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The dynamic effect of infection rates on earnings management during the Covid-19 pandemic

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Abstract

Since the Covid-19 started in the beginning of 2020, the world became into uncertainty, this also holds for firms all over the world. We learned from previous crises that there are different results regarding the effect of any unforeseen period on the earnings management practices of firms. Within this research, the effect of the Covid-19 pandemic on accrual-based earnings management practices is investigated. Different from other articles about this topic, this research mainly focuses on the dynamic effect of the infection rates on earnings management, whether firms change their strategy during the crises and if they increase or decrease their earnings management activities. Besides that, this research examines the direction of earnings management practices, either income-decreasing or income-increasing. The analysis shows significant results for the non-monotonic component within the relationship, however there is no indication about the direction of it.

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1 Introduction

At the beginning of 2020, the world faced an unprecedented crisis in the form of the Covid-19 pandemic. This led to a lot of uncertainty in the world of business, but also for the investors and lenders connected to those businesses, as we could see by the dramatic drop of stock prices at the beginning of the pandemic. Therefore, the quality of financial reporting is important in this relationship between investors and organizations, because those investors, regulators, and lenders make their decisions on the hand of financial reporting information (Yeh et al., 2014). Because of the governmental measures in almost all countries, and a lot of uncertainty in the market, the production of companies was impacted a lot by the Covid-19 outbreak. According to this, the KPGM Global IFRS leader Reinhard Dotzlaw, argues that "Covid-19 poses existential threats on the ability of a business to survive, which in turn has significant financial reporting effects, from going concern and liquidity to recoverability and valuation of assets". Based on those facts, there could be a higher incentive for managers within organizations to mislead their stakeholders on the short run, which could be possible due to asymmetric information between them. One opportunity for managers could be more earnings management practices, therefore the focus of this paper is whether those managers used earnings management practices as a misleading tool to their stakeholders

More researchers investigate this important topic (Ali et al., 2022; Lassoued & Khanchel, 2021; Liu & Sun, 2022; Xiao & Xi, 2021), which can be useful for investors and regulators to see whether companies are engaging in earnings management during periods of uncertainty. In comparison to studies mentioned above, this paper will not only focus on the effects of the pandemic on earnings management but will dive deeper into those effects itself. As we learned from previous financial crises, there are many papers with different results (Filip & Raffournier, 2014; Habib et al., 2013; Cimini, 2014; Dimitras et al., 2015; Matsumoto, 2002; Kasznik & McNichols, 2002; Graham et al., 2005), they are inconclusive in the way some of them found that CEOs boost their earnings during economic downturns, while others found that CEOs negatively adjusted their earnings. Trombetta & Imperatore (2014) showed that, during the financial crisis of 2008, there is a non-monotonic relationship between the financial crisis and earnings management. They showed that the effect on earnings management depends on the intensity of the crisis, so more

financial stress led to more earnings management and the other way around. This paper will also focus on the dynamic effects of a crisis, so to check whether there is a relationship between the intensity of the pandemic and earnings management, by measuring the intensity of the pandemic in the form of infection rates.

Existing literature, which investigates the effect of Covid-19 on earnings management, mainly focuses on the change of manipulating activities during pandemic times compared to the years before (Lassoued & Khanchel, 2021; Xiao & Xi, 2021; Liu & Sun, 2022; Hsu & Yang, 2022). This research contributes to the existing literature by investigating the effects itself, to show whether there is an effect of infection rates on earnings management during pandemic times. The analysis uses quarterly data to get the best results of the effects from infection rates and because of the short time frame of the pandemic. Besides that, this paper will not only include US firms, as done by Trombetta & Imperatore (2014), but it includes many other countries which were available to analyse based on the available data. This leads to a final dataset with 17 different countries with at least 100 observations. Because all existing results on the effect of a crisis on earnings management (Filip & Raffournier, 2014; Habib et al., 2013; Cimini, 2014; Dimitras et al., 2015; Matsumoto, 2002; Kasznik & McNichols, 2002; Graham et al., 2005; Lassoued & Khanchel, 2021; Xiao & Xi, 2021; Liu & Sun, 2022; Hsu & Yang, 2022) , are inconclusive in the way that they all found different results for different countries. During this research I will use different countries, which can generalize the results to a broader sample population.

This analysis, which is conducted within 2,908 worldwide firms, founds support for the hypothesis that there is a non-monotonic relationship between Covid-19 infection rates and accrual-based earnings management activities among firms. However, there is not found any support if firms have prevalence for income-increasing or income-decreasing earnings management activities.

Within this research, the structure is as follows: chapter 2 summarizes the existing literature on both earnings management and financial crises, and the relationship with each other. This will lead to the hypotheses, which are given in that chapter as well. In chapter 3, I will provide you the methodology of this research, which consists of the data sample, data base, and how the data will be analysed. Furthermore, chapter 4 presents the results of the analyses and relate them to the

presented hypotheses. After that, in chapter 5, several robustness checks are done to find whether the results are robust with using other proxies for earnings management. At the final chapter, the results will be discussed, and a conclusion will be drawn.

2 Theoretical Framework and hypotheses development

2.1 What is earnings management?

Firstly, we have to define what earnings management is, and what kind of earnings management will be used within this paper. To define earnings management, this paper will use that of Healy & Wahlen (1999), which is widely used and considers the following:

"Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcome that depend on reported accounting numbers."

Managers are using earnings management tools for several reasons, including to influence stock market perceptions, to increase management's compensation, to reduce the likelihood of violating lending agreements, and to avoid regulatory intervention (Healy & Wahlen, 1999). At the start of the Covid-19 in the beginning of 2020, stock prices dropped dramatically, and this indicated negative market perceptions. To avoid this, managers of organizations might participate more in earnings management than before, to enhance the market perception about their organization.

According to Kim et al. (2018) & Roychowdhury et al. (2006), there are two ways for managers to manipulate the earnings of a company. This can be done by either Real earnings management (REM) or accrual-based earnings management (AEM). In case of accrual-based earnings management, managers use discretionary or non-discretionary accruals to manipulate the financial statements. But on the other hand, firms can manipulate their earnings by their real activity, to shift their expenses to other years or to either increase or decrease their revenue by giving discounts to their customers, performing high sales at the end of a year, overproduction to report lower cost of goods sold, and reduction of discretionary expenditures to improve reported margins (Roychowdhury et al., 2006). But for outsiders, real earnings management is more difficult to detect because it affects cash flows directly. Besides that, the manipulation of real activities is not under the jurisdiction of any auditing system and less monitored (Kim & Sohn, 2013).

