spendings and the abnormal stock market return volatility. The result shows a positive effect between the government spending and abnormal stock market return volatility, what means that government spending induces a higher risk. But this paper does not take into account the increase of government spending as soon a government sees a higher volatility at their stock market. Therefore, future research investigating the effect of the stock market return volatility on government spendings is recommended, to determine if there is an effect the other way around as well.

Lastly, it would be interesting to enlarge the investigated time period to the year 2022, and maybe even to 2023, to see the results of the government spending across the different countries at the aftermath of the Covid-19 crisis. Another interesting enlargement of the research would be to take monetary policy into account.

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APPENDICES

Appendix A – Description of variables

Table A.1: All used variables with description

Variable	Description
Abnormal Stock Market Return (AbStMR)	The return generated by a given stock or portfolio over a period of time which is higher than the return generated by its benchmark or the expected rate of return.[1]
Abnormal Stock Market Return Volatility (AbStMRV)	How much and how quickly the prices move over a given span of time which is higher than the volatility of its benchmark. [1]
Liquidity Support as a percentage of GDP (LiqSupGDPD)	Financial measures which are mainly equity injections, loans, and asset purchases to help companies survive the Covid-19-related restrictions.[2]
Additional Spending and Foregone Revenues as a percentage of GDP (SpendingForeRevGDPD)	Government spendings related to tax policies, that are introduced to make life easier during the Covid-19 crisis.[2]
Confirmed Cases (ConCasesD)	The number of Covid-19 infections in a certain country.[4]
Confirmed Deaths (ConDeathD)	The number of deaths due to Covid-19 in a certain country.[4]
Average Stringency Index (AvgStringency)	Index that records the strictness of policies set by the governments. The strictness policies primarily restrict people's ability to go to social activities, like going to school, going to public events, or going abroad.[3]
Average Economic Support Index (AvgEconomicSupport)	Indix on how strong the debt relief and income support is of a certain country.[3]
Average Containment Health Index (AvgContHealth)	Index based on government measures related to limiting the number of new Covid-19 infections, lockdown restrictions and closures indicators. Testing policies, contact tracing, and short-term healthcare investment indicators are used as well to determine this index.[3]
Average Government Response Index *(AvgGovRes)*	A generic government intervention index. Show how severe the measures of the government were during the Covid-19 crisis were in general.[3]
Gross Domestic Poduct per Capita per Person (GDPPC)	The sum of gross value added by all resident producers in the economy plus any product taxes.[1]
Life Expectancy (LifeExpectancy)	A statistical measure of the estimate of the span of a life in a certain country.[5]

Population (lnPop)	The number of inhabitants in a certain country.[4]
Population Density (lnPopDen)	The average number of people per squared kilometre in a certain country.[4]

Note: In parentheses the version used in the models. 1. Source: WorldBank. 2. Source: IMF. 3. Source: OxCGRT. 4. Source: WHO. 5. Source: National Geographic. 5. Wikipedia

Appendix B – General information

Table B.1: List of countries used in the models and the continent the countries belong to

Country	Continent	Country	Continent	Country	Continent
United Arab Emirates	Asia	**Hong Kong**	Asia	**Namibia**	Africa
Argentina	S. America	**Croatia**	Europe	**Nigeria**	Africa
Australia	Oceania	**Hungary**	Europe	**Netherlands**	Europe
Austria	Europe	**Indonesia**	Asia	**Norway**	Europe
Belgium	Europe	**India**	Asia	**New Zealand**	Oceania
Bangladesh	Asia	**Ireland**	Europe	**Oman**	Asia
Bulgaria	Europe	**Iceland**	Europe	**Pakistan**	Asia
Bahrain	Asia	**Israel**	Asia	**Panama**	N. America
Bosnia and Herzegovina	Europe	**Italy**	Europe	**Peru**	S. America
Brazil	S. America	**Jamaica**	N. America	**Philippines**	Asia
Botswana	Africa	**Jordan**	Asia	**Poland**	Europe
Canada	N. America	**Japan**	Asia	**Portugal**	Europe
Switzerland	Europe	**Kazakhstan**	Asia	**Qatar**	Asia
Chile	S. America	**Kenya**	Africa	**Russia**	Europe
China	Asia	**South Korea**	Asia	**Saudi Arabia**	Asia
Colombia	S. America	**Kuwait**	Asia	**Singapore**	Asia
Cyprus	Europe	**Laos**	Asia	**Serbia**	Europe
Czech Republic	Europe	**Lebanon**	Asia	**Slovakia**	Europe
Germany	Europe	**Sri Lanka**	Asia	**Slovenia**	Europe
Denmark	Europe	**Lithuania**	Europe	**Sweden**	Europe
Egypt	Africa	**Luxembourg**	Europe	**Thailand**	Africa
Spain	Europe	**Latvia**	Europe	**Tunisia**	Asia
Estonia	Europe	**Morocco**	Africa	**Turkey**	Asia
Finland	Europe	**Mexico**	N. America	**Tanzania**	Africa
France	Europe	**Malta**	Europe	**Ukraine**	Europe
United Kingdom	Europe	**Mongolia**	Asia	**United States**	N. America
Ghana	Africa	**Mauritius**	Africa	**Vietnam**	Asia
Greece	Europe	**Malaysia**	Asia	**South Africa**	Africa

Table B.2: Number of countries per continent

Continent	#countries
Africa	11
Asia	27
Europe	34
N. America	5
S. America	5
Oceania	2

Table B.3: Descriptive statistics for the year 2020

Variable	Obs	Mean	Std. Dev.	Min	Max
AbStMR	84	-12.661	12.797	-36.888	30.868
AbStMRV	84	.682	8.241	-38.305	29.049
LiqSupGDPD	84	.96	1.666	0	7.716
SpendingForeRevGDPD	84	5.173	4.349	0	19.063
ConCasesD	84	2.353	1.995	.001	7.363
ConDeathD	84	.045	.05	0	.279
AvgStringency	84	57.649	10.289	25.234	81.772
AvgEconomicSupport	84	63.076	18.856	24.934	99.052
AvgContHealth	84	53.43	8.115	20.353	74.438
AvgGovRes	84	53.193	7.906	17.807	74.014
GDPPC	84	34227.15	24050.07	2694.436	120010.2
LifeExpectancy	84	76.356	6.054	52.887	85.498
Pop	84	75926395	2.185e+08	366463	1.411e+09
PopDen	84	369.969	1172.377	2.076	7965.878

