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# Earnings management by Dutch hospitals and the relation of earnings (management) with selective contracting by health insurers

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## Abstract

The research objective of this thesis is to examine whether Dutch hospitals manage their earnings and what the relation is of the reported earnings and earnings management with selective contracting of hospitals by health insurers. I measure earnings management using four methods: the Jones model (Jones, 1991), the one-step adapted Jones model (Chen, 2018), a method focusing on a specific accrual account for hospitals: the work in progress under DBCs and the earnings frequency distribution (Burgstahler & Dichev, 1997). For the period 2013-2018, I find that Dutch hospitals manage their earnings and that the level of earnings management has not increased over this period, although part of these findings, but not all, are caused by a mechanical relation. Furthermore, I find that health insurers do not contract less with hospitals that report relatively high earnings. The implication of these findings is that stakeholders, especially health insurers, should be aware that the earnings reported by a hospital might not reflect the "real" performance of the hospital.



Key words: Earnings management, Dutch hospitals, hospitals selective contracting, health insurers, earnings management over time, reported earnings, profit.

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# 1. Introduction

The reported earnings of Dutch hospitals are reviewed by many stakeholders: the public and politicians criticize hospitals with high profits (Paauwe, 2019), banks asses the reported earnings for credit evaluation (Schaepkens, 2001) and health insurers in all likelihood assess the reported earnings for contract negotiations (Leone & Van Horn, 2005). High reported earnings or a reported loss could lead to public scrutiny, negative credit evaluation and more price-pressure from, or even less contracts with, health insurers. These incentives possibly drive hospitals to manage their earnings to just above zero. In particular, I focus on the motivation for Dutch hospitals to manage their earnings arising from selective contracting by health insurers. This leads to the following research question:

*"Do Dutch hospitals manage their earnings and is there a relation between earnings (management) of hospitals and selective contracting by health insurers?"*

Whether hospitals manage their earnings could be of interest to all stakeholders mentioned above. If I find that hospitals manage their earnings, stakeholders should be aware that the earnings reported by a hospital might not reflect its "real" performance. Especially health insurers should be aware of this, as the Dutch healthcare system of regulated competition aims to ensure cost-efficient care. If health insurers are not aware of the possible earnings management of hospitals, this might lead to less price-pressure on the hospitals and therefore higher costs, resulting in wasted resources. Eventually, this could lead to a loss in social welfare.

To examine the research question, financial statement data is collected for Dutch hospitals for the period 2012-2018, as well as data on which hospitals are contracted by which health insurers in 2020. First, I measure whether Dutch hospitals have managed their earnings in the period 2012-2018 using four methods: the Jones model (Jones, 1991), the one-step adapted Jones model (Chen, 2018), a method focusing on a specific accrual account for hospitals: the work in progress under DBCs, and the earnings frequency distribution (Burgstahler & Dichev, 1997). Following, as earnings management is expected to have increased in the 2012 – 2018 period due to the increased selective contracting by health insurers, I compare the level of earnings management in 2013 and 2018 . Finally, I examine the relation between the hospital's reported and unmanaged earnings and the number of contracts by health insurers to verify whether Dutch health insurers are less likely to contract with hospitals with higher earnings compared to other hospitals.

I find evidence that Dutch hospitals manage their earnings. However, the results of the Jones (1991) and Chen (2018) method to measure earnings management are likely caused by a mechanical relation between the discretionary accruals and unmanaged earnings, thus, based on these methods, I cannot conclude that hospitals manage their earnings. But, the method focusing on the work in progress under DBCs and part of the earnings frequency distribution do not appear to be biased by this mechanical relation and also provide evidence that Dutch hospitals manage their earnings. Furthermore, comparing the magnitude of earnings management between 2013 and 2018 shows that earnings management has not increased. This suggests that the motivation for hospitals to manage their earnings is not the rise of selective contracting by health insurers, but might be, for example, because of public scrutiny. This conclusion is supported by the finding that health insurers do not seem to contract less with hospitals with relatively high unmanaged or reported earnings. Summarizing, the results suggest that Dutch hospitals manage their earnings, but there appears to be no relation between the earnings (management) of Dutch hospitals and the selective contracting by health insurers.

Whether hospitals manage their earnings is widely researched (for example by Leone & Van Horn, 2005; Eldenburg et al., 2011, Ballantine, 2007; Boterenbrood, 2011; Tan, 2010). Although these studies all find evidence for earnings management by hospitals, most of this research was conducted in other countries. Since the organization of Dutch healthcare differs much from other countries (e.g., only non-profit hospitals, a system of regulated competition and third-party payers, and mandatory health insurance), the evidence of research conducted in other countries might not be applicable to the Netherlands. The only research conducted in the Netherlands is that of Boterenbrood (2011). However, he focused on a specific account that is no longer used in the financial statements of Dutch hospitals. Furthermore, none of this research examines the relation with selective contracting by health insurers. Therefore, this research contributes to the existing literature in examining earnings management by Dutch hospitals and in particular by focusing on the relation of earnings (management) with selective contracting by health insurers. The findings of this thesis add to the existing literature in showing that Dutch hospitals manage their earnings, but that there is no relation between the reported or unmanaged earnings and contracting by health insurers.

The remainder of this thesis is structured as follows. In Section 2, I discuss the organization of the Dutch healthcare market, motivations for earnings management for hospitals, prior literature finding earnings management by hospitals, and I present the research hypotheses. In Section 3, I describe the research methods used and the data collection. Section 4 comprises descriptive statistics and the results. Finally, in Section 5, I discuss my conclusions and the limitations of my research.

## 2. Literature review

First, I provide a brief introduction to the parts and laws of the Dutch healthcare system that are relevant for this thesis (2.1.1). Following, I discuss a definition of earnings management and describe the two types of earnings management that can be distinguished from the literature (2.1.2). Subsequently, I describe the motivations for earnings management according to Healy and Wahlen (1999) and link these motivations to the context of Dutch hospitals (2.2.1). Next, I discuss some research showing that earnings management is used in practice (2.2.2). Then, I discuss some counterarguments (2.2.3). And lastly, I provide a summary and present my hypotheses (2.2.4)

### 2.1 Background

#### *2.1.1 Background Dutch healthcare system*

The Dutch healthcare system is based on regulated competition. *Competition* aims to stimulate cost-efficient and high-quality care by healthcare institutions, while government *regulation* assures solidarity and accessibility and to prevent market failure (Van Kleef et al., 2014). In this system, the health insurer is responsible to purchase cost-efficient and high-quality care for their insured clients. One of the most important tools health insurers have is the selective contracting of healthcare institutions (Loozen et al., 2016). By negotiating and purchasing selectively, or threatening to do so, healthcare insurers are able to contract with only the healthcare institutions with high-quality and cost-efficient care. Consequently, this should stimulate healthcare institutions to improve their quality of care, while remaining cost-efficient. Although health insurers have the possibility to contract selectively since 2006, Schut and Van de Ven conclude in 2011 that health insurers contracted with almost all hospitals and did not use the possibility to contract selectively. However, my data shows that, in 2020, only 20% percent of the hospitals have full contracts with all insurers, which implies that health insurers now do use the possibility to selectively contract with hospitals.

The Dutch healthcare system is regulated by three main laws: the law on health insurance called "Zorgverzekeringswet" (2006), the law on the organization of the healthcare market called "Wet Marktordening Gezondheidszorg" (2006) and the law on admission of healthcare institutions called "Wet toelating zorginstellingen" (2006). The Dutch healthcare authority (Nederlandse Zorgauthoriteit (NZa)) oversees compliance with these laws. Following, I will briefly explain the parts of these laws that are relevant for this thesis.

Zvw states that health insurers have a duty to provide care ("zorgplicht"), which implies that all their insured clients should have access to affordable and high-quality care (Zvw, 2006, art. 11). This means that health insurers have to purchase care for their clients which is sufficient, of high quality, and which is accessible within reasonable time and distance. Additionally, Zvw (art. 13) states that the selective contracting of certain hospitals, and thus a corresponding very low or no compensation for treatments in these hospital, should not be an “obstacle” (“hinderpaal”) for patients to go to this hospital. Therefore, patients have the right to declare at least a reasonable part of the costs with their insurers when they visit a non-contracted hospital.

Wmg (2006, art. 35) divides hospital care into two categories: the A- and B-segment. The A-segment is the government-regulated segment, in which the maximum rates are set nationally (meaning that health insurers have “contracts” with all hospitals). An example of care in the A-segment is emergency care. The B-segment is the free market segment in which hospitals and insurers negotiate about the rates and contracts. This B-segment is where the insurers can selectively contract with hospitals.

Wtzi (2006) states that all institutions that want to provide healthcare have to comply with certain requirements. One of these requirements is that all hospitals are mandatory to report annually, in the form of an annual report and financial statements (Wtzi, 2006, art. 25). For this reporting, they have to follow Title 9 of Book 2 of the Civil Code (“Burgerlijk Wetboek”), like most other public organizations in the Netherlands. However, hospitals have some specific reporting guidelines and items, for example “work in progress under DBCs”. DBC is short for Diagnosis Treatment Combination, which is a declarable performance for the hospital (NZa, 2020). When a patient starts a treatment, a DBC is opened. However, this treatment is not always finished before year-end. This means that at the end of the bookyear (which is always on December 31 for hospitals), a hospital has DBCs which have been opened, but not ended, so the hospital cannot declare them yet with the health insurer (Deloitte, 2016). The value of these unclosed DBCs is estimated and collected under the item “work in progress under DBCs” (RJ 655).

### *2.1.2 Background earnings management:*

There are many definitions of earnings management, but one of the most common used is the one by Healy and Wahlen (1999). They describe that in order to increase the value relevance of the reported earnings, management may use discretion to choose financial reporting methods that best represent the firm’s underlying business economics. However, if management abuses their discretion to manipulate earnings and mislead stakeholders, they call this earnings management: “Earnings management arises when managers use judgement 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 outcomes that depend on reported accounting numbers” (Healy and Wahlen, 1999, p. 368).

Two types of earnings management can be distinguished from the literature: accrual-based earnings management and real earnings management. The first type is accrual-based earnings management, in which accruals are used to manage earnings. The main objective of using accruals in financial reporting is to show the real performance of a firm by allowing to record revenues and expenses in the period in which they are incurred, rather than when the corresponding cash in- or outflow occurred. However, when discretion is used in determining the magnitude of accruals, in order to affect the underlying true economic performance, accrual-based earnings management has been employed (Healy & Wahlen, 1999). Most research on whether accrual-based earnings management is used in practice focuses on “unexpected” accrual behavior when the incentives to manage earnings are high. For example, in the period before an equity offering managers might overstate earnings, using accruals, to inflate the stock price (shown by Teoh, Welch, and Wong (1998)). In the healthcare sector, accrual-based earnings management can also be used. An example of an item in the financial statements of Dutch hospitals that could be used for accrual-based earnings management is “work in progress under DBCs” (for an explanation on DBCs, see 2.1.1). The estimation/valuation of this account is complex and discretion is used in determining the magnitude of this account (Deloitte, 2016). Therefore, if a hospitals would want to manage its earnings, for example because it has an unmanaged income loss, it could overstate this account to manage earnings to above zero. This overstatement would be hard to detect for auditors and stakeholders, because of the complexity of the valuation and scope of discretionary freedom in this valuation.

The other type of earnings management is called real earnings management. As earnings are composed of accruals and cash flows, also the cash flows can be influenced to manage earnings. With real earnings management, firms manipulate their reported income by deviating from normal business practices (Healy & Wahlen, 1999). The difference with accrual-based earnings management is that the actual business practices are adapted, while with accrual-based earnings management, accrual accounts are over- or understated using accounting estimates. Real earnings management is shown to be used in practice by for example Roychowdhury (2006), who shows that companies reduce discretionary spending (expenditures that a company can get by without if necessary) in order to increase their profit (thus managing earnings upwards). An hospital-related example is when a hospital is in need of a new information system, which causes high one-off costs (such as the purchase of a new Electronic Patient Dossier in the Catharina Ziekenhuis in 2018), but postpones this expenditure to the next year, because if they would purchase now, they would have to report a loss.