2.2 Hypothesis development

Historically, there has been different research which investigated the effects of a financial crisis on earnings management activities. As given by Healy & Wahlen (1999), earnings management can be seen as the opportunistic behavior of managers to inflate or deflate earnings to mislead stakeholders. During times of financial problems, like a crisis, this behavior seems to be more prominent (Lisboa & Kacharava, 2018). Existing research is based on the relationship between business cycles and earnings management. Within that aspect we find different results. First, Graham et al. (2005) concluded that in periods of economic downturns, CEOs boost earnings until the economy is recovered. Besides that, to increase the surviving ability for firms, and increase future earnings projections, earnings management can be a tool for managers to improve market perceptions about the firm's accounting fundamentals (Matsumoto, 2002; Kasznik & McNichols (2002). On the other hand, there is much research which are against the results above and found that financial distressed firms engage less in earnings management during times of financial instability (Filip & Raffournier, 2014; Habib et al., 2013; Cimini, 2014; Dimitras et al., 2015). Overall, they find that manipulation of earnings is costly during times of uncertainty, because there is more attention on your performance as a firm and auditors will increase their monitoring activity. As found by Filip & Raffournier (2014), companies significantly decreased their income smoothing activities and improved their accrual quality, during the global financial crisis of 2008. This is supported by the findings from Habib et al. (2013), who found that financially distressed firms manipulate their earnings downwards.

However, besides the results described in the previous section, more results on the relationship between earnings management and the Covid-19 crisis itself are investigated, with some similar findings as from the previous crises. As found by Lassoued & Khanchel (2021), European firms are likely to engage more in earnings management practices than during the pre-crisis period. This is largely supported by the findings from Xiao & Xi (2021), who found that Chinese firms increased their Accrual based earnings management (AEM) but decreased their earnings management by real activities (REM). But similar to findings from previous crises, these results stay somewhat different within the literature. As found by Liu & Sun (2022), they found that US firms decreased their discretionary accruals, suggesting that firms engaged in more

income-decreasing earnings management during the pandemic years, which indicate that companies use the pandemic to adopt a big bath strategy in reporting earnings. Contradictory, Hsu & Yang (2022) found that the overall financial reporting quality is lower during the pandemic, mainly because of more real earnings management (REM). One reason for this increase in REM is to avoid further negative perceptions of investors and to survive the crisis. At the end, we find that all results are contradictory to each other and therefore we cannot conclude what relationship exists between the pandemic and earnings management. However, there seems to be a majority (Hsu & Yang, 2022; Lassoued & Khanchel, 2021; Xiao & Xi, 2021) who concluded that there is an effect of the pandemic. Therefore, our first hypothesis will test whether this effect is present.

Hypothesis 1: During the Covid-19 pandemic, companies significantly engaged more in accruals-based earnings management activities.

As we saw from the previous financial crisis, not all papers found the relationship between a crisis and the manipulating activities of firms. We learned from Trombetta & Imperatore (2014) that there is a relationship, but that the relationship is non-monotonic. This means that earnings quality is higher in times of low intensity of a crisis and that the quality is lower in more extreme times of a crisis. They argue that, during times of a crisis, firms not only focus on earnings targets, but that they got a second goal, which is to survive the crisis. They find that during moderating times, firms do not feel so much threat to survive and therefore will not take too much risk by engaging manipulating activities. On the other hand, during hard times, firms feel more threat of going bankrupt and therefore increase their earnings management activities to influence the perception of stakeholders. Within this paper, this relationship will be tested as well. So, a second hypothesis is formed to model a non-linear relationship, which could better explain the relationship between the Covid-19 pandemic and earnings management.

Hypothesis 2: The relationship from between the pandemic and earnings management is affected by the number of infections (i.e. intensity of the pandemic) and will therefore be non-monotonic.

Additionally, according to Trombetta & Imperatore (2014), they found that there is a higher effect of the financial crisis on income-increasing accruals (i.e. positive accruals). Therefore, the last hypothesis of this research will be to check whether this is the case during the Covid-19 pandemic as well:

Hypothesis 3: During high intense times of the pandemic (i.e. high infection rates), managers have a prevalence of income-increasing earnings management activities.

Summarizing, based on previous results described in this paragraph, this paper first tests whether there is an increase in earnings management during the crisis (e.g. pandemic). But the main focus will be the inclusion of infections in testing that relationship, to see whether the non-monotonic effects, showed by the previous crisis (Trombetta & Imperatore, 2014), are also present during the Covid-19 pandemic. At last, those effects will be separately analyzed by income-increasing activities and income-decreasing activities.

3 Method and data sample

3.1 Data sample

The analyses within this paper will be conducted on a sample of worldwide public firms during the period of 2019-2021. The analysis will use quarterly data because of the short time frame and to better see the effects of infection rate changes within the total time frame. Because quarterly data is used, only companies who have provided quarterly financial statements are included in the dataset. Besides that, the total sample excludes financial institutions because they have different earnings management's measurement processes that might affect the results (Trombetta & Imperatore, 2014). The financial data will be gathered from the dataset WRDS compustat. The distribution of firms per country is given in table 1. This is the result of an unbalanced panel data set with 37,828 observations, distributed over 2,908 firms and 17 different countries all over the world.

Table 1. Distribution of firms by country

Country	Number of firms	Observations	Percentage
Taiwan	856	10,325	27.29
United States	724	10,681	28.24
South-Korea	626	7,755	20.50
China	363	4,625	12.23
Turkey	73	906	2.40
Sweden	65	815	2.15
Canada	56	857	2.27
Israel	39	496	1.31
Germany	35	481	1.27
Denmark	12	166	0.44
Finland	10	137	0.36
United Kingdom	10	105	0.28
Netherlands	10	103	0.27
Ireland	9	126	0.33
Brazil	7	84	0.22
Switzerland	7	98	0.26
France	6	68	0.18
Total firms	**2,908**		
Total observations	**37,828**	**37,828**	

Notes: this table tabulates the distribution of firms and countries within the dataset among the period of 2019q1 till 2021q4.

The covid related data (e.g. infection rates) will be gathered from ourworldindata.org, which gives the opportunity to get the number of confirmed cases (i.e. infections) per capita per country.[1] Weekly data from the particular countries is converted in to quarterly data to match with our company dataset.