Table B.4: Descriptive statistics for the years 2021

Variable	Obs	Mean	Std. Dev.	Min	Max
AbStMR	84	12.655	17.238	-23.759	76.868
AbStMRV	84	.306	7.195	-30.792	12.2
LiqSupGDPD	84	-.014	.958	-4.307	5.969
AdSpendingForeRevGDPD	84	2.033	2.293	-3.043	8.783
ConCasesD	84	6.769	5.014	.002	20.653
ConDeathD	84	.09	.082	0	.34
AvgStringency	84	55.391	10.418	12.059	73.659
AvgEconomicSupport	84	52.794	26.061	0	100
AvgContHealth	84	60.775	9.157	17.213	76.83
AvgGovRes	84	59.791	9.093	17.971	78.173
GDPPC	84	37377.19	26707.84	2850.613	131511
LifeExpectancy	84	75.704	6.67	52.676	85.493
Pop	84	76383657	2.195e+08	372520	1.412e+09
PopDen	84	369.963	1167.012	2.115	7918.951

Table B.5: Descriptive statistics for the years 2020 and 2021

Variable	Obs	Mean	Std. Dev.	Min	Max
AbStMR	168	-.003	19.755	-36.888	76.868
AbStMRV	168	.494	7.715	-38.305	29.049
LiqSupGDPD	168	.473	1.44	-4.307	7.716
dSpendingForeRevGDPD	168	3.603	3.807	-3.043	19.063
ConCasesD	168	4.561	4.402	.001	20.653
ConDeathD	168	.067	.071	0	.34
AvgStringency	168	56.52	10.384	12.059	81.772
AvgEconomicSupport	168	57.904	23.277	0	100
AvgContHealth	168	57.102	9.38	17.213	76.83
AvgGovRes	168	56.492	9.116	17.807	78.173
GDPPC |	168	35802.17	25386.71	2694.426	131511
LifeExpectancy	168	76.03	6.359	52.676	85.498
Pop	168	76155026	2.183e+08	366463	1.412e+09
PopDen	168	369.966	1166.19	2.076	7965.878

Appendix C – Correlations

To see the effect of all the variables on the abnormal stock market return (model 1,2) and abnormal stock market return volatility (model 3,4), a regression of the year 2020 and 2021 is made with all the variables, what can be seen in Table C.1. The four models show that the variables got a bigger explanatory power on the abnormal stock market return compared to the logarithm of the abnormal stock market volatility. Some control variables are however correlated with each other, what will lead to multicollinearity. To get rid of this problem, some control variables will be removed based on the correlation Tables C.2 till C.9. Tables C.2 till C.5 are the correlation tables for the dataset of 2020, Tables C.6 till C.9 are the correlation tables for the dataset of 2021.

Table C.1: Regression results of the abnormal stock market return and of the abnormal stock market return volatility with all dependent and control variables

VARIABLES	(1) 2020 AbStMR	(2) 2021 AbStMR	(3) 2020 AbStMRV	(4) 2021 AbStMRV
LiqSupGDPD	0.948	-0.824	0.073	-0.213
	(0.896)	(1.924)	(0.612)	(0.876)
AdSpendingForeRevGDPD	-0.468	0.972	0.212	0.246
	(0.419)	(0.891)	(0.286)	(0.406)
ConCasesD	1.101	1.605***	0.245	-0.378
	(1.147)	(0.505)	(0.783)	(0.230)
ConDeathD	-58.971	-81.954***	20.841	11.769
	(42.868)	(26.091)	(29.261)	(11.882)
AvgStringency	-0.204	0.426	-0.095	-0.501*
	(0.396)	(0.576)	(0.270)	(0.262)
AvgEconomicSupport	-0.170	16.723**	-0.055	2.302
	(0.218)	(7.972)	(0.149)	(3.631)
AvgContHealth	0.058	116.956**	-0.418	16.870
	(1.766)	(55.603)	(1.206)	(25.321)
AvgGovRes	0.210	-133.966**	0.531	-18.650
	(1.884)	(63.554)	(1.286)	(28.942)
GDPPC	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
LifeExpectancy	0.864**	-0.002	-0.137	0.230
	(0.371)	(0.424)	(0.253)	(0.193)
lnPop	2.479**	-0.167	0.678	0.121
	(1.001)	(1.323)	(0.684)	(0.603)
lnPopDen	-0.403	-0.197	0.449	0.307
	(0.932)	(1.280)	(0.636)	(0.583)
Constant	-109.739***	4.997	-4.810	-24.078
	(31.485)	(38.464)	(21.492)	(17.516)
Observations	84	84	84	84
R-squared	0.234	0.290	0.129	0.155

Note: This table shows the results of the four OLS regressions, with the abnormal stock market return (1,2) and the abnormal stock market return volatility (3,4) as the dependent variable. liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP as dependent variables. Confirmed cases, confirmed deaths, average stringency index, average economic support index, average containment health index, average government response index, GDP per *capita, life expectancy, the natural logarithm of population and the natural logarithm of population density as control variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table C.2: Correlation table for government responses in (2020)

Variables	(1)	(2)	(3)	(4)
(1) AvgContHealth	1.000			
(2) AvgGovRes	0.943	1.000		
(3) AvgEconomicSupport	0.020	0.331	1.000	
(4) AvgStringency	0.906	0.813	-0.096	1.000

In Table C.2, it can be seen that the government response index correlates heavily with the average containment health index and with the average stringency index. This makes sense by the fact that the average government response index is a summary index of the other three indices. Average stringency index and the average containment health index do also show a high correlation. Therefore, in the models, the choice between those two variables should be made. The choice is made based on which variable fits the data best and increases the explanatory power more in the models. For both the variable average stringency index and the variable average containment health index can be combined with the variable average economic support index.

Table C.3: Correlation table for all economic support variables (2020)

Variables	(1)	(2)	(3)
(1) AdSpendingForeRevGDP	1.000		
(2) LiqSupGDPD	-0.240	1.000	
(3)AvgEconomicSupport	0.193	0.200	1.000

In Table C.3, it can be seen that there is no correlation between the three government spending related variables. Because, the average economic support index is based on government spending, there could have been correlation between additional spending and foregone revenue as a percentage of GDP and with liquidity support as a percentage of GDP, this is however not the case. So, all three variables can be used in one regression model.

Table C.4: Correlation table for Covid-19 related victims (2020)

Variables	(1)	(2)
(1) ConCasesD	1.000	
(2) ConDeathD	0.651	1.000

In Table C.4, it can be seen that there is a high correlation between the two variables confirmed cases as a percentage of the population and confirmed deaths as a percentage of the population. Because, confirmed cases as a percentage of the population got a direct effect on the number of deaths. Confirmed cases will be the main variable investigated. This does not apply for the Tables 1, D.1, and D.2, where confirmed deaths as a percentage of the population is taken as a variable.