## 2.2 Literature review

### *2.2.1 Motivations for earnings management by Dutch hospitals*

There are different kinds of motivations to manage earnings, which can differ for profit and non-profit organizations. An article that provides an overview of these different motivations for listed companies is that of Healy & Wahlen (1999), and (part of) these motivations could also be applicable for Dutch hospitals. They categorize the motivations for earnings management into contracting motivations, capital market motivations and regulatory motivations.

*"Contracting motivations"* means that earnings management is used, because outcomes of contracts, in particular management bonus or debt contracts, can rely explicitly on certain accounting numbers and it can be costly to violate these contracts. Although Dutch hospitals do not pay their management bonuses, management's ability is likely partially assessed based on the financial results of the hospital. By reporting a loss, their ability to sustain the organization as a going concern might be questioned, causing the manager reputational damage and increasing the risk of being fired, as described by Leone & van Horn (2005) and Brickley & Van Horn (2002) for hospitals in the USA. If the management of Dutch hospitals also expects this to happen in the Netherlands, it would incentivize to avoid reporting losses. Additionally, Dutch hospitals are responsible for raising their own long-term debt. Research shows Dutch banks use the financial statements of hospitals for funding decisions (Schaepkens, 2001). Therefore, it is important for Dutch hospitals to show that they are financially stable, as this could reduce the cost of debt. Also, most debt contracts of Dutch hospitals rely on certain accounting numbers (Schaepkens, 2001) and it can be costly to violate a contract by reporting a low profit or a loss.

*"Capital market motivations"* means that firms use earnings management to prevent the negative reaction of the market, for example by avoiding reporting a loss, or to enlarge the positive reaction, for example by showing a higher profit prior to an IPO. Capital market motivations are not applicable in the case of non-profit organizations, because there is no need to be concerned with stock prices (Tan, 2011). However, one could argue that Dutch hospitals do operate in a market in which their "value" is important: the market in which health insurers selectively contract care for their insured clients. Research in the USA by Leone and van Horn (2005) describes that health insurers review the financial performance of hospitals in the USA to assess how hard they should push for lower prices. If Dutch hospitals expect health insurers to also do this in the Netherlands, this provides an incentive to avoid presenting a high profit. Since, if a hospital shows that they only have a small profit, they are in a better position to negotiate.

Lastly, *"regulatory motivations"* means that earnings management is used for anti-trust regulation or political considerations. In Dutch hospitals, these political considerations are most important as research shows hospitals with high profits are subject to public scrutiny (Paauwe, 2019), presumably because these high profits are indirectly financed by the insurance premiums paid by citizens (Boterenbrood, 2014). This provides an incentive for hospitals not to show excessive profits and thus to manage earnings downwards. Contrarily, reporting a loss could also be detrimental for the hospital. A reported loss can be perceived by the public as an indication that the hospital is not doing well, for example because of mismanagement (RTLZ, 2019). If the public believes this mismanagement might also impact the quality of care (as was the case with the bankrupt Slotervaartziekenhuis (RTLZ, 2019)), this would cause the hospital reputational damage and therefore provides an incentive to avoid reporting a loss.

*2.2.2 Evidence of earnings management by hospitals*

Boterenbrood (2014) is, to my knowledge, the only research conducted on earnings management in Dutch hospitals. Therefore, I discuss mostly research conducted in other countries.

Boterenbrood (2014) examines the period 2000 to 2008 and focuses on a specific item in the financial statements of Dutch hospitals: the realized revenue corrections. This used to be an item in the financial statements of Dutch hospitals (it is no longer used) that contained the revenue of *previous* years that was not reported in the corresponding fiscal year. These realized revenue corrections occur, because budget settlements could take longer than one-year and thus, at the end of the year, the final amount of revenue was not yet known. Boterenbrood hypothesizes that this account could be used to smooth earnings by influencing the magnitude of the postponed correction in a certain year more or less aggressively, which creates opportunities for future correction, and/or by influencing the timing of the recognition of the correction, for example by influencing the speed of administrative process. The results suggest that Dutch hospitals smooth their income using these realized revenue corrections.

Leone and van Horn (2005) research earnings management by hospitals in the USA. They hypothesize that hospitals manage their earnings to just above zero, as there are costs associated with reporting losses (loss of CEO reputation and increased likelihood of termination, and increased cost of debt, similar to Dutch hospitals (see 2.2.1)), as well as excessive profits (negative reactions of the public and increased price-pressure from third-party payers, similar to Dutch hospitals, but also disadvantage regulation and receiving less donations, which is not applicable to the Dutch setting). Leone and Van Horn examine the distribution of income (changes), the discretionary spending and two specific items in the financial statements susceptible to earnings management (but these are not used in the Netherlands). They conclude that hospitals avoid small losses and manage their earnings to just above zero.

The research of Eldenburg et al. (2011) examines both profit and non-profit hospitals in California, USA and investigates whether managers use real earnings management to manage earnings to just above zero. The incentives they describe to avoid a loss are contractual and reputation-related (similar to Leone and Van Horn (2005), who they reference often) and the incentives to avoid high profits relate to scrutiny by the government and other stakeholders (also similar to Leone and Van Horn (2005)) They distinguish between core versus noncore and operating versus non-operating activities to detect the earnings management. They find that hospitals' expenditures on non-operating activities and noncore operational expenses decrease in hospitals with incentives to engage in such behavior. They conclude that these results suggest that profit and non-profit hospitals use real operating decisions to manage earnings to just above zero.

Tan (2011) researches earnings management in non-profit hospitals in Taiwan. She hypothesizes that hospitals manage their earnings to just above zero, and uses the distribution of reported income (following Burgstahler & Dichev, 1997) and the modified Jones model (Dechow, 2005) to examine this. She concludes that managers use their discretion to manage earnings to just above zero. Especially religion- and business group hospitals and hospitals that receive more donations manage their earnings, presumably because they have more incentives to manage their earnings: Religion-based hospitals likely face more "supervision" from society, business group hospitals would tend to operate more in the form of profit-oriented business organizations (which have been shown to manage earnings, see Healy & Wahlen, 1999) and hospitals that receive more donations likely try to maintain or increase donations. Although Dutch hospitals do not receive donations, the "supervision" religion-based hospitals face and the more profit-oriented business operating of business group hospitals can be viewed as similar to the public scrutiny and market-based competition Dutch hospitals operate in.

Ballantine et al. (2007) investigate earnings management in English NHS Trusts. The main incentives they describe are the statutory duty for English NHS Trusts to break even in each and every year, the additional benefits received if the hospital is performing well (which is assessed on, among other things, achieving the breakeven target), and lastly the potential impairment of the reputation of the CEO, for both losses and profits. Only this last one is applicable for Dutch hospitals. Ballantine et al. (2007) examine the distribution of reported income and discretionary accruals, and find that managers use their discretion over accruals to manage income to the target range of around zero. They conclude that the current financial breakeven target is associated with wide-spread use of income-increasing and decreasing discretionary accruals.

### *2.2.3 Arguments against EM by Dutch hospitals*

Although the motivations for Dutch hospitals to manage their earnings are present (2.2.1) and research (conducted in countries) suggests hospitals manage their earnings (2.2.2), it is possible that Dutch hospitals do not manage their earnings in practice. First, because research from other countries might not be applicable to Dutch hospitals, because of differences in organization of the healthcare market. The organization of the Dutch healthcare sector is unique compared to other countries with only non-profit hospitals, third-party payers, regulated competition and selective contracting of hospitals. This leads to partly different incentives for hospitals in foreign countries than Dutch hospitals, however, many of these incentives are likewise applicable to Dutch hospitals (see 2.2.2).

Second, research suggests that Dutch hospitals generally have a very strong negotiation position with the health insurer (Kleef et al., 2014). This could mean that there is no need for hospitals to manage their earnings, despite the present motivations, as the insurer is not in a position to demand lower prices or threaten not to contract with the hospital. Moreover, part of Zvw (2006) are the "duty to provide care" and the "Hinderpaalcriterium" (see 2.1.2 for an explanation). These requirements impact the insurers' ability to send their clients to cost-efficient hospitals and if hospitals are aware of this, this weakens the negotiation position of the health insurer (Loozen et al. , 2016). This is especially the case for large hospitals, as these often have a large market share in their region, and thus a strong negotiation position (Loozen et al., 2016). However, having a strong negotiation position with the insurer and thus no need to manage earnings would only reduce the market motivations for hospitals, not the contracting and regulatory motivations. Nonetheless, I will control for the size of the hospital in my analyses.

Third, research shows insurers contract based on costs (Loozen et al., 2016; Kleef et al., 2014), there is no evidence they also review the hospitals profit. However, if hospitals have similar cost levels, it is likely that insurers review the reported earnings to determine which hospital to contract and to determine how hard to push for lower prices. But for this reason, I will control for the level of costs.

Lastly, it is possible that the costs or possible consequences for hospitals, in case they are revealed to manage their earnings, which likely leads to a lot of scrutiny from the public, politicians and insurers, outweigh the benefits of managing their earnings.

## 2.3 Summary and hypotheses

Three types of motivations present in Dutch hospitals: contracting motivations, healthcare market motivations and regulatory motivations (see 2.2.1). The contracting motivations for hospitals to avoid losses are present in two forms. First, management's ability is likely assessed based on the financial results of the hospital and presenting a loss could cause reputational damage and increase the risk of being fired (supported by Brickley and Van Horn (2005) in the USA). Second, Dutch hospitals are responsible for raising their own long-term debt and research shows Dutch banks use the financial statements of hospitals for funding decisions. Additionally, many debt contracts of Dutch hospitals rely on certain accounting numbers (Schaepkens, 2001), and it can be costly for a hospital to violate a contract by presenting a low profit or a loss.The healthcare market motivation for hospitals to manage their earnings is to prevent the negative reaction from insurers to reported high profits. If hospitals expect health insurers to review their financial statements (as shown by Leone and van Horn (2005) in the USA), and reporting a high profit (could) leads to more price pressure from, or less contracts with, insurers, it is disadvantageous for hospitals to report a high profit. Lastly, regulatory motivations might incentivize hospitals not to show excessive profits, because of public scrutiny (Boterenbrood, 2014), and not to show losses, because of reputation loss. This motivations are supported are supported by the research of Boterenbrood (2014), conducted in the Netherlands, and research in the USA (Leone & Van Horn, 2005; Eldenburg et al., 2011), Taiwan (Tan, 2011) and England (Ballantine et al., 2007). This leads to the following hypothesis:

*H1: Dutch hospitals manage their earnings upwards when unmanaged earnings are negative and downwards when unmanaged earnings are high*

Contracting and regulatory (political) motives have been present since 2011, but Schut and Van de Ven conclude that health insurers then contracted almost all hospitals, which would mean there were little health market motivations at that time. However, my data shows in 2020 only 20% of hospitals has full contracts with all insurers, thus over time the use of selective contracting has increased. Therefore, if the use of earnings management has increased over time as well, this is possibly due to the increased market motivations (of selective contracting). This leads to the following hypothesis:

*H2: Over time, the earnings management of Dutch hospitals has increased.*

Lastly, the market motivations for hospitals to manage their earnings to just above zero are based on the assumption that health insurers review the financial results of hospitals in the Netherlands when negotiating (supported by research by Leone and Van Horn (2005) in the USA), or that hospitals expect them to review these. To examine whether is it likely that health insurers review the financial statements, the third hypothesis is developed. This hypothesis controls for the level of costs of hospitals, as one of the counterarguments was that health insurers contract mostly on costs (Loozen et al, 2016; Van Kleef et al., 2014), not profits. This leads to the following hypothesis:

*H3: Controlling for the level of costs, hospitals with profits just above zero are more likely to be contracted by health insurers than hospitals with a high profit.*

# 3. Research design

In this chapter I first discuss the measurement of the discretionary accruals. Following, I describe the research methods used to examine the three hypotheses and discuss advantages and disadvantages of these methods. For an overview of all variables descriptions, see Appendix A, and for an overview of the research methods, see the Libby boxes in Appendix B.