3.2 Earnings management proxies

According to Dechow et al. (2010) there are different ways to measure the quality of earnings in general, and earnings management more specifically. Based on existing research (Trombetta & Imperatore, 2014; Lassoued & Khanchel, 2021; Dimitras et al., 2015) , this paper will use accruals to measure Accrual based earnings management. More specific, this paper will use the cross-sectional Jones (1991) model, modified by Dechow et al. (1995) and later adapted to performance (Kothari et al., 2005). Based on those theories, the model will include the following terms, estimated for each 1-digit SIC-quarter:

$$\frac{TA_{it}}{A_{i(t-1)}} = \alpha_0 + \beta_1\left(\frac{1}{A_{i(t-1)}}\right) + \beta_2\left(\frac{\Delta REV_{it}}{A_{i(t-1)}}\right) + \beta_3\left(\frac{PPE_{it}}{A_{i(t-1)}}\right) + \beta_4 ROA_{it} + \varepsilon_{it}$$

where the dependent variable $\frac{TA_{it}}{A_{i(t-1)}}$ measures the firm's total accruals in a particular quarter, divided by the total assets in the previous quarter $A_{i(t-1)}$. TA_{it} are the total accruals given as the change in the non-cash current assets minus the change in the current liabilities excluding the current portion of long-term debt minus depreciation and amortization. ΔREV_{it} considers the change in sales during a quarter and PPE_{it} shows the amount of property, plant, and equipment. And ROA measuring the return on assets to match the performance of firms. The error term is included for several reasons, first to control for heteroskedasticity not alleviated by using the assets as the deflator, secondly to mitigate problems from an omitted scale variable, and finally because models without the error term are considered less symmetric (Kothari et al., 2005).

Now I provided the model to calculate our total accruals. The discretionary accruals and the normal accruals must be separated. Following Trombetta & Imperatore (2014), I exclude the error term and include the change in accounts receivable ΔREC_{it} to the model, following:

[1] www.ourworldindata.org

$$NA_{it} = \alpha_0 + \beta_1\left(\frac{1}{A_{i(t-1)}}\right) + \beta_2\left(\frac{\Delta REV_{it} - \Delta REC_{it}}{A_{i(t-1)}}\right) + \beta_3\left(\frac{PPE_{it}}{A_{i(t-1)}}\right) + \beta_4 ROA_{it}$$

Finally, to calculate our discretionary accruals, retract normal accruals from the total accruals. As a result, the absolute values of discretionary accruals will be use as a proxy for earnings management during (pre)pandemic times.

Where companies also have the opportunity to manage their earnings by their real activities, they are not separately calculated in our model. Since they are difficult to detect (Kim & Sohn, 2013), this model will only control for REM by adding abnormal discretionary expenses to the final model, which is similar to Trombetta & Imperatore (2014).

3.3 Covid-19 proxies

Since there is little research available which measures the Covid-19 effects, some are approaching it (Lassoued & Khanchel, 2021; Liu & Sun, 2022). In their analyses, they use dummy variables for the years in which Covid-19 plays a role to measure the pandemic effects. Since I am interested in the effects during the pandemic, based on the intensity, I will only use a dummy variable to test for differences in earnings management activities in general between the pre-pandemic and pandemic period. To measure the effects within our time frame, I will use infection rates to measure the intensity of the pandemic. As mentioned above, those infection rates will be gathered from ourwoldindata.org. [2]

3.4 Final model

Described the main variables above, the final model will include Earnings management as the dependent variable, measured with absolute value of discretionary accruals, and with Covid included as main independent variable, besides other control variables.

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \sum country\ control + \varepsilon_{it}$$

[2] www.ourworldindata.org which measures weekly infection data, which will be converted into quarterly data.

In this model, $Covid$ is a dummy variable which takes the value 1 if we are in the pandemic period, and 0 if we are in the pre-pandemic period. This to test whether there is a difference between those periods and to test the first hypothesis.

Given this research wants to distinguish the effects of the economic conditions with that of the infection rates, it will control for quarterly variation of the Gross domestic product, with GDP as the independent variable.[3]

Regarding the control variables for firm characteristics, I will follow Trombetta & Imperatore (2014) to be consistent in the procedure. So, considering firm size, measured by the natural logarithm of total assets $(Logta)$, because it is in general assumed that larger firms are more monitored by their stakeholders, and therefore it makes it more difficult to implement earnings management. Besides that, firm leverage will be included, measured by the debt ratio, because it is expected that firms with financial constraints have higher incentives to manipulate their earnings for getting loans. At last, I will include Cash flows from operating activities, divided by total sales (CFO) in case it is a potential determinant of earnings management (Marra et al., 2011).

Besides the firm control variables, Hribar & Nichols (2007) argued that earnings managements is sensitive to firm's operating volatility, like the volatility of sales and volatility of cash flows. They argue that it is possible that the variation variable (i.e. infection rates) is correlated with that of those volatility variables and that it can create an omitted variable bias. Therefore, I will include the variables of volatility of sales $(SDrev)$, which is the standard deviation of sales, and volatility of cash flows $(SDcfo)$, which is the standard deviation of operating cash flows. Besides that, to measure those volatilities, I will include $Growth$ which is measured as the difference in revenues between quarter t and t-1 divided by revenues in quarter t-1. As a last variable to control for firm characteristics, the lagged value of total accruals $(lagtac)$ is included (Krishnan et al., 2011) to control for general accruals over time, and that the change of earnings management practices is based on accounting choices made in the past and not based on current financial conditions.

[3] https://data.oecd.org/gdp/quarterly-gdp.htm which measures the quarterly variation of GDP per country.

As mentioned in chapter two, this research only focuses on accrual-based earnings management, and does not consider real earnings management in first instance. But as we saw from existing Covid-19 related literature (Hsu & Yang, 2022), it could be the case that earnings management practices are increased by REM practices, therefore the model will include $(RMdisx)$ to control for it.

Different from the paper by Trombetta & Imperatore (2014), this research uses different countries to compare, and therefore the model will include different country control variables $(\sum country\ control)$. Following the paper of Lassoued & Khanchel (2021), who measured the pandemic effects on earnings management in general, those country control variables include the following: (1) shareholder rights index[4] (SH_index), because Leuz et al. (2003) find that earnings management is less frequent in economies with stronger outside investor rights and better law enforcement. Besides that, the rule of law index $(Rule\_law)$[5] will be included in the model, because Burgstahler et al. (2006) argued that the legal rules to shareholders might not be effective without proper enforcement. At last, Lassoued & Khanchel (2021) included the disclosure index as well $(Disclosure)$[6] because it is expected that countries with lower disclosure rules to participate more in earnings management practices. Besides these three variables, I already mentioned *GDP*, which is also a variable on country level but presented separately.