Table C.5 Correlation table for country specific characteristics (2020)

Variables	(1)	(2)	(3)	(4)
(1) lnPop	1.000			
(2) lnPopDen	0.085	1.000		
(3) GDPPC	-0.392	0.165	1.000	
(4) LifeExpectancy	-0.313	0.201	0.705	1.000

In Table C.5, life expectancy shows a strong correlation with GDP per capita. Wealthier countries are overall more capable of investing in healthcare and provide good living conditions, what will eventually lead to a higher life expectancy. Therefore, one of these variables will be dropped in the models, to limit multicollinearity.

Table C.6: Correlation table for government responses in (2021)

Variables	(1)	(2)	(3)	(4)
(1) AvgContHealth	1.000			
(2) AvgGovRes	0.935	1.000		
(3) AvgEconomicSupport	0.145	0.487	1.000	
(4) AvgStringency	0.920	0.810	-0.007	1.000

Table C.6, looks similar to Table C.2. The same conclusion as for Table C.2 can therefore be made.

Table C.7: Correlation table for all economic support variables (2021)

Variables	(1)	(2)	(3)
(1) AdSpendingForeRevGDP	1.000		
(2) LiqSupGDPD	0.033	1.000	
(3)AvgEconomicSupport	0.256	-0.248	1.000

Table C.7 looks different compared to Table C.3. The correlation between additional spending and foregone revenue as a percentage of GDP and liquidity support as a percentage of GDP is positively correlated. While the average economic support index is now negatively correlated with liquidity support. However, Table C.7 shows there is no multicollinearity between those variables.

Table C.8: Correlation table for Covid-19 related victims (2021)

Variables	(1)	(2)
(1) ConCasesD	1.000	
(2) ConDeathD	0.483	1.000

Table C.8, looks similar to Table C.4. The same conclusion as for Table C.4 can therefore be made.

Table C.9: Correlation table for country specific characteristics (2021)

Variables	(1)	(2)	(3)	(4)
(1) lnPop	1.000			
(2) lnPopDen	0.084	1.000		
(3) GDPPC	-0.393	0.164	1.000	
(4) LifeExpectancy	-0.287	0.219	0.705	1.000

Table C.9, looks similar to Table C.5. The same conclusion as for Table C.5 can therefore be made.

Appendix D – Robustness checks

The robustness checks are shown by various tables in this chapter. Tables D.1 till D.8 will check the values of the coefficients by solely having one of the two government spending variables into the OLS regressions. Table D.9 till Table D.12 will show the coefficients values of the two government spending variables with different control variables. Tables E.13 till E.16 are regressions with the same control variables as used in the Tables 1 till 4, however now with solely European countries as dataset. Lastly Table E.17 will show the results of the fixed-effect models.

Table D.1: OLS regression model results for liquidity support as a percentage of GDP on the abnormal stock market return (2020)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	1.467*	1.647*	1.723**	1.476*	1.388*
	(0.832)	(0.852)	(0.863)	(0.842)	(0.831)
AvgEconomicSupport		-0.086	-0.088	-0.188**	-0.179**
		(0.076)	(0.076)	(0.084)	(0.083)
AvgContHealth			0.125	0.201	0.083
			(0.195)	(0.191)	(0.198)
ConDeathD				-38.145	-38.421
				(28.463)	(28.024)
LifeExpectancy				0.764***	0.888***
				(0.267)	(0.271)
lnPopD					1.573*
					(0.849)
Constant	-14.069***	-8.852*	-15.523	-69.790***	-99.482***
	(1.594)	(4.891)	(11.490)	(21.367)	(26.443)
Observations	84	84	84	84	84
R-squared	0.037	0.052	0.057	0.160	0.196

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.2: OLS regression model results for additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return (2020)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
AdSpendingForeRevGDPD	-0.048	0.070	0.087	-0.268	-0.498
	(0.325)	(0.363)	(0.368)	(0.370)	(0.375)
AvgEconomicSupport		-0.066	-0.068	-0.164*	-0.141
		(0.084)	(0.084)	(0.088)	(0.086)
AvgContHealth			0.077	0.135	-0.023
			(0.199)	(0.193)	(0.201)
ConDeathD				-31.212	-31.052
				(28.769)	(28.054)

LifeExpectancy				0.902***	1.109***
				(0.283)	(0.291)
lnPop					1.979**
					(0.887)
Constant	-12.414***	-8.864*	-12.980	-75.709***	-116.114***
	(2.190)	(5.011)	(11.727)	(22.287)	(28.294)
Observations	84	84	84	84	84
R-squared	0.000	0.008	0.010	0.132	0.185

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.1 and D.2 show the individual effects of liquidity support as a percentage of GDP (D.1) and additional spending and foregone revenue as a percentage of GDP (D.2) on the abnormal stock market return in the year 2020. The coefficients presented in both tables look almost identical to the ones in Table 1. Liquidity support as a percentage of GDP shows in all 5 models of Table D.1 a slightly smaller coefficient value compared to the coefficient values given in Table 1. The coefficient values of additional spending and foregone revenue are in table D.2 slightly larger (more negative) compared to the values given in Table 1. The coefficients added up with each other in Table 1 do not show a larger effect on the abnormal stock market return compared to the added up values of liquidity support and additional spending and foregone revenue as percentage of GDP given in Table D.1 and D.2. The other coefficients in the models at Table D.1 and D.2 show similar results compared to Table 1.