## 3.1 Measuring discretionary accruals

The discretionary accruals are measured using two methods. The first is based on the model developed by Jones (1991) and the second focuses on a specific accrual account method: the work in progress under DBCs.

### *3.1.1 Jones model*

The Jones (model) estimates the part of the accruals that could be used to manage earnings by decomposing accruals into a discretionary and non-discretionary part. The non-discretionary accruals are the part of the accruals assumed to be determined by accounting standards and conventions (Boterenbrood, 2015). The other part is not completely determined by the accounting standards and conventions, but is subject to managerial discretion. These accruals are referred to as the discretionary accruals. Management can use discretion to influence the magnitude of these discretionary accruals and thus these are the accruals that can be used to manage earnings. These discretionary and non-discretionary accruals are not directly observable in hospitals' (or other companies') annual reports. It is a conceptual distinction made by Jones (1991). To estimate the discretionary accruals, Jones (1991) developed a model: by estimating the level of non-discretionary accruals and subtracting this from the total accruals, the discretionary accruals are left as the residual. Non-discretionary accruals are estimated using the following model:

$$\frac{TACC_{i,t}}{TA_{i,t-1}} = \alpha_{0,t}\frac{1}{TA_{i,t-1}} + \alpha_{1,t}\frac{\Delta REV_{i,t}}{TA_{i,t-1}} + \alpha_{2,t}\frac{PPE_{i,t}}{TA_{i,t-1}} + \omega_{i,t} \qquad (1)$$

Where $TACC_{i,t}$ are the total accruals of hospital i in year t. $\Delta REV_{i,t}$ is the increase in revenue of hospital i from year t-1 to year t. $PPE_{i,t}$ is the property, plant and equipment of hospital i in year t. These variables are scaled by $TA_{i,t-1}$, the lagged total assets of hospital *i* in year *t-1*. $\omega_{i,t}$ is the residual and the measure for the discretionary accruals. An overview of all variable definitions is included in Appendix A.

Although this method to estimate the discretionary accruals is widely used (for example by Ali & Zwang, 2015; Tan et al., 2011; Leone and Van Horn, 2005; Ballantine et al., 2007), it is also much criticized, as accruals are shown to be often incorrectly classified as discretionary or non-discretionary (Jackson, 2018). When too much of the accruals are incorrectly classified as discretionary, this could lead to a Type 1 error in the second step: the identification of earnings management when it is not present (Chen, 2019; Jackson, 2018). Alternatively, if not enough of the total accruals are classified as discretionary, this could lead to a Type 2 error: not identifying earnings management when it is present. As the Jones model usually explains only about 10% of the variation in total accruals, implying that around 90% of the total accruals are discretionary (which seems very high), a Type 1 error is more likely. The Jones model is further criticized by using a two-step procedure to detect earnings management (Chen, 2018). I discuss this criticism in Section 3.3.1.

### *3.1.2 Specific accrual account method: work in progress under DBCs*

The method focusing on a specific accrual account, in this thesis the work in progress under DBCs, is inspired by the research of McNichols and Wilson (1988) on the provision for bad debts account. Later, this method was used by Leone and Van Horn (2005) in USA non-profit hospital sector. They identified two accounts that were most susceptible to earnings management: the third-party settlement liability account and the allowance for doubtful accounts. Unfortunately, their research was conducted in the USA and these accounts are not used in the annual reports of Dutch hospitals. However, an account in Dutch hospitals' annual reports that is large in magnitude and requires substantial judgement, is the item "work in progress under DBCs" (see 2.1.1 and 2.1.2). The magnitude and required judgement make it highly susceptible to earnings management.

The work in progress under DBCs reported on the balance sheet is composed of multiple items: an estimation of the costs and imputed income of work in progress(1), minus the advances received (2), minus the provision for work in progress (3) (RJ 655.302 and RJ 655.303). The discretionary part can be derived as follows. Although it is not clear on what insurers base their advances, they presumably only pay the amount of advances that they expect will be realized in the following year. Then, the discretionary amount would be the difference between the hospitals' estimation of costs and the advances paid by the insurer:

$$DDBC_{i,t} = WIP_{i,j} - ADV_{i,j}$$

Where $DDBC_{i,t}$ is the estimated discretionary amount of work in progress under DBCs of hospital i in year t, $WIP_{i,j}$ is hospital i's estimation of *total* work in progress under DBCs of year t, and $ADV_{i,j}$ is the advances received from health insurers by hospital i in year t.

The advantages of this method are that it avoids the two-step procedure, as needed in the Jones model and much criticized (Chen et al., 2018; Christodoulou et al., 2018), and that the discretionary part is likely more reliably estimated. Therefore, I expect this method is less likely than the Jones model to lead to Type 1 and Type 2 errors. However, this method has not been used before in literature and possible weaknesses are not yet exposed. Furthermore, the estimation of the discretionary component of the work in progress under DBCs is somewhat arguable, as it is unclear how health insurers determine the advances they pay hospitals. This could lead to Type 1 errors, if the estimation of the discretionary amount is too high, and to Type 2 errors, if the estimation of the discretionary amount is too low, similar to the Jones model. I assume that the health insurers pay the amount based on their estimation of the value of the work in progress under DBCs. However, it is possible that these advances are simply based on, for example, the amount they paid last year. But, since the annual total work in progress is expected to stay relatively the same percentage of revenue (if the hospital does not significantly change its course of business), this should not have a large impact on the discretionary level. Alternatively, the insurer could structurally pay less than their expected work in progress under DBCs, however, then you would expect to see only positive net-amounts in this account, which is not the case. Therefore, this reasoning for the classification of the discretionary part of the work in progress under DBCs seems reasonable.

## 3.2 Dutch hospitals manage their earnings upwards when unmanaged earnings are negative and downwards when unmanaged earnings are high (H1)

### *3.2.1 OLS regression models*

I use ordinary least squares (OLS) regressions to analyze the relation between the discretionary accruals and the earnings before the respective discretionary accruals: the unmanaged earnings. These unmanaged earnings are calculated as follows for the discretionary accruals as estimated by the Jones model (1991):

$$EBDA_{i,t} = EARN_{i,t} - DA_{i,t}$$

Where $EBDA_{i,t}$ are hospital i's earnings before discretionary accruals in year t, scaled by lagged total assets. $EARN_{i,t}$ is hospital i's reported net income in year t, scaled by lagged total assets. $DA_{i,t}$ are hospital i's estimated discretionary accruals in year t, scaled by lagged total assets.

And the unmanaged earnings are calculated as follows for the discretionary accruals based on work in progress under DBCs:

$$EBDBC_{i,t} = EARN_{i,t} - DDBC_{i,t}$$

Where $EBDBC_{i,t}$ are hospital i's earnings before the discretionary component of work in progress under DBCs, scaled by lagged total assets. $EARN_{i,t}$ is hospital i's reported net income in year t, scaled by lagged total assets. $DDBC_{i,t}$ are hospital i's estimated discretionary accruals in year t, scaled by lagged total assets.

Subsequently, the relation between the discretionary accruals of hospital i in year t and the unmanaged earnings can be analyzed. If hospitals manage their earnings downwards when unmanaged earnings are high, and upwards when the unmanaged earnings are negative (a loss), this would show as an inverse relation between the discretionary accruals ($DA_{i,t}$ and $DDBC_{i,t}$) and unmanaged earnings ($EBDA_{i,t}$ and $EBDBC_{i,t}$, respectively).

The first model presented in equation (2) is based on the model developed by Jones (1991). Many modifications have been suggested for this model to improve the explanatory power of the model and reduce Type 1 and Type 2 errors (see the criticism in 3.1.1 and below by Chen (2018)). The most known and used is the Modified Jones model, as proposed by Dechow, Sloan and Sweeney (1995). According to Dechow et al. (1995) an implicit assumption of the Jones model is that revenues are nondiscretionary. However, management might use its discretion to accrue revenues at year-end, while it is unclear whether revenues have been earned. In that case, the Jones model would remove part of the managed earnings from the discretionary accruals. Therefore, they correct revenues for accounts receivable. For hospitals however, the revenues are unlikely to be managed, as accruing revenues at year-end is difficult (Eldenburg, 2011). Nonetheless, to ascertain that this indeed does not have an effect on my results, I estimate the regressions including the accounts receivable, scaled by lagged total assets, and this indeed does not make a difference.

Another frequently used adaption to the model is including return on assets and lagged net income as control variables, as suggested by Kothari (2005). They show extreme performance by some firms leads to incorrectly classifying too much accruals as discretionary for these firms, consequently leading to Type 1 errors. Including the return on assets and lagged net income controls for this extreme performance. However, due to the non-profit organization of Dutch hospitals, they do not show extreme performance and including these control variables is not necessary. Nonetheless, to ascertain these indeed do not have an effect on my results, I estimate the regressions including the return on assets and lagged net income, scaled by lagged total assets, and this indeed makes no difference.

The control variables that I do include in my models are the lagged (discretionary) accruals, to capture predictable accrual reversals (suggested by Chambers, 1999) and the lagged total assets, as I expect large hospitals to manage their earnings less than smaller hospitals (see 2.2.3).

The second model presented in equation (3) is based on the adaption of the Jones model suggested by Chen (2018). Chen (2018) shows that the two-step regression procedure employed by Jones (1991) regularly leads biased coefficient and subsequently to a Type 1 error, as it does not fully account for the correlation between the independent variables included in the two regressions. Therefore, he suggests combining the two regressions into one. However, the disadvantage of this method (Model (3)), is that the discretionary accruals are not estimated separately, therefore the level of discretionary accruals or unmanaged earnings cannot be determined based on this model. Instead, I use the cash flows from operations and focus on this coefficient, expecting it to be negative due to the same inverse relation as in Model (2) and Model (4). Although this model reduces the likelihood of a Type 1 error, it employs a similar method to “estimate” the discretionary part of the total accruals as the Jones model and therefore might still over- or underestimate the discretionary accruals, leading to a Type 1 or Type 2 error.

To mitigate this estimation method as suggested by Jones, the third model presented in equation (4) focuses on a specific accrual account: the discretionary work in progress under DBCs. Since I expect the estimation of the discretionary accruals to be more reliable (see 3.1.2), Type 1 and Type 2 errors are less likely.