Similar to Trombetta & Imperatore (2014) and to test the second hypothesis and correct for non-linearity, I will include a quadratic term computed by the infections during that quarter. They found in their analysis that there is a U-shaped relationship and therefore they verified the use of a quadratic term into the model.

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \sum country\ control + \beta_{11} Covid^2 + \varepsilon_{it}$$

[4] https://tradingeconomics.com/

[5] https://worldjusticeproject.org/rule-of-law-index/

[6] https://data.worldbank.org/

4 Results

4.1 Descriptive analyses

Table 2 presents descriptive statistics of all variables, separated in three parts: the full sample (first panel), the pre-pandemic period (second panel) and the pandemic period (third panel). To avoid the impact of outliers, I winsorized the calculated discretionary accruals between 1% and 99% levels. Noteworthy that the mean of absolute discretionary accruals decreases by 0.002 during the pandemic period, which could be an indication of less earnings management practices during the Covid-19 pandemic.

Table 3 reports the correlation matrix of all variables and their variance inflation factor (VIF). Assuming an acceptance level of 10 (Hair, 1995) and our number of independent variables, I do not expect any multicollinearity issues in further analyses.

Table 2. Descriptive statistics

Panel A

Variable	Obs	Mean	Std. Dev.	Min	Max
Descriptive statistics for full sample					
ABS DACC	37,828	.035	.037	0	.258
Sign DACC	37,828	0	.051	-.257	.258
Covid	37,828	5,393.17	11,048.638	0	79,998.931
GDP	37,828	.834	3.114	-19.428	18.581
LogTA	37,828	8.747	2.819	-1.505	19.871
Lev	37,828	.477	.409	.004	29.569
CFO TS	37,828	-2.012	89.499	-12,290.667	309.418
SdCfo	37,828	21.191	418.375	0	21,843.951
SdRev	37,828	14.416	168.495	0	7415.197
LagTac	37,828	0	.062	-2.329	1.252
Growth	37,828	.12	2.777	-4.822	360.253
RM_DISX	37,828	0	.072	-6.318	1.229
Rule_law	37,828	.619	.135	.42	.9
Disclosure	37,828	8.44	1.444	0	10
SH IND	37,828	3.642	2.419	1	9

Panel B

Variable	Obs	Mean	Std. Dev.	Min	Max
ABS DACC	12,127	.036	.038	0	.258
Sign DACC	12,127	0	.053	-.257	.258
Covid	12,127	0	0	0	0
GDP	12,127	.887	.534	-.493	2.38
LogTA	12,127	8.711	2.83	-1.37	19.683
Lev	12,127	.47	.307	.01	11.762
CFO TS	12,127	-3.937	148.674	-12,290.667	309.418
SdCfo	12,127	21.486	426.933	0	21,843.951
SdRev	12,127	14.368	169.357	0	7,415.197
LagTac	12,127	-.001	.064	-1.037	.602
Growth	12,127	.085	1.771	-4.018	125.93
RM_DISX	12,127	0	.07	-1.737	.798
Rule_law	12,127	.616	.136	.42	.9
Disclosure	12,127	8.487	1.432	0	10
SH IND	12,127	3.621	2.448	1	9

Panel C

Variable	Obs	Mean	Std. Dev.	Min	Max
Descriptive Statistics for pandemic period					
ABS DACC	25,701	.034	.037	0	.257
Sign DACC	25,701	0	.051	-.257	.257
Covid	25,701	7,937.933	12,628.28	2.081	79,998.931
GDP	25,701	.81	3.76	-19.428	18.581
LogTA	25,701	8.764	2.814	-1.505	19.871
Lev	25,701	.48	.449	.004	29.569
CFO TS	25,701	-1.104	36.849	-3,276.344	168.167
SdCfo	25,701	21.051	414.284	0	21,843.951
SdRev	25,701	14.439	168.089	0	7,415.197
LagTac	25,701	0	.061	-2.329	1.252
Growth	25,701	.136	3.142	-4.822	360.253
RM_DISX	25,701	0	.073	-6.318	1.229
Rule_law	25,701	.62	.134	.42	.9
Disclosure	25,701	8.417	1.449	0	10
SH IND	25,701	3.651	2.406	1	9

Notes: Panel A provides descriptive statistics of all variables of the total data sample. Panel B provides the descriptive statistics for the pre-pandemic period (2019q1 – 2020q1) and panel C provides the descriptive statistics for the pandemic period (2020q2 – 2021q4).

Table 3. Correlation matrix

Variables	(1)*	(2)*	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	VIF
(3) Covid	-0.047***	0.020***	1.000													1.35
(4) GDP	0.007	-0.057***	0.067***	1.000												1.04
(5) LogTA	-0.100***	-0.041***	-0.272***	-0.009*	1.000											1.43
(6) Lev	0.065***	0.005	0.089***	-0.022***	-0.064***	1.000										1.04
(7) CFO_TS	-0.018***	-0.019***	-0.001	0.003	0.028***	-0.017***	1.000									1.00
(8) SdCfo	-0.017***	-0.013	-0.020***	-0.006	0.154***	-0.006	0.001	1.000								6.07
(9) SdRev	-0.024***	-0.001	-0.033***	-0.009	0.236***	0.003	0.002	0.912***	1.000							6.29
(10) LagTac	-0.006	-0.212***	-0.008	0.072***	0.002	-0.044***	-0.004	0.000	0.000	1.000						1.01
(11) Growth	0.034***	0.026***	0.000	0.022***	-0.017***	0.005	0.000	-0.002	-0.002	-0.016***	1.000					1.00
(12) RM_DISX	-0.064***	-0.040***	-0.152***	0.021***	0.262***	-0.129***	0.039***	0.004	0.015***	0.006	-0.020***	1.000				1.14
(13) Rule_law	-0.069***	-0.004	0.299***	-0.124***	0.104***	0.108***	-0.000	0.043***	0.071***	-0.013**	-0.005	-0.174***	1.000			5.82
(14) Discl	0.081***	0.013**	-0.448***	0.109***	0.137***	-0.148***	0.005	-0.014***	-0.023***	0.007	0.005	0.232***	-0.830***	1.000		4.23
(15) SH_IND	-0.033***	0.011**	0.233***	-0.089***	0.166**	0.099***	0.004	0.047***	0.077***	-0.000	-0.004	-0.104***	0.839***	-0.702***	1.000	3.48

*(1)ABS_DACC
(2)Sign_DACC

**** p<.01, ** p<.05, * p<.1*

Notes: This table shows the correlations between all variables. Numbers on the columns belongs to the corresponding variable on the vertical column. On the right side, VIF (Variance Inflation Factor) is added to check for multicollinearity issues. Regarding the higher values of SdCfo and SdRev, there is no indication of multicollinearity after running a separate regression without one of the variables, therefore they are still included in the final model.