Table D.3: OLS regression model results for liquidity support as a percentage of GDP on the abnormal stock market return (2021)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	AbStMR	AbStMR	AbStMR	AbStMR	AbStMR
LiqSupGDPD	0.786	0.950	0.944	-0.514	-0.474
	(1.986)	(2.061)	(2.079)	(2.017)	(2.029)
AvgEconomicSupport		0.024	0.024	-0.096	-0.093
		(0.076)	(0.077)	(0.082)	(0.082)
AvgContHealth			0.009	0.057	0.040
			(0.213)	(0.203)	(0.207)
ConCasesD				1.087***	1.156***
				(0.403)	(0.431)
GDPPC				0.000	0.000
				(0.000)	(0.000)
lnPop					0.594
					(1.266)
Constant	12.666***	11.383**	10.870	2.953	-6.884
	(1.891)	(4.421)	(13.079)	(12.615)	(24.495)
Observations	84	84	84	84	84
R-squared	0.002	0.003	0.003	0.128	0.131

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.4: OLS regression model results for additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return (2021)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
AdSpendingForeRevGDPD	1.438*	1.490*	1.518*	0.687	0.620
	(0.815)	(0.848)	(0.864)	(0.877)	(0.909)
AvgEconomicSupport		-0.018	-0.016	-0.095	-0.093
		(0.075)	(0.075)	(0.078)	(0.078)
AvgContHealth			-0.043	0.024	0.015
			(0.211)	(0.205)	(0.208)
ConCasesD				0.978**	1.033**
				(0.411)	(0.452)
GDPPC				0.000	0.000
				(0.000)	(0.000)
lnPop					0.391
					(1.130)
Constant	9.732***	10.572**	13.049	4.632	-2.004
	(2.488)	(4.300)	(12.906)	(12.727)	(25.499)
Observations	84	84	84	84	84
R-squared	0.037	0.037	0.038	0.134	0.135

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.3 and D.4 show the individual effects of liquidity support as a percentage of GDP (D.3) and additional spending and foregone revenue as a percentage of GDP (D.4) on the abnormal stock market return of 2021. The coefficients presented in Table D.2 and D.3 look almost identical to the coefficients in Table 2. The coefficients in Table 2 show, just as with Table 1 no synergy effect of the results between the two government spending variables. The other conclusions drawn from Table D. 1 and D.2 about the relationship with Table 1, do also apply for the Tables D.3 and D.4 and their relationship with Table 2.

The differences in coefficients between the two years (Tables D.1 and D.2 being the results of 2020 and Tables D.3 and D.4 being the results of 2021) are similar with the differences showed by Table 1 and 2 in the results section. Interestingly based on the six tables reviewed (D.1 to D.4, Table 1 and 2), the conclusion can be made that in 2020 liquidity support as a percentage of GDP causes the larger R-squared value in model 1 of table 1, based on the models 1 of Table D.1 and D.2 compared to additional spending and foregone revenue as a percentage of GDP. While, in 2021 additional spending and foregone revenue as a percentage of GDP causes the larger R-squared value in model 1 of Table 2 compared to liquidity support as a percentage of GDP.

Table D.5: OLS regression model results for liquidity support as a percentage of GDP on the abnormal stock market return volatility (2020)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
LiqSupGDPD	0.501	0.172	0.169	0.112	0.156
	(0.543)	(0.560)	(0.561)	(0.567)	(0.571)
GDPPC		0.000*	0.000*	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			0.021	0.019	0.015
			(0.051)	(0.052)	(0.052)
ConCasesD				0.410	0.401
				(0.505)	(0.506)
lnPopDen					0.451
					(0.573)
Constant	0.201	-2.097	-3.570	-3.930	-5.616
	(1.040)	(1.551)	(3.130)	(3.168)	(3.831)
Observations	84	84	84	84	84
R-squared	0.010	0.056	0.068	0.075	0.083

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.6: OLS regression model results for additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return volatility (2020)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
AdSpendingForeRevGDPD	0.367*	0.233	0.256	0.300	0.311
	(0.205)	(0.219)	(0.232)	(0.236)	(0.237)
GDPPC		0.000	0.000*	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			0.003	-0.003	-0.007
			(0.054)	(0.054)	(0.054)
ConCasesD				0.535	0.534
				(0.504)	(0.505)
lnPopDen					0.475
					(0.565)
Constant	-1.214	-2.719	-3.340	-3.757	-5.539
	(1.384)	(1.657)	(3.116)	(3.138)	(3.790)
Observations	84	84	84	84	84
R-squared	0.037	0.067	0.081	0.094	0.102

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.5 and D.6 show the individual effects of liquidity support as a percentage of GDP (D.5) and additional spending and foregone revenue as a percentage of GDP (D.6) on the abnormal stock market return volatility of 2020. The coefficients presented by Table D.6 are almost identical to the values given by Table 3 in the results section. By comparing model 1 in Table D.5 and D6 the conclusion can be made that additional spending explains more of the variance of the abnormal stock market return volatility compared to liquidity support. This is the opposite result compared to the abnormal stock market return of 2020, in which liquidity support caused the majority of the variance explanation in model 1 of Table 1. The models of the Tables D.5 and D.6 show similar results of the coefficient of the control variables, only the average economic support index differs in sign. In D.5 it is positive related with the abnormal market return volatility, while in Table D.6 it is negatively related. A possible explanation for this is the fact that the variables liquidity support and additional spending and foregone revenue as a percentage of GDP have some correlation with the variable average economic support index. What results in a small difference of the variable coefficients.

Table D.7: OLS regression model results for liquidity support as a percentage of GDP on the abnormal stock market return volatility (2021)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
LiqSupGDPD	-0.131	-0.172	-0.239	-0.038	-0.099
	(0.830)	(0.812)	(0.848)	(0.859)	(0.862)
GDPPC		0.000**	0.000**	0.000**	0.000**
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			-0.010	0.004	-0.004
			(0.033)	(0.034)	(0.035)
ConCasesD				-0.221	-0.189
				(0.171)	(0.175)
lnPopDen					0.462
					(0.516)
Constant	0.304	-2.038	-1.650	-1.145	-2.907
	(0.790)	(1.335)	(1.896)	(1.928)	(2.759)
Observations	84	84	84	84	84
R-squared	0.000	0.054	0.055	0.075	0.084

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.8: OLS regression model results for additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return volatility (2021)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
AdSpendingForeRevGDPD	0.210	0.038	0.055	0.192	0.223
	(0.346)	(0.349)	(0.358)	(0.369)	(0.370)
GDPPC		0.000**	0.000**	0.000**	0.000**
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			-0.008	0.002	-0.006
			(0.032)	(0.033)	(0.034)
ConCasesD				-0.246	-0.219
				(0.174)	(0.177)
lnPopDen					0.485
					(0.516)
Constant	-0.120	-2.078	-1.772	-1.198	-3.076
	(1.056)	(1.406)	(1.878)	(1.910)	(2.763)
Observations	84	84	84	84	84
R-squared	0.004	0.054	0.055	0.078	0.088

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.7 and D.8 show the individual effect of liquidity support as a percentage of GDP (D.7) and additional spending and foregone revenue as a percentage of GDP (D.8) on the abnormal stock market return volatility of 2021. The Tables D.7, D.8 and 4, show coefficients that are all pretty similar. Also in 2021 additional government spending and foregone revenue as a percentage of GDP explains the variance of the abnormal stock market return volatility more compared to the variable liquidity support as a percentage of GDP. The differences between the years 2020 and 2021 in the tables D.5 till D.8 are similar to the differences showed between the Tables 3 and 4.