This leads to the following regression models:

$$DA_{i,t} = \beta_0 + \beta_1 EBDA_{i,t} + \beta_2 DA_{i,t-1} + \beta_3 TA_{i,t-1} + \omega_{i,t} \quad (2)$$

$$TACC_{i,t} = \beta_0 + \beta_1 CFO_{i,t} + \beta_2 TACC_{i,t-1} + \beta_3 TA_{i,t-1} + \beta_4 \Delta REV_{i,t} + \beta_5 PPE_{i,t} + \omega_{i,t} \quad (3)$$

$$DDBC_{i,t} = \beta_0 + \beta_1 EBDBC_{i,t} + \beta_2 DDBC_{i,t-1} + \beta_3 DDBC_{i,t-1} + \beta_4 TA_{i,t-1} + \omega_{i,t} \quad (4)$$

Where $DA_{i,t}$ are hospital i’s discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. $TACC_{i,t}$ are hospital i’s total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t-1, scaled by lagged total assets in year t-1 ($TA_{i,t-2}$). $DDBC_{i,t}$ is hospital i’s discretionary work in progress in year t, scaled by lagged total assets. $EBDA_{i,t}$ is hospital i’s net income before discretionary accruals in year t, scaled by lagged total assets ($TA_{i,t-1}$). $CFO_{i,t}$ are hospital i’s cash flows from operations in year t, scaled by lagged total assets. $EBDBC_{i,t}$ is hospital i’s net income before discretionary work in progress under DBCs in year t, scaled by lagged total assets. $TA_{i,t-1}$ are hospital i’s lagged total assets of year t (total assets in year t-1). $\Delta REV_{i,t}$ is hospital’s i change in revenue from year t-1 to t (calculated as revenue in year t – revenue in year t-1), scaled by lagged total assets. $PPE_{i,t}$ are hospital i’s tangible fixed assets in year t, scaled by lagged total assets. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

A fundamental issue in detecting earnings management using all these methods is the unobservability of the managed and unmanaged components of reported earnings. I estimate the unmanaged earnings ($EBDA_{i,t}$ and $EBDBC_{i,t}$) by subtracting the discretionary accruals ($DA_{i,t}$ and $DDBC_{i,t}$, respectively) from the reported earnings ($EARN_{i,t}$) (see 3.3.1). Subsequently, I estimate regression Models (2) and (4) (for simplicity, I focus on Model (2), however this also applies to Model (4)), of which a simplified version is:

$$DA_{i,t} = \beta_0 + \beta_1 EBDA_{i,t} + \varepsilon_{i,t} \quad (A)$$

Substituting $EBDA_{i,t}$ for $\mathrm{EARN_{i,t}} - \mathrm{DA_{i,t}}$ gives:

$$DA_{i,t} = \beta_0 + \beta_1 (EARN_{i,t} - DA_{i,t}) + \varepsilon_{i,t} \quad (B)$$

However, in these models, by definition of the unmanaged earnings, a lower value of the unmanaged earnings is likely to be driven by a high value of discretionary accruals. This implies a mechanical negative relation between the discretionary accruals and unmanaged earnings ($\beta_1$), leading to a Type

1 error: obtaining a $\beta_1$ for $EBDA_{i,t}$ that is < 0 (indicating earnings management), while the actual $\beta_1 = 0$ (no earnings management). This mechanical relation is also pointed out by Leone and Van Horn (2005) and Boterenbrood (2014), and they argue it is likely to be caused by measurement error in estimating the discretionary accruals. More specifically, the mechanical relation arises as a result of the following. Equation (B) requires the same coefficient ($\beta_1$) for $EARN_{i,t}$ as for $\mathrm{DA_{i,t}}$. However, if the regression model would be:

$$\mathrm{DA_{i,t}} = \beta_0 + \beta_{1a} EARN_{i,t} - \beta_{1b} \mathrm{DA_{i,t}} + \varepsilon_{i,t} \qquad \text{(C)}$$

Then, of course, $\beta_{1a}$ = 0 and $\beta_{1b}$ = -1. Accordingly, $\beta_1$ is the weighted average of $\beta_{1a}$ and $\beta_{1b}$, thus of $\beta_{1a}$ and -1 ($\beta_{1b}$), the weights depending on the relative magnitudes of $EARN_{i,t}$ and $DA_{i,t}$. The larger the magnitude of the discretionary accruals relative to the reported earnings, the more weight is placed on it, thus obtaining a $\beta_1$closer to -1. A high value of discretionary accruals can be caused by actual relatively large discretionary accruals or by a large measurement error leading to relatively large discretionary accruals. As it is unlikely that the discretionary accruals are, actually, very large in magnitude (Jackson, 2018), it is likely caused by measurement error ($e$). According to Leone and Van Horn (2005), this mechanical relation thus arises because of the following: If there is a measurement error, then: actual $\mathrm{DA_{i,t}}$ = estimated $\mathrm{DA_{i,t}}$ + $e$. However, if there is no measurement error ($e = 0$), then actual $\mathrm{DA_{i,t}}$ = estimated $\mathrm{DA_{i,t}}$. Suppose there is no measurement error, then substituting $EARN_{i,t}$ in equation (B) for $\mathrm{EBDA_{i,t}} + \mathrm{DA_{i,t}}$ gives:

$$\mathrm{DA_{i,t}} = \beta_0 + \beta_1 (EBDA_{i,t} + \mathrm{DA_{i,t}} - \mathrm{DA_{i,t}}) + \varepsilon_{i,t} \qquad \text{(D)}$$

Thus, then the obtained $\beta_1$ is unlikely to be driven by a mechanical relation. However, there is measurement error, then actual $\mathrm{DA_{i,t}}$ = estimated $\mathrm{DA_{i,t}}$ + $e$, and equation (B) would be:

$$DA_{i,t} + e = \beta_0 + \beta_1 (EARN_{i,t} - \mathrm{DA_{i,t}} - e) + \varepsilon_{i,t} \qquad \text{(E)}$$

Again, substituting $EARN_{i,t}$ for $EBDA_{i,t} + DA_{i,t} + e$ gives:

$$DA_{i,t} + e = \beta_0 + \beta_1 (EBDA_{i,t} + e) + \varepsilon_{i,t} \qquad \text{(F)}$$

Note the difference with equation D in equation F. As $e$ appears on both sides of the equation, it induces the mechanical relation.

To detect whether this mechanical relation biases my results, I regress the reported earnings ($EARN_{i,t}$) on the discretionary accruals ($DA_{i,t}$ and $DDBC_{i,t}$) presented in equation (5) and (6) and assess the obtained $\beta_a$. When $\beta_a$ > 0 and $\beta_1$ < 0 (in Model (2) and (4)), then $\beta_1$ < 0 must be driven by the mechanical relation. However, when $\beta_a$ < 0 and $\beta_1$ < 0 then $\beta_1$ < 0 is not completely driven by the mechanical relation.

$$DA_{i,t} = \beta_0 + \beta_a EARN_{i,t} + control\ variables\ Model\ (2) + \varepsilon_{i,t} \qquad (5)$$

$$DDBC_{i,t} = \beta_0 + \beta_a EARN_{i,t} + control\ variables\ Model\ (4) + \varepsilon_{i,t} \qquad (7)$$

Although Model (3), does not estimate the unmanaged earnings, but instead focuses on the cash flows from operations and its relation with the discretionary part of the total accruals to detect earnings management, this mechanical relation also applies to this model for two reasons. First, because similar to the discretionary accruals and unmanaged earnings, a lower value of the total accruals likely to be driven by a high value of cash flows from operations. And second, because the discretionary part of the accruals is estimated with a similar method as the original Jones model and therefore might still overestimate the discretionary accruals, leading to this error term ($e$) in the regression model. Again, to detect whether this mechanical relation biases my results, I estimate the following regression:

$$TACC_{i,t} = \beta_0 + \beta_a EARN_{i,t} + control\ variables\ Model\ (3) + \varepsilon_{i,t} \quad (6)$$

*3.3.2 Earnings frequency distribution*

The earnings frequency distribution method examines the distribution of reported earnings and discontinuities around zero. If hospitals do not manage their earnings, a normal distribution of income around zero would be expected (Burgstahler & Dichev, 1997). However, if hospitals manage their earnings by avoiding losses, this would result in an abnormal distribution of the levels of reported earnings and a discontinuity around zero. This means that there would be unusually low frequencies of small losses and unusually high frequencies of small profits (*figure 3.1*). Burgstahler and Dichev's method also focuses on earnings management to avoid small earnings decreases. However, there is no research and no imaginable incentives that suggest Dutch hospitals also engage in this type of behavior. I expect that, as long as their profit stays just above zero, they do not avoid earnings decreases (following Leone & Van Horn, 2005).

The earnings frequency distribution method uses two types of evidence. First, graphically in a histogram and second, by statistically testing this distribution. This method is used in the healthcare sector by Leone and Van Horn (2005) and Tan (2011) to detect earnings management by non-profit hospitals in the USA and Taiwan, respectively. To graphically examine the earnings frequency distribution, I first plot and examine a histogram of the reported earnings of Dutch hospitals, scaled by the lagged total assets, to detect a possible discontinuity around zero. Subsequently, I plot and examine the unmanaged earnings ($EBDA_{i,t}$ and $EBDBC_{i,t}$, scaled by lagged total assets), which I are expect to be more similar to a normal distribution than the reported earnings (following Burghstahler & Dichev, 1997 and Leone & Van Horn, 2005). Additionally, I plot the average discretionary accruals ($DA_{i,t}$ and $DDBC_{i,t}$) for each bin of the unmanaged earnings histograms. These average discretionary accruals are expected to be positive for unmanaged earnings bins left of zero (as the discretionary accruals would then be income-increasing, as expected in case of a loss) and negative for unmanaged earnings bins right of zero (as the discretionary accruals would then be income-increasing, as expected in case of a high profit).

After graphically examining the distribution of the reported earnings of Dutch hospitals, I statistically test the expected discontinuity around zero. The test I perform is similar to that performed by Burgstahler and Dichev (1997) and Leone and Van Horn (2005). The assumption is that, in case of no earnings management, the distribution of income around zero is smooth, meaning that the number of observations in the interval just left, and right, of zero is the average of the number of observations in the two adjacent intervals. This is statistically tested by calculating the standardized difference:

$$Standardized\ difference = \frac{n_i - \frac{1}{2}(n_{i-1} + n_{i+1})}{SD}$$

where SD = $Np_i(1 - p_i) + \frac{1}{4}N(p_{i-1} + p_{i+1})(1 - p_{i-1} - p_{i+1}) + Np_i(p_{i-1} + p_{i+1})$

Where $n_i$ is the actual number of observations in interval i. $n_{i-1}$ is the actual number of observations in the interval just left of i, interval i-1. $n_{i+1}$ is the actual number of observations in the interval just right of i, i+1. SD is the standard deviation of the difference. N is the total number of observations in the dataset. $p_i$ is the probability of an observation in interval i (calculated as $n_i/N$), $p_{i-1}$ is the probability of an observation in the interval just left of i, interval i-1. $p_{i+1}$ is the probability of an observation in the interval just right of i, i+1.

The earnings frequency distribution approach has two advantages. As it examines the reported frequency distribution, it captures both real- and accrual based earnings management. And, for the analysis of the distribution of reported earnings, no estimations have to be made about the level of discretionary accruals, which is difficult and much criticized (see 3.1 and 3.1.2). However, the main disadvantage of this approach is that an abnormal earnings distribution does not provide robust evidence that the earnings have been managed. Durtschi and Easton (2005) and Dechow et al. (2003) describe that this discontinuity in the reported earnings distribution might also be caused by other factors than earnings management, and caution to be careful to interpret a discontinuity as earnings management. For example, the sample selection criteria might lead to excluding observations (just) to the left of zero, causing the discontinuity. This might also be applicable in my thesis, as I exclude hospitals that went bankrupt before 2018 (see 3.4), while these hospitals of course reported losses in the years before the bankruptcy, thus possibly causing a discontinuity left of zero.

### 3.3 Over time, the earnings management of Dutch hospitals has increased (H2)

To examine whether the earnings management of Dutch hospitals has increased in the period 2013-2018, year-specific analyses of Model (2) and (4) are performed for 2013 and 2018. I do not examine the earnings frequency distribution for 2013 and 2018 separately, as there are too little observations in a year to plot this expect a normal distribution. I expect less earnings management in 2013 than in 2018, because of the increase in incentives to manage earnings resulting from the increase in healthcare market motivations (as discussed in 2.2.1), which I expect to present in one of the following ways. First, I expect the coefficient for the unmanaged income proxy ($EBDA_{i,t}$,and $EBDBC_{i,t}$, respectively) in regression Models (2) and (4), $\beta_1$, to be more negative for 2018 than for 2013, assuming the magnitude of the discretionary accruals has stayed the same for 2013 and 2018. Alternatively, if the coefficient of interest $\beta_1$, has not changed significantly from 2013 to 2018, I expect the magnitude of the discretionary accruals to have increased. Only examining whether the 2013 and 2018 coefficients differ significantly would not be sufficient, as this does not provide evidence on the magnitude of the earnings management. For example, if the discretionary accruals and unmanaged income would both have increased from 2013 to 2018, the effect of the unmanaged earnings on the discretionary accruals might not have changed, but the magnitude of the discretionary accruals is larger, hence the magnitude of earnings management has increased.