4.2 Regression results

The analysis starts by testing the first hypothesis and whether there is a significant difference in earnings management practices during the Covid-19 pandemic or not. As shown in table 4, *DummyCovid* is used as a proxy for the pandemic and takes value 1 when there are reported infections and 0 otherwise.

The coefficient of *DummyCovid* turns out to be negative and significant at 1% level. This shows that the Covid-19 pandemic leads to lower earnings management practices. However, in the second model, where I used the signed value of discretionary accruals, there is no significance found in the relationship. This means that there is no evidence regarding the question whether there were more income-increasing or income-decreasing earnings management activities during the pandemic.

Looking at the other variables, it is noteworthy that GDP has no effect on the absolute value of discretionary accruals. But that there is a very significant effect on income-decreasing earnings management activities, as shown by the -.001 coefficient in the second column. Another thing to notice is the significance and negative effect of *RMDISX*, which indicates that higher real earnings management activities reduces the level of accruals based earnings management. This is in line with the results of Cohen et al. (2008) who suggest that firms see both activities as substitutes to each other. Furthermore, the total accruals from the previous period *(LagTac)* does not show very significant results (only at 10% level) indicating that there is no large effect of this on the current value of discretionary accruals. All other variables' significance and direction are in line with the results of Trombetta & Imperatore (2014).

In the following regression, estimated in table 5, I used the raw value of infection rates to see whether there is a direct effect of it on the earnings management activities. Based on the coefficient of *Covid,* which is weak but highly significant (1% level), we can see that there will be an effect of infection rates on earnings management. This effect also turns to be negative and therefore the results suggest that the higher the infection rates, the less accrual-based earnings management activities firms will perform. Different from the previous results in table 4, we see that the coefficient is now significant in both models. This could suggest that the infection rates

itself have a positive effect on the signed value of discretionary accruals, meaning more income-increasing activities. All the results of the other control variables are similar to the results I found in the first regression in table 4.

Table 4. Regression with Covid-pandemic as a dummy variable

$$EM_{it} = \beta_0 + \beta_1 DummyCovid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule\_law + \beta_{12} Disclo + \beta_{13} SHind + \varepsilon_{it}$$

Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
DummyCovid	-.002***	0
	(0)	(.001)
GDP	0	-.001***
	(0)	(0)
LogTA	-.002***	-.001***
	(0)	(0)
Lev	.006***	-.002**
	(0)	(.001)
CFO_TS	0**	0***
	(0)	(0)
SdCfo	0	0
	(0)	(0)
SdRev	0	0*
	(0)	(0)
LagTac	.006*	-.173***
	(.003)	(.004)
Growth	0***	0***
	(0)	(0)
RM_DISX	-.029***	-.022***
	(.003)	(.004)
Rule_law	-.005	-.018***
	(.003)	(.005)
Discl	.005***	0
	(0)	(0)
SH_IND	.002***	.001***
	(0)	(0)
_cons	0	.015***
	(.004)	(.005)
Observations	37,828	37,828
R-squared	.035	.051

*** p<.01, ** p<.05, * p<.1

Notes: table 4 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The main variable of interest is DummyCovid which takes value 1 for pandemic and 0 for no pandemic. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, RM_Disx is the control variable of real earnings management, Rule_Law is a country control variable for the laws within a country, Discl represents the disclosure rules within countries, and SH_IND represents the shareholder rights within a country. All variables are calculated on firm individual level.

Table 5. Regression with Covid as the raw value of infection rates

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule\_Law + \beta_{12} Disclo + \beta_{13} SHind + \varepsilon_{it}$$

Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
Covid (/0000)	-0.001***	0.000***
	(0)	(0)
GDP	0	-.001***
	(0)	(0)
LogTA	-.002***	-.001***
	(0)	(0)
Lev	.006***	-.002**
	(0)	(.001)
CFO_TS	0**	0***
	(0)	(0)
SdCfo	0	0
	(0)	(0)
SdRev	0	0*
	(0)	(0)
LagTac	.006*	-.173***
	(.003)	(.004)
Growth	0***	0***
	(0)	(0)
RM_DISX	-.029***	-.022***
	(.003)	(.004)
Rule_law	-.005	-.017***
	(.003)	(.005)
Discl	.005***	0
	(0)	(0)
SH_IND	.002***	.001***
	(0)	(0)
_cons	.006	.011**
	(.004)	(.005)
Observations	37,828	37,828
R-squared	.036	.051

*** p<.01, ** p<.05, * p<.1

Notes: table 5 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The main variable of interest is Covid which represents the number of infection rates. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, RM_Disx is the control variable of real earnings management, Rule_Law is a country control variable for the laws within a country, Discl represents the disclosure rules within countries, and SH_IND represents the shareholder rights within a country. All variables are calculated on firm individual level.

Table 6. Regression with Covid as the raw value of infection rates and Covid2 as a quadratic value

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule_{law} + \beta_{12} Disclo + \beta_{13} SHind + \beta_{14} Covid^2 + \varepsilon_{it}$$

Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
Covid(/0000)	-0.0003***	0
	(0)	(0)
GDP	0	-.001***
	(0)	(0)
LogTA	-.002***	-.001***
	(0)	(0)
Lev	.006***	-.002**
	(0)	(.001)
CFO_TS	0**	0***
	(0)	(0)
SdCfo	0	0
	(0)	(0)
SdRev	0	0*
	(0)	(0)
LagTac	.006*	-.173***
	(.003)	(.004)
Growth	0***	0***
	(0)	(0)
RM_DISX	-.029***	-.022***
	(.003)	(.004)
Rule_law	-.006*	-.018***
	(.003)	(.005)
Discl	.004***	0
	(0)	(0)
SH_IND	.002***	.001***
	(0)	(0)
Covid2	0.000***	0
	(0)	(0)
_cons	.008**	.012**
	(.004)	(.005)
Observations	37,828	37,828
R-squared	.037	.051

*** p<.01, ** p<.05, * p<.1

Notes: table 6 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The main variables of interest are Covid, which represents the number of infection rates, and Covid2, which shows the quadratic value of the infection rates. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, RM_Disx is the control variable of real earnings management, Rule_Law is a country control variable for the laws within a country, Discl represents the disclosure rules within countries, and SH_IND represents the shareholder rights within a country. All variables are calculated on firm individual level.