By having analysed the results in the Tables D.1 till D.8 the conclusion can be made that investigating the two government spending variables separately does not change the models much compared to the models presented in the Tables 1 till 4 where they were investigated together. It shows however, that liquidity support as percentage of GDP, has a larger explanatory power of the variance of the abnormal stock market return in 2020 compared to additional spending and foregone revenue as a percentage of GDP. While additional spending and foregone revenue as a percentage of GDP has a larger explanatory power on the variance of the abnormal stock market return in 2021. The results of the abnormal stock market return volatility is the other way around. In which liquidity support as a percentage of GDP led in 2021 to a bigger explanatory power, while additional spending and foregone revenue as a percentage of GDP led in 2020 to a bigger explanatory power. Although these conclusions cannot be made with a degree of certainty, due to the lack of significance.

Table D.9: OLS regression model results with the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP with additional control variables on the abnormal stock market return (2020)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR
LiqSupGDPD	1.481*	1.075	1.319
	(0.843)	(0.829)	(0.848)
AdSpendingForeRevGDPD	-0.087	-0.608*	-0.230
	(0.325)	(0.358)	(0.368)
AvgGovRes	0.043	-0.085	
	(0.178)	(0.182)	
ConDeathD		-38.929	-29.913
		(28.063)	(28.262)
LifeExpectancy		0.893***	0.790***
		(0.289)	(0.292)
lnPop		2.150**	
		(0.848)	
AvgEconomicSupport			-0.174**
			(0.087)
lnPopDen			0.344
			(0.876)
Constant	-15.940	-108.227***	-62.335***
	(9.608)	(28.260)	(19.607)
Observations	84	84	84
R-squared	0.038	0.177	0.154

*Note: This table shows three OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), the average government response index (1,2) , confirmed death as percentage of the total population (2,3), life expectancy (2,3), the natural logarithm of the population (2), the average economic support index (3), and the natural logarithm of the population density (3) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

In Table D.9, three regressions are shown in which different control variables are added, compared to the control variables used in the models of Table 1. Table D.9 shows what kind of effect this has on the government spending variables and on the abnormal stock market return of the year 2020. In all three models liquidity support as a percentage of GDP shows a positive effect on the abnormal stock market return, while additional spending and foregone revenues as a percentage of GDP shows a negative effect on the abnormal stock market return. This is in line with the results given by the models in Table 1. Model 1 of Table D.9, shows the effect of the two government spending variables and the variable average government response index. The variable average government response index shows a small positive effect of 0.043, while the coefficients of the two government response variables remain similar to the coefficients of the two variables in model 3 of Table 1. The second model shows the same model as model 5 in Table 1, however now the two government variables average economic support index and average containment health index are replaced by the more general average government response index. The variables of both models look pretty similar. The effect of additional spending and foregone revenue as percentage of GDP is slightly larger in this model, while the effect of liquidity support as percentage of GDP is slightly smaller in Table D.9. The last model checks the effect of the natural logarithm of population density instead of the natural logarithm of population. The natural logarithm of population density shows a positive effect of 0.344. What means 1 percent increase of the natural logarithm of the population density results in a 0.344% increase of the abnormal stock market return. Because, the value is not significant at a level of 10%, the effect cannot be stated with a degree of certainty.

Table D.10: OLS regression model results with the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP with additional control variables on the abnormal stock market return (2021)

	(1)	(2)	(3)
VARIABLES	AbStMR	AbStMR	AbStMR
LiqSupGDPD	0.678	0.243	-0.474
	(1.973)	(1.935)	(2.022)
AdSpendingForeRevGDPD	1.476*	0.459	0.685
	(0.832)	(0.910)	(0.870)
AvgStringency	-0.074	0.023	
	(0.183)	(0.188)	
ConCasesD		0.943**	0.962**
		(0.451)	(0.421)
GDPPC		0.000	0.000
		(0.000)	(0.000)
lnPop		0.491	
		(1.325)	
lnPopDen			-0.442
			(1.214)
AvgEconomicSupport			-0.093
			(0.084)
Constant	13.776	-7.316	7.848
	(10.219)	(24.405)	(6.488)
Observations	84	84	84
R-squared	0.040	0.120	0.137

*Note: This table shows three OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), the stringency index (1,2) , confirmed cases as percentage of the total population (2,3), GDP per capita (2,3), the natural logarithm of the population (2), the natural logarithm of the population density (3), and the average economic support index (3) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

In Table D.10, three regressions are shown in which different control variables are added to see what kind of effect they have on the government spending variables and the abnormal stock market return. Model 1 of Table D.10, shows the effect of the variable average stringency index on the abnormal stock market return. This variable is replace by the variable average economic support index, what can be seen in model 2 of Table 2. The variable average stringency index shows a negative effect of -0.074

on the abnormal stock market return. The values of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP show similar results in model 1 of Table D.10 compared to the coefficient values given in Model 2 of Table 2. Model 2 of D.10 shows the same model as model five of Table 2, however the variable average economic support index is replaced by the variable average stringency index. This changes the coefficients of the government spending variables. In Model 5 of Table 2 liquidity support as a percentage of GDP shows a negative effect of -0.526, while in model 2 of Table D.10 liquidity has a positive effect of 0.210. The average stringency index shows an effect of 0.023 on the abnormal stock market return. Apart from the variable liquidity support as a percentage of GDP the other variables show similar results. In Model 3 of Table D.10, the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return can be seen with the addition of the natural logarithm of population density. The coefficient shows a negative effect of -0.442 on the abnormal stock market return. While the coefficients of the two government spending variables remain similar compared to model in which the variable natural logarithm of population is incorporated into the regression.