I examine whether there is a significant difference in the 2013 and 2018 coefficients with a t-test, and examine whether the magnitude of the discretionary accruals is different for 2013 than for 2018 by estimating regression Models (8) and (9):

$$DA_{i,t} = \beta_0 + \beta_1 DYEAR + \beta_2 DA_{i,t-1} + \beta_3 TA_{i,t-1} + \varepsilon_{i,t} \quad (8)$$

$$DDBC_{i,t} = \beta_0 + \beta_1 DYEAR + + \beta_2 DDBC_{i,t-1} + \beta_3 TA_{i,t-1} + \omega_{i,t} \quad (9)$$

Where $DA_{i,t}$ are hospital i's discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. $TACC_{i,t}$ are hospital i's total accruals in year t, scaled by lagged total assets. $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t. $DYEAR$ is a dummy variable that equals 0 for 2013 and 1 for 2018. $TA_{i,t-1}$ are hospital i's lagged total assets of year t (total assets in year t-1). $\Delta REV_{i,t}$ is hospital's i change in revenue from year t-1 to t (calculated as revenue in year t – revenue in year t-1), scaled by lagged total assets. $PPE_{i,t}$ are hospital i's tangible fixed assets in year t, scaled by lagged total assets. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Separate models are estimated for unmanaged earnings above zero and below zero, as income-increasing accruals are expected when unmanaged earnings are negative, and income-decreasing accruals are expected when unmanaged earnings are positive and high. I do not compare all years, as I do not expect the increase of earnings management to be linear, but fluctuate over the years in an upwards trend, for which a linear regression would not be appropriate. But, if earnings management has increased from 2013 to 2018, I do expect at least a significant difference between 2013 and 2018. However, it is possible that the significant difference I might find between 2013 and 2018 is just due to these fluctuations. Lastly, although I have data from 2011, I use 2013 as the beginning comparison, to be able to include the lagged discretionary accruals of 2012, for which the lagged total assets, thus of 2011, are needed to estimate.

### 3.4 Controlling for the level of costs, hospitals with profits just above zero are more likely to be contracted by health insurers than hospitals with a high profit (H3).

To examine whether health insurers are less likely to contract with hospitals with higher reported profit percentages, regression Model (10) is estimated. I include both the 2018 and 2017 earnings, since the negotiations for the contracts of year t are conducted in year t-1 (2019), health insurers likely review the financial statements of the years t-2 (2018) and likely t-3 (2017). The regression only includes the hospitals with positive earnings ($EARN_i$>0) in 2017 and 2018, as I estimate a linear regression and expect that hospitals with a reported loss are also less likely to be contracted by a health insurers, which does not correspond with a linear scale. Further, I do not include a dummy variable indicating when a hospital reports a loss, as there are only 4 hospitals in 2018, and 5 in 2017, that reported a loss and this is not a sufficient number of observations to estimate the coefficient reliably. Additionally, I include the hospital's total costs ($TC_{i,2018}$), scaled by the lagged total assets, as I expect hospitals with higher relative costs are also less likely to be contracted by health insurers (see 2.2.3). Lastly, I include the hospital's total assets ($TA_{i,2017}$), as I expect larger hospitals are more likely to be contracted, because of more bargaining power than smaller hospitals (see 2.2.3).
However, it is possible that health insurers are aware hospitals manage their earnings and try to estimate the unmanaged earnings themselves. Therefore, I repeat the regression with the unmanaged earnings proxies ($EBDA_{i,t}$, and $EBDBC_{i,t}$), shown in Model (11) and (12) respectively. I do not include the 2017 unmanaged earnings, as doing this would lead to too little observations to estimate the regression models reliably.

$$CONT = \beta_0 + \beta_1 POSEARN_{i,2018} + \beta_2 POSEARN_{i,2017} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i \quad (10)$$

$$CONT = \beta_0 + \beta_1 POSEBDA_{i,2018} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i \quad (11)$$

$$CONT = \beta_0 + \beta_1 POSEBDBC_{i,2018} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i \quad (12)$$

Where $CONT_{i,2020}$ is hospital i's number of contracts with health insurers in 2020. $POSEARN_{i,t}$ is hospital i's $EARN_{i,t}$ in 2017 or 2018, if this is positive, scaled by lagged total assets. $POSEBDA_{i,t}$ is hospital i's $EBDA_{i,t}$ in 2017 or 2018, if this is positive, scaled by lagged total assets. $POSEBDBC_{i,t}$ is hospital i's $EBDBC_{i,t}$ in 2017 or 2018, if this is positive, scaled by lagged total assets. $TC_{i,t}$ are hospital i's total costs in 2018, scaled by lagged total assets. $TA_{i,2017}$ are hospital i's total assets in 2017. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

### 3.5 Data

In this thesis, the data used comprises all Dutch general and academic hospitals for an eight-year period from 2011 to 2018, excluding hospitals that went bankrupt before 2018. I include both general and academic hospitals, as I expect they do not differ in their earnings management motivations. I have chosen this period, as I expect earnings management to have increased during this period, due to the increased contracting incentives (see 2.3). The starting point for my data collection is the list of all Dutch general and academic hospital organizations in 2019 of the RIVM. They list 69 hospitals, of which 61 general and 8 academic hospitals. However, in the period 2011 to 2018 there have been several mergers and acquisitions. Therefore, all the hospital organizations websites have been checked, which revealed 13 mergers or acquisitions. These hospitals were included individually in the years before their merger (for an overview, see Appendix C1). Additionally, for the year of the merger, the beginning total assets balance of the newly merged hospital is included, as the beginning book balances are needed to scale all variables. For example, if two hospitals merged on 01-01-2018, the first published consolidated financial statements are published for 2018. From this financial statement, the beginning book balance (on 01-01-2018) is retrieved.

Data is collected from multiple sources. First, financial statement data is extracted from datasets that are managed by the Dutch Ministry of Health, Welfare and Sport (jaarverantwoordingzorg.nl, 2019). There is one dataset for each year and these comprise financial and non-financial information on all Dutch healthcare institutions. These datasets have been combined, and the data extracted is all financial information of general and academic hospitals for an eight-year period from 2012 to 2017. This led to 417 firm-year observations. However, not all hospitals filed their financial statements in these datasets and there was no complete dataset available for 2018. Thus, data on 2018 and the firm-years missing from the dataset were hand-collected from the annual reports of the respective hospitals (91 firm-year observations). Despite, still 11 firm-year observations are missing, leading to a total of 508 firm-years in the dataset (for an overview, see Appendix C2)[1].

For testing the third hypothesis, I have hand-collected the data on which hospitals were contracted by which insurance policies in 2020 from the website independer.nl. Unfortunately, this data is only available for 2020 and not previous years.

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[1] *Note*: Excluded/missing data: Antoni van Leeuwenhoek (all years, does not present an annual report). Ruwaard van Putten (only 2012 data available, while at least two years is needed to determine the lagged total assets and change in revenues). Medisch Centrum Leeuwarden (2011, no data available). Spaarne (2014, no data available). Bronovo (2014, no data available). Medisch Centrum Alkmaar (2014, no data available).

# 4. Results

## 4.1 Estimation of discretionary accruals

The discretionary accruals are estimated with the Jones model, as a residual of regression equation (1). The results of this regression are presented in Table 4.1. The tangible fixed assets ($PPE_{i,t}$) are significant and explain part of the variation in total accruals. The model has an explained variance of 15.49% (Adj. $R^2$ = 15.49%), meaning that 15.49% of the variation in total accruals can be explained by the level of tangible fixed assets, increase in revenue and total assets. $\Delta REV_{i,t}$ and $1/TA_{i,t-1}$ are not significant and removing these from the model shows they do not contribute to the Adj. $R^2$. Since the explained variance is 15.49%, 15.49% of the total accruals is classified as non-discretionary, and the remaining 84.51% (1-0.1549) is classified as discretionary. Although the Jones model usually classifies only around 10% of the total accruals as non-discretionary (Jackson, 2018) and mine classifies 15.49% as non-discretionary, this still seem very low relative to the discretionary accruals (for a discussion on the impact on my results, see 4.3.1). Furthermore, estimating discretionary accruals per year shows that the explanatory power of the Jones model differs considerably between years: from 0% in 2012 to almost 55% in 2018 (see Appendix D). However, since the 2012 model is only used to calculate the lagged discretionary accruals for 2013, the impact on my results will be low. For the other years, these errors might impact the reliability of my results. If the errors lead to a lower explanatory power of the Jones model, and thus lead to classifying not enough of the total accruals as non-discretionary, this could lead to a Type I error (see 3.1.1 and 3.2.1).

## 4.2 Descriptive statistics

Table 4.2 shows descriptive statistics of my sample. The minimum net income for a Dutch hospital in the period of 2012-2018 is a loss of 11.5% of their total assets. while the maximum profit is 18.4% of their total assets. The average profit is 2.0% and the median is 1.9%, indicating that the data is not skewed. Examining the *unscaled* descriptive statistics reveals a skewness for all variables, expect $CONT_{i,2020}$ (for example, the average profit is 6.3 million, but the median is 3.9 million euros), this skewness is thus corrected by scaling all variables by the lagged total assets. Furthermore, the first quartile of profit is positive, which is consistent with the expectation that most Dutch hospitals set their profit target at just above zero. The hospital with the lowest number of contracts with health insurers has 45 contracts (out of 57), while some hospitals have contracts with all insurers. In the appendix, the profit percentages over time for period 2012-2018 are included (see Appendix E).The average profit percentage of hospitals has stayed relatively the same, fluctuating around the average of 2.0%. Due to the increased pressure from health insurers a decrease in profit percentage might be expected. However, no clear time trend is observable.

The correlations between key variables (Pearson correlations) are presented in Table 4.3. The variables have been scaled by lagged total assets. The net income ($EARN_{i,t}$), cash flows from operations ($CFO_{i,t}$), operating profit ($IBC_{i,t}$), total accruals ($TACC_{i,t}$), revenue ($REV_{i,t}$) and total costs ($TC_{i,t}$) are mostly highly correlated with each other, as expected. The lagged total assets ($TA_{i,t-1}$) show a negative and significant correlation with revenue ($REV_{i,t}$), total costs ($TC_{i,t}$) and number of contracts with health insurers ($CONT_{i,t}$), indicating that larger hospitals have relatively lower revenues and costs, and are contracted less by health insurers. This is surprising, as I expected larger hospitals to be more likely to be contracted by health insurers (see 2.3). However, the correlation of variables with the lagged total assets might also be driven by a mechanical relation: because all variables have been scaled by the lagged total assets, an increase in the total assets by definition decreases the scaled respective variable.

## 4.3 Dutch hospitals manage their earnings upwards when unmanaged earnings are negative and downwards when unmanaged earnings are high (H1)

### *4.3.1 OLS Regression Models*

To examine whether Dutch hospitals manage their earnings, regression Models (2), (3) and (4) have been estimated. The results of these three regressions are presented in Table 4.4. All three regression models show a highly significant negative relation of the unmanaged earnings $EBDA_{i,t}$, $CFO_{i,t}$ and $EBDBC_{i,t}$ with the discretionary component $DA_{i,t}$, $TACC_{i,t}$, $DDBC_{i,t}$, respectively ($\beta_1 =$ -0.951***, -0.971***, -0.619***). This is consistent with the expected inverse relation: hospitals manage their earnings downwards when unmanaged earnings are high, and upwards when the unmanaged earnings are low or negative. Furthermore, the coefficient on $TA_{i,t-1}$ shows a significant negative effect in Model (3) and Model (4), but not in Model (2). The significance in Model (3) might be explained by the fact that it combines Model (1) and Model (2) into one model, but in Model (1) the lagged total assets are not significant, thus we would expect them to here not be significant as well. Also, this does not apply to Model (4) and therefore it provides weak evidence that larger hospitals manage their earnings either less upwards (in case of a loss, as discretionary accruals would then positive), or more downwards (in case of a profit, as discretionary accruals would then be negative). This contradicts what was expected, namely that larger hospitals manage their earnings less than smaller hospitals, since they are in a better negotiation position. Although Table 4.3 shows no correlation between the TA and reported earnings ($EARN_{i,t}$), meaning that larger and smaller hospitals do not differ significantly in their reported earnings percentage, their unmanaged income might differ (smaller losses and smaller profits). If larger hospitals have relatively smaller, or even no, unmanaged losses than smaller hospitals and also smaller unmanaged positive earnings, this leads to a smaller need to manage their earnings. Regressing the magnitude of the loss (scaled by lagged total assets) of the unmanaged income proxy $EBDBC_{i,t}$ on the lagged total assets shows that the unmanaged loss before discretionary work in progress under DBCs ($EBDBC_{i,t}$) is significantly more positive for larger hospitals than for smaller hospitals, thus larger hospitals have significantly smaller losses than smaller hospitals. And, regressing the magnitude of the positive income of the unmanaged income proxy $EBDBC_{i,t}$ on the lagged total assets shows that the unmanaged positive earnings before discretionary work in progress under DBCs ($EBDBC_{i,t}$) is also significantly more negative for larger hospitals than for smaller hospitals, thus larger hospitals have significantly smaller profits than smaller hospitals.