As stated in the second hypothesis, I expect that there will be a non-monotonic component in the relationship between infection rates and earnings management as well. This relationship is tested by the results presented in table 6, where *Covid2* represents the quadratic term for infection rates, to show whether there is a non-monotonic component or not. As we see by the results, the quadratic term has a significant and positive value, where the raw value stays significant as well (1% level). This indicates that the accrual-based earnings management activities of firms depends on the infection rates itself and on a quadratic component which shows the non-monotonicity of the relationship and supports the second hypothesis. This provides evidence for a non-monotonic relationship between Covid-19 infection rates and earnings management activities, where firms tend to decrease those activities when the intensity is low (i.e. low infection rates) and increase those activities when the intensity of the pandemic is high (i.e. high infection rates).

Regarding the third hypothesis about the direction of the relationship (either income-increasing or income-decreasing), the *Covid2* variable is not significant in the quadratic model, and therefore we cannot conclude if Covid-19 infection rates tends firms to manage their earnings either upwards or downwards during high intensity periods.

Overall, the results only provide evidence to support the second hypothesis. The first hypothesis took the other direction in the results, which means that the pandemic has a negative effect on the amount of earnings management practices by firms. The second hypothesis is supported in the way that there is a non-monotonic relationship by the quadratic term of Covid-19 infections, while the direction (third hypothesis) is not clear, so there is no evidence provided if firms tend to increase or decrease their earnings during different forms of intensity of the pandemic.

5 Robustness checks

To check whether the results stay significant or not in another setting, two robustness checks are used. Because our data sample, as presented in table 1, considers countries with much more observations than some others, the first robustness check analyses if the results from chapter 4 are the same in a different data sample. Secondly, an alternative pandemic proxy is used, instead of the infection rates, the stringency index is used. Within the following chapter the results of those two new regressions are presented.

5.1 Alternative data sample

To use an alternative data sample, I decided to only take the two countries with the most observations, and which are almost equally distributed to each other. As shown by table 7, only the United States and Taiwan are used in the regressions to check the robustness of the results from chapter 4. To avoid country specific biases, I decided to separate them in doing the analyses, which is shown by tables 8, 9, and 10.

Table 7. Number of firms and observations for USA and Taiwan

Country	Number of firms	Observations
United States	733	10,019
Taiwan	749	9,115

As presented by table 8 below, there are still significant effects of the pandemic on earnings management activities in general, for both the United States and Taiwan. Both the coefficients of *DummyCovid* are significant, however it is more significant for the United States compared to Taiwan. So, in general, these findings are similar to the results from chapter 4 in the way that there is an effect of the pandemic on earnings management activities, but it shows that this effect is now positive, while it was negative in chapter 4. This means that for the United States and Taiwan, there were more earnings management activities during the pandemic, while it was the other way around for the worldwide sample. Analysing the other control variables, the results are in line with the earlier results, besides the effect of the lagged total accruals, which is negative for

Taiwan while it was positive in the previous results and for the United States. This means that, in Taiwan, the total accruals of the previous period have a negative impact on the discretionary accruals in the current period. Regarding the direction of the discretionary accruals, whether they are income-decreasing or income-increasing, no significance is found as shown by the value of *Sign_DACC*, which is also similar as the results from chapter 4.

Table 8. Regression with Covid as a dummy variable for Taiwan & USA

$$EM_{it} = \beta_0 + \beta_1 DummyCovid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule\_law + \beta_{12} Disclo + \beta_{13} SHind + \varepsilon_{it}$$

	Taiwan		USA	
Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
DummyCovid	.001**	.001	.003***	.001
	(.001)	(.001)	(.001)	(.001)
GDP	-.001***	0	0	0
	(0)	(0)	(0)	(0)
LogTA	-.002***	0	-.005***	-.002***
	(0)	(0)	(0)	(0)
Lev	.015***	.002	.011***	.002*
	(.002)	(.003)	(.001)	(.001)
CFO_TS	0	0	0	0
	(0)	(0)	(0)	(0)
SdCfo	0	0*	.002***	0
	(0)	(0)	(0)	(.001)
SdRev	0	0	-.001	0
	(0)	(0)	(.001)	(.001)
LagTac	-.025***	-.124***	.014**	-.071***
	(.006)	(.008)	(.006)	(.007)
Growth	0**	0***	0**	-.001**
	(0)	(0)	(0)	(0)
RM_DISX	-.033**	.041*	-.014***	-.028***
	(.015)	(.022)	(.003)	(.004)
_cons	.04***	0	.053***	.011***
	(.002)	(.003)	(.001)	(.002)
Observations	9,115	9,115	10,019	10,019
R-squared	.017	.026	.09	.024

*** p<.01, ** p<.05, * p<.1

Notes: table 8 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The sample is regression is made for two countries separately: the United States and Taiwan. The main variable of interest is DummyCovid which takes value 1 for pandemic and 0 for no pandemic The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, and RM_Disx is the control variable of real earnings management.. All variables are calculated on firm individual level.

Following the method presented in chapter 4, table 9 presents the results of using the raw value of infection rates, in the United States and Taiwan, and the effect on earnings management. The coefficient of *Covid* stays highly significant in these results, which is similar to earlier results. Main difference is presented by the regression of the signed value of discretionary accruals, where the coefficient of *Covid* is not significant, which was the case in the results from chapter 4. So, also presented by these results, no conclusion can be drawn on the question if firms participate more in income-increasing or income-decreasing earnings management activities.