Table D.11: OLS regression model results with the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP with additional control variables on abnormal stock market return volatility (2020)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV
LiqSupGDPD	0.456	0.098	0.179
	(0.548)	(0.567)	(0.571)
AdSpendingForeRevGDPD	0.359	0.241	0.290
	(0.228)	(0.243)	(0.226)
GDPPC		0.000	0.000
		(0.000)	(0.000)
AvgEconomicSupport	0.019	0.003	
	(0.053)	(0.055)	
ConCasesD		0.603	0.526
		(0.512)	(0.522)
lnPop		0.721	
		(0.579)	
AvgGovRes			-0.089
			(0.118)
lnPopDen			0.556
			(0.578)
Constant	-2.920	-16.695	-1.131
	(3.148)	(10.893)	(6.360)
Observations	84	84	84
R-squared	0.056	0.113	0.094

Note: This table shows three OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), GDP per capita (2,3), the average economic support index (1,2), confirmed cases a percentage of the total population (2,3, the natural logarithm of the population (2), average government response index (3), and the natural *logarithm of the population density (3) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

In Table D.11, three regressions are shown in which different control variables are added compared to the control variables used in the models of Table 3. All three models in Table D.11 show similar results compared to the results given by Table 3. The largest difference between the models of Table 3 and D.11 is showed by model 2 of Table D.11. Here the natural logarithm of population density is replaced by the natural logarithm of population. As a result the coefficient of liquidity support as percentage of GDP decreases to a value of 0.098. The coefficient of additional support and foregone revenue as a percentage of GDP does decrease compared to the model with the natural logarithm of the population density, to a value of 0.241. On the other hand confirmed cases and the average government support index show an increase in their coefficients to a value of 0.603 and 0.003. The change in the used control variable of average government response index instead of the average economic support index results in lower coefficients of the two government spending variables in model 3 of Table D.11 compared to model 5 of Table 3. In model 1 of Table D.11 the variable average economic response index is used instead of the variable GDP per capita as the only control variable. Resulting in slightly larger coefficients for the two government spending variables compared to model 3 of Table 3. Both models of D.11 have a lower R-squared value compared to the models in Table 3. The last thing to add is due to the insignificance of the coefficient in the models of D.11, the coefficients and the related conclusions cannot be stated with a degree of certainty.

Table D.12: OLS regression model results with the effect of liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP with additional control variables on abnormal stock market return volatility (2021)

	(1)	(2)	(3)
VARIABLES	AbStMRV	AbStMRV	AbStMRV
LiqSupGDPD	-0.080	-0.061	-0.071
	(0.869)	(0.870)	(0.824)
AdSpendingForeRevGDPD	0.183	0.207	0.218
	(0.364)	(0.388)	(0.381)
GDPPC		0.000**	0.000**
		(0.000)	(0.000)
AvgEconomicSupport	0.010	0.001	
	(0.033)	(0.035)	
ConCasesD		-0.255	-0.224
		(0.196)	(0.173)
lnPop		-0.074	
		(0.556)	
AvgGovRes			-0.004
			(0.095)
lnPopDen			0.472
			(0.531)
Constant	-0.577	0.170	-2.988
	(1.873)	(10.319)	(5.365)

Observations	84	84	84
R-squared	0.006	0.078	0.088

*Note: This table shows three OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), GDP per capita (2,3), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (1,2), confirmed cases as a percentage of the total population (2,3), the natural logarithm of the population (2), and the average government response index (3) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

In Table D.12, three regressions are shown in which different control variables are added compared to the control variables used in the models of Table 4 and the effect of them on the government spending variables and the abnormal stock market return volatility. The first model shows the effect of the variable average economic support index together with the two government spending variables. The coefficients of the government spending variables are similar in model 1 of D.12 compared to the coefficients given in model 1 of Table 4. What suggest that average economic support index does not have a large effect on these two government spending variables. Model 2 and 3 are similar models compared to model 2 and 3 in Table D.11. The liquidity support variable coefficient is a bit less negative compared to the values of the models in table 4, with a value of -0.061. In model 3 it is shows a slightly larger effect of -0.071. Additional spending and foregone revenue as a percentage of GDP shows in both models a similar result compared to the result given in model 5 in Table 4.

To check for validity another robustness check is performed, by applying the same models on only European countries, which consist out of 34 countries. The European dataset is chosen because of two reasons. The first reason is the fact that the main dataset consist mainly out of European and Asian countries, what makes comparing the various countries easier. The data of the European countries is overall also a bit more trustworthy compared to the Asian country dataset, based on the way the countries present their numbers to the outside world. The European countries were overall more open about their policies and true number of confirmed cases during the Covid-19 crisis, compared to some Asian countries, like China. (*"China Liegt Bewust Over Doden En Besmettingen Door Coronavirus,"* 2020)

Table D.13: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on abnormal stock market return Europe (2020)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	1.119	1.305	1.202	1.162	1.161
	(0.758)	(0.786)	(0.752)	(0.759)	(0.774)
AdSpendingForeRevGDPD	-0.893	-0.751	-1.176*	-1.017	-1.010
	(0.584)	(0.605)	(0.616)	(0.632)	(0.664)
AvgEconomicSupport		-0.086	-0.124	-0.145	-0.147

		(0.094)	(0.092)	(0.095)	(0.102)
AvgContHealth			0.541*	0.614**	0.617**
			(0.273)	(0.276)	(0.290)
ConDeathD				-58.694	-58.272
				(38.719)	(40.531)
LifeExpectancy				0.226	0.223
				(0.491)	(0.507)
lnPop					-0.057
					(1.264)
Constant	-8.193*	-3.424	-25.841*	-42.844	-41.768
	(4.075)	(6.606)	(12.968)	(37.760)	(45.189)
Observations	34	34	34	34	34
R-squared	0.161	0.184	0.281	0.346	0.346

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed deaths as a percentage of the total population (4,5), life expectancy (4,5), and the natural logarithm of the population (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.13, shows the same results as table 1, however now the dataset only consists out of European countries. The first thing noticeably different is the R-squared value of the five models in Table D.13. With the lowest R-squared of 0.161 and the highest of 0.346, the R-squared values are significantly larger compared to the ones in Table 1. So, the variance of the abnormal stock market return is better explained by the variables used on the European dataset. The only two variables that show significance are the variables average containment health index and additional spending and foregone revenue as a percentage of GDP. Average containment health index shows in every model a significance, contrary to the models in Table 1. The effect of this variable is also larger with a value from 0.541, 0.614, and 0.617 compared to the effect showed in the models of Table 1. Liquidity support as a percentage of GDP coefficients, look similar to the coefficients given in Table 1. The variables in Table D.13 are however not significant, contrary to the values in Table 1. The coefficients of additional spending and foregone revenue as a percentage of GDP are all negative related to the abnormal stock market return. In model 5 with a value of -1.010, what is more (more negative) compared to the -0.420 in Table 1. The coefficients of the natural logarithm of the population shows also a difference in Table D.13 compared to the value in Table 1, with a value of -0.056 instead of a value of 1.854.