Furthermore, the coefficient on the lagged discretionary accruals in Model (2) ($DA_{i,t}$) is negative, which is consistent with the expected predictable accrual reversals. In Model (3), the lagged total accruals ($TACC_{i,t}$) are not significant, indicating that there are no predictable total accrual reversals. However, the lagged discretionary work in progress under DBCs ($DA_{i,t}$) show a significant positive relation with the lagged discretionary work in progress under DBCs, indicating that there are no predictable accrual reversals. On the contrary, this positive coefficient indicates that hospitals who reported positive (negative) work in progress under DBCs last year, are likely to have positive (negative) work in progress under DBCs this year. This might be explained by the nature of the work in progress under DBCs account, as it is re-estimated every year and thus not influenced by under- or overestimation in previous years.

Lastly, it should be noted that the explained variance is relatively high in all models ($R^2$ = 91.08%, 87.37% and 75.14%), while few variables are significant. Step-by-step moving these all control variables shows that the explained variance is almost completely driven by the unmanaged earnings proxies ($R^2$ = 90.97%, 86.51% and 73.36% without the control variables).

Although, based on these regressions, the null-hypothesis that hospitals do not manage their earnings is rejected, there should be some caution in interpreting the results. As discussed in the methodology section (see 3.1.1 and 3.3.1), the Jones model (2) is widely criticized. Chen (2018) shows that using a two-step procedure does not fully account for the correlation among the independent variables included in the two regressions, and in many cases leads to biased coefficients. To check whether Model (1) and Model (2) collectively suffer from this bias, I assess the correlations between the independent variables in the two regressions. It shows that the tangible fixed assets ($PPE_{i,t}$) and ($\Delta REV_{i,t}$), and lagged discretionary accruals ($DA_{i,t-1}$), and increase in revenue ($\Delta REV_{i,t}$) are significantly correlated. The increase in revenue and lagged total assets are only included in Model (1), thus this does not cause bias. However, the lagged discretionary accruals and increase in revenue are included in Model (2) and Model (1), respectively. Therefore, my results might suffer from the bias described by Chen (2018). However, to mitigate this problem, the one-step model (Model (3)) was estimated.

The Jones model is additionally criticized as it can lead to Type I errors, the identification of earnings management when it is not present, and Type II errors, not identifying the earnings management when it is present, by incorrectly classifying accruals as discretionary or non-discretionary. Since I do identify earnings management, a Type I error is most likely (although it is possible that some accruals were also classified as nondiscretionary while they are discretionary). This is affirmed by the highly positively correlation of the total accruals with the discretionary accruals (99.7%***, see Table 4.3) and highly negative correlation of the discretionary accruals with the cash flows from operations (-93.4%***). As research shows a mechanical relation between the total accruals and cash flows from operations (Dechow, 1995), these correlations are suggestive of a Type 1 error.  This is supported by the fact that $\beta_1 =$ -0.951*** in Model (2), almost -1, which is suggestive of a mechanical relation leading to a Type 1 error (see 3.3.1). This Type 1 error is likely be caused by the relatively high level of accruals that was classified as discretionary (see 3.3.1). Model (1) classifies only 16.72% of the total accruals as non-discretionary (Adj. $R^2$ = 16.72%, see Table 4.1), which seems very low. Although it is possible that hospitals truly have much discretion in the accrual process, which they use, Jackson (2018) describes that it is hard to believe auditors "would have been fooled" by discretionary accruals this large and signed off on the reports. In addition, Ball (2013) concludes that "it is a form of arrogance" that researchers claim they are able to detect earnings management based on large datasets, when auditors who are close to the firm are unable to do so. To assess whether this mechanical relation (see 3.2) biases Model (2), I estimate regression Model (5) and find that $\beta_a$ = 0.466* (see Table 4.5). Therefore, as this is > 0, the obtained $\beta_1$ in Model (2) must be driven by this mechanical relation (see 3.3.1). Furthermore, as Model (3) estimates the discretionary accruals similarly to Model (1) and Model (2) combined, and the obtained $\beta_1$ = 0.971*** in Model (3), this model is also likely to suffer from this mechanical relation. To assess this, I estimate regression Model (6) and find that $\beta_a$ = 0.538** (see Table 4.5). Thus, the obtained $\beta_1$ Model (3) must also be driven by this mechanical relation. This has a large impact on my results, as based on these models, I cannot draw conclusions whether hospitals manage their earnings.

The third method used to measure earnings management is the specific accrual method focusing on the discretionary work in progress under DBCs, Model (4). The discretionary work in progress under DBCs is an account of which it is known that it requires substantial judgement and thus could be used to manage earnings, but the determination of the discretionary part is somewhat arguable, as it is unclear on what health insurers base their paid advances (see 3.1.2). If too much of the work in progress under DBCs is categorized as discretionary, this might lead to a Type 1 error (see 3.3.1).

However, in my opinion the estimation of the discretionary accruals is more reliable, as it likely removes more of the non-discretionary accruals than the other two models. To assess whether Model (4) suffers from the mechanical relation (see 3.2), similar to Model (2) and (3), I estimate regression Model (7) and find that $\beta_a$ = -0.037 (see Table 4.5). As this is < 0, this indicates that the obtained $\beta_1$ in Model (4) is not completely driven by this mechanical relation.
Concluding, the model that is likely the least subject to possible errors, and therefore is the most reliable method yet available, is the model focusing on the discretionary work in progress under DBCs.

*4.3.2 Earnings frequency distribution*

Because of the limitations of the discretionary accrual models, Burgstahler and Chuck (2017) suggest focusing on discontinuity evidence. To detect a discontinuity in the earnings frequency distribution of Dutch hospitals, Figure 4.1 has been plotted, showing the earnings frequency distribution of hospitals' reported net income, scaled by the lagged total assets ($EARN_{i,t}$). The width of the intervals is 0.005 (following Burgstahler & Dichev, 1997). The distribution of earnings is very narrow, but visually looks normal. There is no asymmetry as clear as in the research of Burgstahler & Dichev, however, the drop just left of zero and around 0.025 suggests that hospitals do manage their earnings to a range just above zero, to avoid high profits as well as losses. As no clear cut-off point as a maximum accepted profit is expected based on the literature, I focus on the discontinuity around zero. Following Burgstahler & Dichev, this discontinuity is tested by calculating the standardized difference. The frequency in the interval just left of zero is significantly lower than expected (Z=-2.55***), while the frequency in the interval just right of zero is significantly higher than expected (Z=1.64*). This suggests hospitals avoid reporting earnings just below zero. For the frequencies in the intervals and the calculation of these Z-statistics, see Appendix F. However, the observed discontinuity might also be caused by the sample selection criteria, as suggested by Durtschi and Easton (2005) and Dechow et al. (2003), as these sample selection criteria might lead to excluding observations (just) left of zero, causing the discontinuity (see 3.3.2). This might also be applicable in my thesis, as I exclude hospitals that went bankrupt before 2018, while these hospitals of course reported losses in the years before the bankruptcy, thus possibly causing a discontinuity left of zero. Another limitation of the use of this method with my sample, is that the expected number of observations in interval i ($Np_i$) is lower than 25. According to Burgstahler and Chuk (2017), when $Np_i$ < 25, the normal approximation to the binomial might not be reasonably accurate, which could lead to over- or understated significance. However, even if the intervals would be increased in width, this problem would not be mitigated as there are simply not enough Dutch hospitals who reported a loss to meet the target of 25.

Figure 4.2 shows the unmanaged earnings as earnings before the discretionary component as estimated by the Jones model, scaled by lagged total assets ($EBDA_{i,t}$) The width of the intervals is also 0.005. The histogram shows large spikes and much fluctuation, but the unmanaged earnings are much more widespread than the reported earnings, suggesting that hospitals use discretionary accruals to manage their earnings to range above zero. However, becausee of the fluctuation, testing the observed frequency would not be appropriate. These findings are supported by Figure 4.3, in which the average discretionary accruals, scaled by the lagged total assets, ($DA_{i,t}$) for each of the bins in Figure 4.2 was plotted (for at least one observation per bar). As expected, all bins to the left of zero have positive average discretionary, thus are income-increasing, while all bins to the right of zero have negative average discretionary accruals, and thus are income-decreasing. However, there should be some caution in interpreting these results as evidence for earnings management, because of the estimation method for the discretionary accruals (see 4.1 and 4.3.1). Additionally, the relation in Figure 4.3 seems very strong, almost perfectly linear, which is suggestive of a mechanical relation between the unmanaged earnings and discretionary accruals, as shown exists in 4.3.1.
Figure 4.4 shows the frequency distribution of the unmanaged earnings as earnings before discretionary work in progress under DBCs, scaled by lagged total assets, ($EBDBC_{i,t}$). The frequency distribution of the earnings before discretionary work in progress under DBCs ($EBDBC_{i,t}$) visually is closest to a normal distribution of the three histograms, which confirms that this could be the most reliable method to detect earnings management in hospitals. However, the observed frequency in the interval left of zero is still significantly lower than expected (Z=-1.890**) and the observed frequency in the interval right of zero is not significantly higher than expected. A possible explanation could be that the discretionary work in progress under DBCs only contains part of the discretionary accruals, while other discretionary accruals could be used to manage earnings as well. In this case, the estimated unmanaged earnings would still contain some discretionary accruals used to manage earnings, leading to the histogram still containing some discontinuity because of earnings management. However, there should be some caution in interpreting these results as evidence for earnings management, because of the uncertainty whether this discretionary part of the work in progress under DBCs should really be classified as discretionary (see 3.1.2 and 4.1).

Concluding, both the regression results as the analyses based on these histogram are consistent with my hypothesis that Dutch hospitals manage their earnings to just above zero. However, Model (2) and Model (3) suffer from a mechanical relation between the unmanaged earnings and discretionary, and total accruals and cash flows from operations, that biases the results. On the contrary, Model (4), not necessarily suffers from this mechanical relation but also detects earnings management. This is supported by the corresponding earnings frequency distributions. Therefore, based on these results, I suspect Dutch hospitals manage their earnings, anyway using the work in progress under DBCs.