Table 9. Regression with Covid as the raw value of infection rates for Taiwan & USA

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule\_Law + \beta_{12} Disclo + \beta_{13} SHind + \varepsilon_{it}$$

	Taiwan		USA	
Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
Covid(/0000)	.006***	.004	0.0001***	0
	(.002)	(.003)	(0)	(0)
GDP	0*	0	-0.0002**	0
	(0)	(0)	(0)	(0)
LogTA	-.002***	0	-.005***	-.002***
	(0)	(0)	(0)	(0)
Lev	.015***	.002	.011***	.002*
	(.002)	(.003)	(.001)	(.001)
CFO_TS	0	0	0	0
	(0)	(0)	(0)	(0)
SdCfo	0	0*	.002***	0
	(0)	(0)	(0)	(.001)
SdRev	0	0	-.001	0
	(0)	(0)	(.001)	(.001)
LagTac	-.025***	-.124***	.013**	-.071***
	(.006)	(.008)	(.006)	(.007)
Growth	0**	0***	0**	-.001**
	(0)	(0)	(0)	(0)
RM_DISX	-.033**	.041*	-.014***	-.028***
	(.015)	(.022)	(.003)	(.004)
_cons	.04***	.001	.054***	.011***
	(.002)	(.003)	(.001)	(.002)
Observations	9,115	9,115	10,019	10,019
R-squared	.017	.026	.09	.024

*** p<.01, ** p<.05, * p<.1

Notes: table 9 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The sample is regression is made for two countries separately: the United States and Taiwan. The main variable of interest is Covid which represents the number of infection rates. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, and RM_Disx is the control variable of real earnings management.. All variables are calculated on firm individual level.

To test whether the results on the third hypothesis, about the dynamic effects of infection rates on earnings management, are still robust, I performed the regressions as presented by table 10. Noteworthy is that the effect of *Covid* is still significant, but that the quadratic value of it (*Covid2),* is not significant anymore, which is different from the earlier results from chapter 4. Furthermore, the effect of *Covid* and *Covid2* are much higher for Taiwan than for the United States, however they are not significant. So, for both the United States and Taiwan, there is no dynamic effect of Covid-19 infection rates on the earnings management activities of firms, which is different from the results from chapter 4.

Table 10. Regression with Covid as the raw value of infection rates and Covid2 as a quadratic value for the USA

$$EM_{it} = \beta_0 + \beta_1 Covid + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule_{law} + \beta_{12} Disclo + \beta_{13} SHind + \beta_{14} Covid^2 + \varepsilon_{it}$$

	Taiwan		USA	
Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
Covid(/0000)	.033*	.04	0.0002**	0
	(.019)	(.028)	(0)	(0)
Covid2	-.046	-.061	0	0
	(.032)	(.047)	(0)	(0)
GDP	0*	0	0**	0
	(0)	(0)	(0)	(0)
LogTA	-.002***	0	-.005***	-.002***
	(0)	(0)	(0)	(0)
Lev	.015***	.002	.011***	.002*
	(.002)	(.003)	(.001)	(.001)
CFO_TS	0	0	0	0
	(0)	(0)	(0)	(0)
SdCfo	0	0*	.002***	0
	(0)	(0)	(0)	(.001)
SdRev	0	0	-.001	0
	(0)	(0)	(.001)	(.001)
LagTac	-.026***	-.125***	.013**	-.071***
	(.006)	(.008)	(.006)	(.007)
Growth	0**	0***	0**	-.001**
	(0)	(0)	(0)	(0)
RM_DISX	-.033**	.041*	-.014***	-.028***
	(.015)	(.022)	(.003)	(.004)
_cons	.04***	0	.053***	.011***
	(.002)	(.003)	(.001)	(.002)
Observations	9115	9115	10019	10019
R-squared	.017	.027	.09	.024

*** p<.01, ** p<.05, * p<.1

Notes: table 10 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The sample is regression is made for two countries separately: the United States and Taiwan. The main variables of interest are Covid, which represents the number of infection rates, and Covid2, which shows the quadratic value of the infection rates The main variable of interest is Covid which represents the number of infection rates. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, and RM_Disx is the control variable of real earnings management.. All variables are calculated on firm individual level.

5.2 Alternative pandemic proxy

Since I am interested in the dynamic effects during the pandemic, the first regressions include infection rates as a proxy for the Covid-19 pandemic. But government measurements were not included in the analysis, however it could influence earnings management instead of the infection rates itself. This because of the fact that some Asian countries (e.g. China and Taiwan) use their zero-tolerance policy in order to protect their countries against Covid-19.[7] This could lead to very low infections rates, while the country itself is in a complete disorder by lockdowns or other strict measurements. Because of that, I will run an analysis by using the stringency index from the Oxford university, which measures the government responses on how to tackle Covid-19 outbreaks in their country.[8] They used several indicators, like school closures and travel bans, to come up to a stringency index per country, which will be used during the following regressions. Thereby, I took the average of all stringency values during a particular quarter.

Since we are mainly interested in the dynamic effect of the Covid-19 pandemic, I only used the analysis with the quadratic value, to test whether the relationship is non-monotonic or not by using the stringency index as an alternative for infection rates.

Looking at the results from table 11, where both the raw value and the quadratic value are used, we see that both coefficient of *Stringency* and *Stringency2* are zero but highly significant, which means that there is a non-monotonic effect of the stringency index on earnings management. This is a similar finding as presented by chapter 4.

Regarding the third hypothesis and the signing of the discretionary accruals, again no significant findings can be found within these results, which means that these findings are also similar as the results from table 6 and stay robust by using an alternative proxy for the pandemic.

[7] https://thediplomat.com/2021/11/as-other-countries-try-living-with-covid-19-china-keeps-up-zero-tolerance/

[8] https://covidtracker.bsg.ox.ac.uk/stringency-scatter

Table 11. Regression with Stringency as the raw value of the index and Stringency2 as a quadratic value

$$EM_{it} = \beta_0 + \beta_1 Stringency + \beta_2 GDP + \beta_3 Logta_{it} + \beta_4 Lev_{it} + \beta_5 CFO_{it} + \beta_6 Sdcfo_{it} + \beta_7 Sdrev_{it} + \beta_8 Lagtac_{it} + \beta_9 Growth_{it} + \beta_{10} RMdisx + \beta_{11} Rule_{law} + \beta_{12} Disclo + \beta_{13} SHind + \beta_{14} Stringency^2 + \varepsilon_{it}$$

Variables	ABS_DACC Coefficient (St. error)	Sign_DACC Coefficient (St. error)
Stringency(/000)	-0.158***	0
	(0)	(0)
GDP	0	-.001***
	(0)	(0)
LogTA	-.002***	-.001***
	(0)	(0)
Lev	.006***	-.002**
	(0)	(.001)
CFO_TS	0**	0***
	(0)	(0)
SdCfo	0	0
	(0)	(0)
SdRev	0	0*
	(0)	(0)
LagTac	.005*	-.173***
	(.003)	(.004)
Growth	0***	0***
	(0)	(0)
RM_DISX	-.03***	-.022***
	(.003)	(.004)
Rule_law	-.004	-.018***
	(.003)	(.005)
Discl	.005***	0
	(0)	(0)
SH_IND	.002***	.001***
	(0)	(0)
Stringency2(/000)	2.499***	0
	(0)	(0)
_cons	-.002	.014***
	(.004)	(.005)
Observations	37,828	37,828
R-squared	.036	.051