Because of the differences between the European database and the database of the 84 countries, some conclusions can be made. The first conclusion that can be made on these results is, because of these differences it is harder to verify the assumption that the models in Table 1 fit all the regions in the world perfectly. The second conclusion which can be made, although with no 100% certainty due to the lack of significance, is that in European countries liquidity support as percentage of GDP is more effective in handling the abnormal stock market return compared to the additional spending and foregone revenue in 2020, what is in line with the results of the complete database presented in Table 1. However, the sidenote can be made, that there is the possibility that certain European countries, who are in deeper problems will use more additional spending and foregone revenue as a percentage of GDP, what will explain the large negative effect of additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return. This should however be investigated by other papers. Life expectancy plays also a smaller role in Europe, what can be explained that in especially Western Europe the life expectancy across countries is pretty similar if you compare this to the differences between Western European countries and some developing countries in Africa. The size of the country population size does in Europe play also a smaller effect compared to the world dataset.

Table D.14: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on abnormal stock market return Europe (2021)

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	0.865	1.404	1.397	0.778	0.799
	(1.677)	(1.756)	(1.781)	(1.628)	(1.595)
AdSpendingForeRevGDPD	1.258	0.925	0.770	0.622	0.421
	(0.952)	(1.004)	(1.084)	(0.982)	(0.971)
AvgEconomicSupport		0.110	0.092	0.108	0.068
		(0.107)	(0.117)	(0.108)	(0.109)
AvgContHealth			0.144	-0.007	0.228
			(0.344)	(0.313)	(0.346)
ConCasesD				0.406	0.259
				(0.534)	(0.533)
GDPPC				0.000***	0.000**
				(0.000)	(0.000)
lnPop					-2.237
					(1.530)
Constant	12.472***	6.355	-0.468	-8.936	19.813
	(3.543)	(6.928)	(17.739)	(16.457)	(25.428)
Observations	34	34	34	34	34
R-squared	0.061	0.093	0.098	0.322	0.373

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), average economic support index (2,3,4,5), average containment health index (3,4,5), confirmed cases as a percentage of the total population (4,5), GDP per capita (4,5), and the natural logarithm of the population (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.14, shows the same results as in Table 2, however now the dataset only consists out of European countries. The R-squared value is almost in all five models 3 times as large as in the models of Table 2. However, Table D.14 shows that only GDP per capita got significant coefficients. There is a big difference in the coefficients of liquidity support as a percentage of GDP among the two tables. In Table 2 the coefficients switches to a negative value with the adding of confirmed cases and GDP per capita, while this is not the case in Table D.14. Additional spending and foregone revenue as a percentage of GDP shows similar results in Table D.14 compared to the values given in Table 2. Confirmed cases got a smaller effect on European countries with a value of 0.406 in model 4 and 0.259 in model 5 compared to the world based dataset with a value of 0.997 and 1.049. The natural logarithm of population shows a negative effect to the abnormal stock market return. So, a country with more inhabitants is more prone to a negative abnormal stock market return. Average economic support index shows in Table D.14 a positive effect on the abnormal stock market return, while in Table 2 it shows a negative effect.

Table D.15: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on abnormal stock market return volatility Europe (2020)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	AbStMRV	AbStMRV	AbStMRV	AbStMRV	AbStMRV
LiqSupGDPD	0.735	0.090	0.078	-0.100	-0.077
	(0.450)	(0.423)	(0.432)	(0.438)	(0.442)
AdSpendingForeRevGDPD	0.760**	0.653**	0.635**	0.642**	0.754**
	(0.347)	(0.297)	(0.310)	(0.303)	(0.339)
GDPPC		0.000***	0.000***	0.000***	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			0.013	0.007	0.005
			(0.051)	(0.050)	(0.050)
ConCasesD				0.805	1.005*
				(0.521)	(0.587)
lnPopDenD					-0.007
					(0.009)
Constant	-4.269*	-9.776***	-10.359***	-12.524***	-10.942**
	(2.422)	(2.570)	(3.463)	(3.661)	(4.240)
Observations	34	34	34	34	34
R-squared	0.164	0.415	0.416	0.462	0.473

*Note: This table shows the results of five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), GDP per capita as a percentage of the total population (2,3,4,5), average economic support index (3,4,5), confirmed deaths as a percentage of the total population (4,5), and the natural logarithm of the population density (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.15, shows the same results as Table 3, however the dataset in Table D.15 only consists out of European countries. The models of D.15 have a far larger explanatory power of the variance of the abnormal stock market return volatility compared to the models in Table 3. The R-squared values of Table D.15 reach from 0.164 to 0.573, the R-squared values of Table 3 reach from 0.046 to 0.104. Just as what was the case with the two previous Tables, the coefficients of the European dataset do not totally match with the coefficients of the complete dataset. Liquidity support as a percentage of GDP shows in model 5 of Table D.15 a negative effect on the abnormal stock market return, while in Table

3 a positive effect is shown. In addition additional spending and foregone revenue as a percentage of GDP shows in Table D.15 a larger positive effect on the abnormal stock market return volatility compared to the one in Table 3. Furthermore, additional spending and foregone revenue as a percentage of GDP shows a significant effect at a 5% level in all 5 models. Confirmed cases as percentage of the total population does also show a significance at a 10% level in model 5. The effect of confirmed cases is in the European dataset is twice as much compared to the effect of the total dataset in Table 3 with a value of 1.005 in Table D.15. Population density shows a negative value of -0.007, in model 5 of Table D.15, this is a opposite and smaller effect compared to the effect of 0.498 in model 5 of Table 3.

Table D.16: OLS regression model results for liquidity support as a percentage of GDP, and additional spending and foregone revenue as a percentage of GDP on abnormal stock market return volatility Europe (2021)

VARIABLES	(1) AbStMRV	(2) AbStMRV	(3) AbStMRV	(4) AbStMRV	(5) AbStMRV
LiqSupGDPD	-0.126	-0.380	-0.320	-0.380	-0.407
	(0.779)	(0.677)	(0.719)	(0.737)	(0.734)
AdSpendingForeRevGDPD	0.679	0.590	0.553	0.522	0.532
	(0.442)	(0.382)	(0.411)	(0.420)	(0.418)
GDPPC		0.000***	0.000***	0.000***	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
AvgEconomicSupport			0.012	0.008	0.009
			(0.044)	(0.045)	(0.045)
ConCasesD				0.126	0.049
				(0.242)	(0.250)
lnPopDen					0.895
					(0.796)
Constant	-0.844	-6.908***	-7.616**	-8.559**	-11.572**
	(1.644)	(2.282)	(3.417)	(3.907)	(4.723)
Observations	34	34	34	34	34
R-squared	0.071	0.329	0.331	0.338	0.367