### 4.4 Over time, the earnings management of Dutch hospitals has increased (H2)

To examine whether earnings management of Dutch hospitals has increased from 2013 to 2018, first the 2013 coefficients are compared to the 2018 coefficient of the respective unmanaged income proxy ($EBDA_{i,t}$, $CFO_{i,t}$ and $EBDBC_{i,t}$). These differences are tested with a t-test of which the results are presented in Panel A of Table 4.6. None of the differences in coefficients between 2013 and 2018 is statistically significant, suggesting that the effect of the unmanaged income on the respective discretionary component has not changed over time. However, it is possible that the magnitude of earnings management has increased, due to an increase in the discretionary accruals as well as the unmanaged earnings. To examine whether the level of the (discretionary) accruals is higher for 2018 than for 2013, regression Models (8) and (9) are estimated. Separate models are estimated for unmanaged earnings above zero and below zero, as income-increasing accruals are expected when unmanaged earnings are negative, and income-decreasing accruals are expected when unmanaged earnings are positive and high. The results of these regressions are presented in Panel B of Table 4.6. The dummy variable for the year ($DYEAR_i$ equals 0 for 2013 and 1 for 2018) is not significant in Model (8) and the model for the negative unmanaged earnings in Model (9), but is positive and significant in the positive unmanaged earnings Model (9). This implies that the discretionary accruals ($DA_{i,t}$), total accruals ($TACC_{i,t}$) and discretionary work in progress under DBCs for negative unmanaged earnings ($DDBC_{i,t}$) do not differ significantly between 2013 and 2018, but that the discretionary work in progress under DBCs for positive unmanaged earnings ($DDBC_{i,t}$) has increased from 2013 to 2018. As the discretionary work in progress under DBC's is expected to be income-decreasing for positive (high) earnings, thus negative, an increase from 2013 to 2018 indicates that the discretionary work in progress under DBCs has become less negative, which means there is less downwards earnings management in 2018 than in 2013. This contradicts my expectation that the magnitude of earnings management has increased over the period of 2013-2018. A possible explanation could be that hospitals have become less profitable from 2013 to 2018, possibly due to increased price-pressure from insurers (leading to increased costs, but revenues that increased relatively less). This would mean that there would be a smaller discretionary component "required" to manage earnings down to the same level, assuming the reported profit percentages have not changed. To support this explanation, the average profit percentages in 2013 and 2018 have been compared by a t-test, which showed no significant difference. Subsequently, the positive unmanaged earnings in 2013 and 2018 have been compared: the unmanaged earnings in 2013 were significantly higher than in 2018. Thus, although the reported earnings have not changed from 2013 to 2018, the unmanaged earnings have become significantly lower over time, which possibly explains the lower discretionary work in progress under DBCs in 2018 than in 2013. However, Model (8) does not show this decrease in the discretionary component. Since the discretionary work in progress is just a part of the total discretionary accruals, the total effect might be negligible.

Overall, the results contradict my expectation that earnings management has increased over time. It appears to have even decreased slightly, or might not even have changed significantly at all. Although the motivations for hospitals to manage their earnings have increased (see 2.2.3), the actual earnings management apparently has not. A possible explanation could be that hospitals do not feel the pressure from insurers to report low profits, but possibly that public scrutiny, which was already a motivation in 2013, is still present.

### 4.5 Controlling for the level of total costs, hospitals with higher profits are less likely to be contracted by health insurers (H3)

To examine whether health insurers are less likely to contract with hospitals with higher profit percentages, Model (10) is estimated. The regression only includes the hospitals with positive earnings ($EARN_i$>0) in 2017 and 2018, as I estimate a linear regression and expect that hospitals with a reported loss are also less likely to be contracted by a health insurer. This does not correspond with a linear scale. I do not include a dummy variable indicating whether a hospital reports a loss, as there are only 3 hospitals in 2018, and 5 in 2017, that reported a loss and this is not a sufficient number of observations to estimate the coefficient reliably. The results of the regression are presented in Table 4.7. The regressions show that the 2017 and 2018 earnings do not have a significant effect on the total number of contracts. This is inconsistent with my hypothesis that, controlling for the level of total costs, hospitals with higher profits are less likely to be contracted by health insurers. The total assets, however, are significantly related. The coefficient for $TA_{i,2017}$ is positive and significant ($\beta_4$=4.16e$^{-9}$***), indicating that larger hospitals are less likely to be contracted by health insurers. This contradicts my expectation that larger hospitals are more likely to be contracted. A possible explanation could be that larger hospitals provide more specialized care than smaller hospitals (Jeurissen et al, 2013). As health insurance policies with selective contracting are often budget-policies, which focus mostly on costs, not the more expensive complicated care (Kleef, 2015), this could be a possible explanation. However, this contradicts the fact that there is no significant association between the number of contracts and total costs. If larger hospitals provide more specialized care, than you would expect the total costs to also be higher. However, because larger hospitals treat more complicated patients, the treatment of these patients will likely take longer, due to the complexity. These complicated patients more often have to stay in the hospital (and for longer) than patients with a less complex care-need, leading to higher costs per patient but not necessarily higher total costs relative to the total assets. But hospitals with more complex patients, which are the large hospitals, also need for example more beds, and thus have higher total assets. Therefore, the scaled total costs are relatively lower for large hospitals, while actual costs per patient are higher (which is probably what insurers look at). However, to really test this, we would have to examine the costs per treatment relative to other hospitals, unbiased by scaling by total assets (also because of the mechanical relation between lagged total assets and the other variables, see 4.2). However, as this is not the focus of this research, I do not further examine this.

Lastly, the explained variance ($R^2$) of Model (10) is only 6.17%, indicating that very little of the variance in the contracting is explained by this model and that there are likely omitted variables. These omitted variables might be for example the costs per treatment relative to other hospitals, and geographical location (as a hospital in a rural area with few other hospitals is also more likely to be contracted with (Kleef, 2015).

A possible explanation for the overall results, that show that hospitals with higher profits are not less likely to be contracted by health insurers, is that health insurers are aware hospitals manage their earnings and try to estimate the unmanaged earnings themselves. Therefore, I repeat this regression with the unmanaged earnings proxies ($EBDA_{i,t}$, and $EBDBC_{i,t}$), and estimate Model (11) and (12), of which the results are shown in Table 4.6. But, these regressions yield similar results. Thus, based on these results, it appears health insurers in the Netherlands do not review the earnings, or estimated unmanaged earnings based on these models, of Dutch hospitals to decide whether to contract with them. However, it is of course possible that the earnings number is used to determine how much price-pressure will be used, but due to a lack of data, this remains open for further research.

## 5. Conclusion

In this thesis I examine whether Dutch hospitals manage their earnings and what the relation between earnings (management) and selective contracting by health insurers is. Using the models to detect earnings management of Jones (1991), Chen (2018), a specific accrual account method: the work in progress under DBCs and Burgstahler & Dichev (1997), I find evidence that Dutch hospitals manage their earnings. However, the Jones (1991) and Chen (2018) model suffer from a mechanical relation. Therefore, based on these two models, I cannot conclude that hospitals manage their earnings. However, the specific accrual account model is less likely to suffer from this mechanical relation, and also detects earnings management. Thus, I suspect hospitals manage their earnings, although there should be some caution in this conclusion. Furthermore, comparing earnings management in 2013 and 2018 shows that earnings management has not increased during the examined period, it might have even decreased slightly, due to lower unmanaged earnings and thus less need to manage earnings. This suggests the motivation for hospitals to manage their earnings is not the selective contracting by health insurers, but might be for example, public scrutiny. That is supported by the finding that health insurers do not appear to contract less with hospitals with relatively higher earnings. Summarizing, Dutch hospitals are suspected to manage their earnings, but there appears to be no relation between the earnings (management) of Dutch hospitals and the selective contracting by health insurers.

This thesis contributes to the existing literature by examining earnings management specifically for Dutch hospitals, which operate in a very different environment (e.g., only non-profit hospitals, a system of regulated competition and third-party payers, and mandatory health insurance) than hospitals in other countries, where earnings management had already been shown to be used. In particular, this thesis contributes by documenting, for the first time and in contrast to what was expected, that there is no relation of earnings (management) by Dutch hospitals with selective contracting by health insurers. These findings have some implications for the key stakeholders (the public and politicians, banks and health insurers). Namely, they should be aware that the earnings reported by the hospitals are possibly managed to hide the “real” performance of the hospital. Especially health insurers, who although they do not appear to review the reported earnings to decide whether to contract with a hospital, might still use it to decide on the amount of price-pressure, should be aware of this. If they are unaware of it, this might lead to less price pressure and therefore higher costs, resulting in wasted resources and eventually possibly in a loss in social welfare.

However, the main limitation of this research (see Chapter 4 for an extensive discussion) is that two of the three methods (the method by Jones (1991) and Chen (2018)) used to detect earnings management suffer from a mechanical relation leading to Type 1 errors: the detection of earnings management when it is not present. Although the specific accrual account is less likely to suffer from this mechanical relation, there should still be some caution in interpreting these results, as this is the first time this method was used, and I might be unaware of possible methodological problems. As a final note, while I show that Dutch hospitals manage their earnings and that this has not increased due to the rise of selective contracting, many questions for future research remain. For example the determinants of earnings management in Dutch hospitals: although I document no relation with selective contracting, the reason that hospitals manage their earnings remains unclear. Particularly, it could be the case that health insurers do indeed contract less with hospitals with high profits and that this is the main motivation for hospitals to manage their earnings . But that hospitals know this, and manage their earnings to a range above zero. Since all hospitals would do this, all hospitals are contracted by health insurers based on this criterium. Furthermore, due to a lack of data, I focused my analyses on whether hospitals with relatively high earnings are contracted less by health insurers in 2020, but to increase the validity of these analyses, multiple years should be examined. Lastly, although health insurers do not seem to contract less with hospitals if they report relatively high earnings, it is possible that health insurers do use the reported, or estimates of the unmanaged earnings, for price-pressure. This is not captured by my research due to a lack of data.

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# Tables and figures

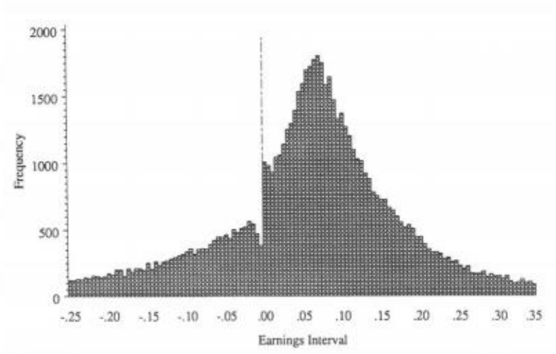



*Figure 3.1 The abnormal distribution of annual net income around zero as shown in Burgstahler and Dichev 1997.*

Table 4.1 Regression results for the estimation of discretionary accruals using the Jones model (1991)

$$TACC_{i,t} = \alpha_{0,t}\frac{1}{TA_{i,t-1}} + \alpha_{1,t}\Delta REV_{i,t} + \alpha_{2,t}PPE_{i,t} + \omega_{i,t} \quad (1)$$

| ***Variable*** | |
|---|---|
| $1/TA_{i,t-1}$ | -357657.1 |
| | (957083) |
| $\Delta REV_{i,t}$ | 0.020 |
| | (0.039) |
| $PPE_{i,t}$ | -0.063*** |
| | (0.011) |
| N | 491 |
| Adj. $R^2$ | 15.49% |

*Note:* Standard errors are in the parentheses; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level; Where $TACC_{i,t}$ are the total accruals of hospital i in year t (in thousands), scaled by lagged total assets ($TA_{i,t-1}$). $\Delta REV_{i,t}$ is the change in revenue of hospital i from year t-1 to year t, scaled by lagged total assets. $PPE_{i,t}$ is the property, plant and equipment of hospital i in year t, scaled by lagged total assets. $\omega$ is the residual and the measure for the discretionary accruals. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Table 4.2 Descriptive statistics of Dutch hospitals in the period 2012 - 2018

| | *N* | *Mean* | *St. Dev.* | *Min* | *Q1* | *Median* | *Q3* | *Max* |
|---|---|---|---|---|---|---|---|---|
| $EARN_{i,t}$ | 491 | 0.020 | 0.027 | -0.115 | 0.009 | 0.019 | 0.031 | 0.184 |
| $CFO_{i,t}$ | 491 | 0.085 | 0.095 | -0.279 | 0.027 | 0.085 | 0.137 | 0.388 |
| $IBC_{i,t}$ | 491 | 0.041 | 0.036 | -0.086 | 0.026 | 0.037 | 0.050 | 0.297 |
| $REV_{i,t}$ | 491 | 1.099 | 0.378 | 0.198 | 0.917 | 1.070 | 1.200 | 2.486 |
| $TC_{i,t}$ | 491 | 1.058 | 0.372 | 0.029 | 0.873 | 1.030 | 1.165 | 2.371 |
| $TACC_{i,t}$ | 491 | -0.044 | 0.098 | -0.429 | -0.097 | -0.048 | 0.011 | 0.304 |
| $WIPDBC_{i,t}$ | 491 | 0.018 | 0.049 | -0.210 | 0 | 0.011 | 0.031 | 0.291 |
| $DA_{i,t}$ | 491 | -0.004 | 0.098 | -0.419 | -0.056 | -0.005 | 0.057 | 0.382 |
| $TA_{i,t-1}$ | 491 | 314 | 287 | 28.8 | 128 | 223 | 388 | 2056 |
| $PPE_{i,t}$ | 491 | 0.651 | 0.199 | 0.133 | 0.572 | 0.643 | 0.716 | 1.778 |
| $CONT_{i,2020}$ | 68 | 53 | 3.870 | 45 | 51 | 52 | 56 | 57 |