*** p<.01, ** p<.05, * p<.1

Notes: table 6 shows the results of the regression presented on the first row. Where EM_{it} is used as the absolute value of discretionary accruals (ABS_DACC) and as the signed value of discretionary accruals (Sign_DACC). The main variables of interest are Stringency, which represents the number of stringency index of measures within countries, and Stringency2, which shows the quadratic value of the index. The corresponding coefficients and standard errors are presented for each independent variable, where GDP stands for the GDP variation between two quarters, LogTA stands for the natural logarithm of Total Assets, Lev stands for leverage, CFO_TS stands for cash flow from operating activities divided by total sales, SdCfo is the standard deviation of Cash flow from operating activities, SdRev is the standard deviation for Revenues, LagTac represents the lagged value of total accruals, Growth shows the growth of revenues, RM_Disx is the control variable of real earnings management, Rule_Law is a country control variable for the laws within a country, Discl represents the disclosure rules within countries, and SH_IND represents the shareholder rights within a country. All variables are calculated on firm individual level.

6 Conclusion & Discussion

6.1 Discussion

As described by the theoretical framework in chapter 2, there is some inconclusiveness regarding the previous results and whether firms engage more or less in earnings management practices during times of uncertainty. Speaking in terms of business cycles, this research found that there is a significant effect of the economic downturn, led by the pandemic, on earnings management practices. This is in line with the findings from different articles (Lisboa & Kacharava, 2018; Graham et al., 2005; Matsumoto, 2002; Kasznik & McNichols (2002) who also found that firms inflate or deflate their earnings during times of uncertainty. These findings are supported during the robustness checks by using an alternative data sample. So, during the Covid-19 pandemic we see more earnings management practices among firms than in the period before. If we relate this to existing literature on the pandemic effects, this is in line with previous articles (Lassoued & Khanchel, 2021; Xiao & Xi, 2021), who also found that there were more earnings management practices during the Covid-19 pandemic, and therefore supports the first hypothesis which indicates that companies significantly engaged more in accruals-based earnings management activities. During this research, I had a closer look in those effects and focused on the relationship between infection rates and earnings management. More specific, I followed the model by Trombetta & Imperatore (2014) who found a non-monotonic relationship during the previous financial crises, measured by a financial stress indicator. Instead of the financial stress index, I used the infection rates of Covid-19 as a stress indicator of the crisis (and the stringency index during the robustness checks) and I found similar results. As described in chapter 4, there were significant coefficients for both the raw value and the quadratic value of the infection rates, indicating a non-monotonic component within the relationship. Therefore, it supports the second hypothesis which stated that the relationship is affected by the number of infections, the intensity of the crisis, and therefore will be non-monotonic. Furthermore, this research examined whether firms prefer to inflate or deflate their earnings during the pandemic. As stated in the third hypothesis, the expectation was that firms have a prevalence of income-increasing earnings management activities, to show better financial performance to outsiders. However, based on

the results, no significant results are found in either direction (i.e. income-increasing or income-decreasing), and therefore there is no evidence to support the hypothesis. But there are neither results who support an income-decreasing prevalence of firms during the pandemic, so this stays somewhat inconclusive, which is in line with previous results which also found different directions of earnings management practices (Trombetta & Imperatore, 2014; Filip & Raffournier, 2014; Liu & Sun, 2022).

This research also has its limitations. First, since there was only quarterly data available until the end of 2021 for a selected number of firms, a major part of the dataset comes from the United States and Taiwan. All other countries have a minor contribution to the dataset. With the country control variables and the robustness checks, this sample bias is minimized. Furthermore, the data set does not represent the whole Covid-19 period, because there was no data available over 2022 during time of writing. It might be the case that in a later stage, more firm specific quarterly data is available to extent the data sample and perform a better distribution among countries. A second limitation of this research could be that there is only used a quadratic term to investigate whether there is a non-monotonic relationship or not. There could be other models which can investigate this relationship and they might be more specific. Therefore, a suggestion for further research could be to examine whether this relationship still holds within a larger data sample and maybe to investigate deeper into the cross-country differences. Secondly, to examine if the non-monotonic term is still significant by using another model, like multilevel modelling or a quantile regression. Besides that, it will be interesting to see whether these effects are still present during future crises or pandemics.

6.2 Conclusion

This research examined the relationship between the Covid-19 pandemic and the accrual-based earnings management activities of 2,908 worldwide firms, with focus on the non-monotonicity of that relationship. First, to test whether there was a significant difference in earnings management activities during the pandemic or not, there is used a dummy value of the pandemic and that turns out to be significant and negative, which indicates that firms engaged less in earnings

management activities during the pandemic than before. However, during the robustness checks, this effect was not found by analysing the United States and Taiwan separately, who contributed together for more than 50% of the dataset. Secondly, to test the second hypothesis and to see whether there is a non-monotonic component within the relationship of Covid-19 infection rates and earnings management practices, the raw value of infection rates together with the quadratic value is regressed on the absolute value of discretionary accruals. The results showed that both the raw value and the quadratic value were highly significant, and this supports the second hypothesis and shows evidence for a non-monotonic relationship between earnings management activities and the Covid-19 pandemic. However, using an alternative data-sample during the robustness checks, it does not show evidence for this non-monotonic relationship using only the United States and Taiwan. On the other hand, using the stringency index as an alternative proxy for the intensity of the pandemic, it still supports evidence for the hypothesis and a non-monotonic relationship. Regarding the third hypothesis, there are no significant results that show whether firms prefer to engage in either income-increasing or income-decreasing earnings management activities. This means that there are different strategies among firms in choosing a direction and that there is no effect of the pandemic on a particular direction (i.e. income-increasing or decreasing) of earnings management.

Overall, the conclusion can be drawn that there is a non-monotonic U-shaped relationship between the intensity of the pandemic and earnings management practices. This means that there is more earnings management during high intense periods of the crisis and that this decreases when the crisis become more moderate. However, there is no evidence found if firms like to use more income-increasing or income-decreasing strategies.

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