*Note: This table shows the results of the five OLS regression models, with the abnormal stock market return volatility as the dependent variable, liquidity support as a percentage of GDP (1,2,3,4,5), additional spending and foregone revenue as percentage of GDP (1,2,3,4,5), GDP per capita as a percentage of the total population (2,3,4,5), average economic support index (3,4,5), confirmed deaths as a percentage of the total population (4,5), and the natural logarithm of the population density (5) as the independent variables. The values given represent the regression coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.16, shows the same results as Table 4, however the dataset is in Table D.16 only based on European countries. The models of D.16 have a far larger explanatory power on the variance of the abnormal stock market return volatility compared to the models in Table 4. The R-squared reaches in Table D.16 from 0.071 to 0.367, while in Table 4 it reaches from 0.005 to 0.089. In both tables the only variable that shows significant coefficients is the variable GDP per capita. In the European dataset the coefficients of liquidity support and additional spending as a percentage of GDP are larger compared to the coefficients given in Table 4. Liquidity support as a percentage of GDP is 4 times more negative in Table D.16, while additional spending and foregone revenue as a percentage of GDP is more than two times as large, compared to Table 4. Confirmed cases and the average economic support index show in model 5 of Table D.16 some small positive values, while in model 5 of Table 3 they show some small negative values. The natural logarithm of the population density has in the European dataset a larger positive effect on the abnormal stock market return volatility compared to the complete dataset.

The overall conclusion of the validity check of running the regressions with solely European countries, is that the regressions of Table 1 till 4 are not suitable to copy on every other dataset concerning the response of government spending on the stock market return (volatility). The variables used in the models do explain the variances of the abnormal stock market return (volatility) of the European countries better compared to the complete dataset. The coefficients of the European models are overall also a bit more extreme (less close to 0).

Using a different type of model is the last robustness check. The data consist out of multiple countries and out of two different time periods. The data can therefore be regarded as panel data. However, there are some doubts about using this method explained in the methodology section. To see if this is true the fixed-effect models of the abnormal stock market return is shown in Table D.17. The fixed-effect model is chosen over the random-effect model based on the results of the Hausman tests shown by the Tables E.1 till E.5. The abnormal stock market return is solely investigated, because using one of the two dependent variables already shows what the effect of combining the two years in one model does to the variables liquidity support as a percentage of GDP and additional spending and foregone revenue as percentage of GDP.

Table D.17: Fixed-Effect model results for liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP on the abnormal stock market return

VARIABLES	(1) AbStMR	(2) AbStMR	(3) AbStMR	(4) AbStMR	(5) AbStMR
LiqSupGDPD	-3.431**	-1.635	-1.141	-0.914	-0.836
	(1.626)	(1.266)	(1.247)	(1.228)	(1.231)
AdSpendingForeRevGDPD	-2.089***	-0.708	-0.345	-0.180	-0.029
	(0.659)	(0.535)	(0.541)	(0.536)	(0.558)
ConCasesD		3.507***	2.959***	2.769***	2.637***
		(0.456)	(0.498)	(0.496)	(0.515)
AvgContHealth			0.752**	0.794**	0.705**
			(0.312)	(0.307)	(0.320)
AvgEconomicSupport				-0.247**	-0.233**
				(0.113)	(0.114)
GDPPC					0.001
					(0.001)
Constant	9.145***	-12.676***	-54.683***	-42.753**	-63.624**
	(2.685)	(3.505)	(17.753)	(18.413)	(28.223)
Observations	168	168	168	168	168
R-squared	0.226	0.552	0.583	0.608	0.613

*Note: This table shows the main results of five fixed-effect models (based on the Hausman tests Table E.1-E.5), with the abnormal stock market return as the dependent variable, liquidity support as a percentage of GDP and additional spending and foregone revenue as a percentage of GDP (1,2,3,4,5), confirmed cases as a percentage of the total population (2,3,4,5), the average containment health index (3,4,5), the average economic support index (4,5) and the GDP per capita (5) as the independent variables. The values given represent the fixed-effect coefficients. The values in the parentheses are the given standard errors. *** p<0.01, ** p<0.05, * p<0.1.*

Table D.17 uses a different model compared to the models used in previous tables. The effect of liquidity support as a percentage of GDP and the effect of additional spending as a percentage of GDP and foregone revenue as a percentage of GDP shows in this model a complete different result. Here both variables show a large negative effect on the abnormal stock market return. While confirmed cases does show a large positive effect on the abnormal stock market return. Table D.17, therefore, proofs the problem stated in the methodology section.

Appendix E – Hausman tests

To determine if the random-effect model or the fixed-effect model should be used, the Hausman test should be conducted.

Table E.1 Hausman test on abnormal stock market return, liquidity support as a percentage of GDP, additional spending and foregone revenue as a percentage of GDP

	Coef.
Chi-square test value	15.086
P-value	.001

Note: H_0: Difference in coefficients not systematic. Because the p-value <0.05 H_0, is rejected. Therefore, the Fixed-Effect model is used.

Table E.2 Hausman test on abnormal stock market return, liquidity support as a percentage of GDP, additional spending and foregone revenue as a percentage of GDP, and confirmed cases

	Coef.
Chi-square test value	53.415
P-value	0

Note: H_0: Difference in coefficients not systematic. Because the p-value <0.05 H_0, is rejected. Therefore, the Fixed-Effect model is used.

Table E.3 Hausman test on abnormal stock market return liquidity support as a percentage of GDP, additional spending and foregone revenue as a percentage of GDP, confirmed cases, and average containment health index

	Coef.
Chi-square test value	61.3
P-value	0

Note: H_0: Difference in coefficients not systematic. Because the p-value <0.05 H_0, is rejected. Therefore, the Fixed-Effect model is used.

Table E.4 Hausman test on abnormal stock market return, liquidity support as a percentage of GDP, additional spending and foregone revenue as a percentage of GDP, confirmed cases, average containment health index, and average economic support index

	Coef.
Chi-square test value	61.891
P-value	0

Note: H_0: Difference in coefficients not systematic. Because the p-value <0.05 H_0, is rejected. Therefore, the Fixed-Effect model is used.

Table E.5 Hausman test on abnormal stock market return, liquidity support as a percentage of GDP, additional spending and foregone revenue as a percentage of GDP, confirmed cases, average containment health index, average economic support index, and GDP per capita

	Coef.
Chi-square test value	77.015
P-value	0

Note: H_0: Difference in coefficients not systematic. Because the p-value <0.05 H_0, is rejected. Therefore, the Fixed-Effect model is used.