Where $EARN_{i,t}$ is the hospitals' net income (after nonoperating adjustments), scaled by lagged total assets. CFO are the cash flows from operations, scaled by lagged total assets. $IBC_{i,t}$ is the hospital's reported operating income, scaled by lagged total assets. $REV_{i,t}$is the hospital's revenues, scaled by lagged total assets. $TC_{i,t}$are the hospital's total costs, scaled by lagged total assets. $TACC_{i,t}$are the total accruals, calculated as the difference between the reported operating income and the cash flows from operations, scaled by lagged total assets. $WIPDBC_{i,t}$is the hospital's reported work in progress under DBCs, a net account calculated as the estimated work in progress under DBCs minus the advances paid by health insurers, scaled by lagged total assets. $DA_{i,t}$ are the hospital's discretionary accruals, as estimated by the Jones model. $TA_{i,t-1}$ are the hospital's total assets in year t-1, in thousands, scaled by lagged total assets. $PPE_{i,t}$are the hospital's tangible fixed assets (property, plant and equipment as described in the Jones model) , scaled by lagged total assets. $CONT_{i,2020}$ is the number of contracts with health insurers in 2020, with a maximum of 57 as there are 57 health insurance policies in the Netherlands.

Table 4.3 Correlation matrix for key variables (Pearson correlations)

| | $EARN_{i,t}$ | $CFO_{i,t}$ | $IBC_{i,t}$ | $REV_{i,t}$ | $TC_{i,t}$ | $TACC_{i,t}$ | $WIPDBC_{i,t}$ | $DA_{i,t}$ | $TA_{i,t-1}$ | $PPE_{i,t}$ | $CONT_{i,2020}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $EARN_{i,t}$ | 1 | | | | | | | | | | |
| $CFO_{i,t}$ | 0.138*** | 1 | | | | | | | | | |
| $IBC_{i,t}$ | 0.749*** | 0.113** | 1 | | | | | | | | |
| $REV_{i,t}$ | 0.182*** | 0.101** | 0.102** | 1 | | | | | | | |
| $TC_{i,t}$ | 0.088** | 0.098** | 0.025 | 0.985*** | 1 | | | | | | |
| $TACC_{i,t}$ | 0.130*** | -0.937*** | 0.242*** | -0.069 | -0.087* | 1 | | | | | |
| $WIPDBC_{i,t}$ | -0.124*** | -0.163*** | -0.149*** | 0.155*** | 0.187*** | 0.107** | 1 | | | | |
| $DA_{i,t}$ | 0.125*** | -0.934*** | 0.242*** | -0.041 | -0.082* | 0.997*** | 0.096** | 1 | | | |
| $TA_{i,t-1}$ | -0.031 | 0.030 | -0.067 | -0.208*** | -0.202*** | -0.053 | -0.025 | -0.063 | 1 | | |
| $PPE_{i,t}$ | 0.089 | -0.075* | 0.021 | 0.090** | 0.075* | 0.081* | -0.082* | 0.159*** | -0.024 | 1 | |
| $CONT_{i,2020}$ | 0.083 | -0.079 | 0.047 | 0.037 | 0.033 | -0.065 | -0.013 | -0.046 | -0.354*** | -0.117 | 1 |

*Note:* * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level. Where $EARN_{i,t}$is hospital i's net income (after nonoperating adjustments) in year t, scaled by lagged total assets. $CFO_{i,t}$ are hospital i's cash flows from operations in year t, scaled by lagged total assets. $IBC_{i,t}$ is hospital i's operating income in year t, scaled by lagged total assets. $REV_{i,t}$ is is hospital i's revenue in year t, scaled by lagged total assets. $TC_{i,t}$ hospital i's total costs in year t, scaled by lagged total assets. $TACC_{i,t}$ hospital i's total accruals in year (calculated as $IBC_{i,t}$ - $CFO_{i,t}$), scaled by lagged total assets. $WIPDBC_{i,t}$ is hospital i's discretionary work in progress under DBCs in year t, scaled by lagged total assets. $DA_{i,t}$ are hospital i's discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. $TA_{i,t-1}$ are hospital i's total assets in year t-1. $PPE_{i,t}$ are hospital i's tangible fixed assets in year t , scaled by lagged total assets. $CONT_{i,2020}$are hospital i's number of contracts with health insurers in 2020 (linked to 2018, with a maximum of 57 as there are 57 health insurance policies in the Netherlands). All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Table 4.4: Linear regressions to detect earnings management based on Model (2), (3) and (4)

(2) $DA_{i,t} = \beta_0 + \beta_1 EBDA_{i,t} + \beta_2 DA_{i,t-1} + \beta_3 TA_{i,t-1} + \omega_{i,t}$

(3) $TACC_{i,t} = \beta_0 + \beta_1 CFO_{i,t} + \beta_2 TACC_{i,t-1} + \beta_3 TA_{i,t-1} + \beta_4 \Delta REV_{i,t} + \beta_5 PPE_{i,t} + \omega_{i,t}$

(4) $DDBC_{i,t} = \beta_0 + \beta_1 EBDBC_{i,t} + \beta_2 DDBC_{i,t-1} + \beta_3 TA_{i,t-1} + \omega_{i,t}$

| **Variable** | **(2) $DA_{i,t}$** | **(3) $TACC_{i,t}$** | **(4) $DDBC_{i,t}$** |
|---|---|---|---|
| $Constant$ | 0.020*** | 0.039*** | 0.018*** |
| | (0.002) | (0.009) | (0.002) |
| $EBDA_{i,t}$ | -0.951*** | | |
| | (0.022) | | |
| $CFO_{i,t}$ | | -0.971*** | |
| | | (0.019) | |
| $EBDBC_{i,t}$ | | | -0.619*** |
| | | | (0.062) |
| $DA_{i,t-1}$ | -0.021* | | |
| | (0.012) | | |
| $TACC_{i,t-1}$ | | 0.014 | |
| | | (0.017) | |
| $DDBC_{i,t-1}$ | | | 0.137*** |
| | | | (0.046) |
| $TA_{i,t-1}$ | -4.08e$^{-12}$ | -8.34e$^{-12}$* | -3.00e$^{-12}$* |
| | (3.88e$^{-12}$) | (5.57e$^{-12}$) | (2.88e$^{-12}$) |
| $\Delta REV_{i,t}$ | | 0.018 | |
| | | (0.020) | |
| $PPE_{i,t}$ | | 0.001 | |
| | | (0.017) | |
| $R^2$ | 91.08% | 87.37% | 75.14% |
| N | 397 | 397 | 397 |

*Note*: Robust standard errors are in the parentheses (Robust standard errors are used when Breusch-Pagan and Cook-Weisberg tests for heteroskedasticity show variances are not constant for the dependent variable (p<10%) ; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level; Where $DA_{i,t}$ are hospital i's discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. $TACC_{i,t}$ are hospital i's total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t-1, scaled by lagged total assets in year t-1 ($TA_{i,t-2}$). $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t, scaled by lagged total assets. $EBDA_{i,t}$ is hospital i's net income before discretionary accruals in year t, scaled by lagged total assets ($TA_{i,t-1}$). $CFO_{i,t}$ are hospital i's cash flows from operations in year t, scaled by lagged total assets. $EBDBC_{i,t}$ is hospital i's net income before discretionary work in progress under DBCs in year t, scaled by lagged total assets. $DA_{i,t-1}$ are hospital i's discretionary accruals in year t-1, as estimated by the Jones model, scaled by lagged total assets ($TA_{i,t-2}$). $TACC_{i,t-1}$ are hospital i's total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t-1, scaled by lagged total assets in year t-1. $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t-1, scaled by lagged total assets. $TA_{i,t-1}$ are hospital i's lagged total assets of year t (total assets in year t-1). $\Delta REV_{i,t}$ is hospital's i change in revenue from year t-1 to t (calculated as revenue in year t – revenue in year t-1), scaled by lagged total assets. $PPE_{i,t}$ are hospital i's tangible fixed assets in year t, scaled by lagged total assets. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Table 4.5: Linear regressions to detect mechanical relation (5), (6) and (7)

(5) $DA_{i,t} = \beta_0 + \beta_a EARN_{i,t} + \beta_b DA_{i,t-1} + \beta_c TA_{i,t-1} + \omega_{i,t}$

(6) $TACC_{i,t} = \beta_0 + \beta_a EARN_{i,t} + \beta_b TACC_{i,t-1} + \beta_c TA_{i,t-1} + \beta_d \Delta REV_{i,t} + \beta_e PPE_{i,t} + \omega_{i,t}$

(7) $DDBC_{i,t} = \beta_0 + \beta_a EARN_{i,t} + \beta_b DDBC_{i,t-1} + \beta_c TA_{i,t-1} + \omega_{i,t}$

| **Variable** | **(5) $DA_{i,t}$** | **(6) $TACC_{i,t}$** | **(7) $DDBC_{i,t}$** |
|---|---|---|---|
| $Constant$ | -0.0198*** | -0.093** | 0.011*** |
| | (0.009) | (0.029) | (0.003) |
| $EARN_{i,t}$ | 0.466*** | 0.538** | -0.037* |
| | (0.243) | (0.232) | (0.055) |
| $DA_{i,t-1}$ | -0.0748* | | |
| | (0.039) | | |
| $TACC_{i,t-1}$ | | -0.093** | |
| | | (0.047) | |
| $DDBC_{i,t-1}$ | | | 0.471*** |
| | | | (0.051) |
| $TA_{i,t-1}$ | -8.50e$^{-12}$ | -5.65e$^{-12}$ | -2.60e$^{-12}$ |
| | (1.35e$^{-11}$) | (1.35e$^{-11}$) | (5.19e$^{-12}$) |
| $\Delta REV_{i,t}$ | | -0.123** | |
| | | (0.057) | |
| $PPE_{i,t}$ | | 0.049 | |
| | | (0.041) | |
| $R^2$ | 8.92% | 8.78% | 33.19% |
| N | 397 | 397 | 397 |

*Note*: Robust standard errors are in the parentheses (Robust standard errors are used when Breusch-Pagan and Cook-Weisberg tests for heteroskedasticity show variances are not constant for the dependent variable (p<10%) ; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level; Where $DA_{i,t}$ are hospital i's discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. $TACC_{i,t}$ are hospital i's total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t-1, scaled by lagged total assets in year t-1 ($TA_{i,t-2}$). $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t, scaled by lagged total assets. $EARN_{i,t}$ is hospital i's reported net income in year t, scaled by lagged total assets ($TA_{i,t-1}$). $CFO_{i,t}$ are hospital i's cash flows from operations in year t, scaled by lagged total assets. $EBDBC_{i,t}$ is hospital i's net income before discretionary work in progress under DBCs in year t, scaled by lagged total assets. $DA_{i,t-1}$ are hospital i's discretionary accruals in year t-1, as estimated by the Jones model, scaled by lagged total assets ($TA_{i,t-2}$). $TACC_{i,t-1}$ are hospital i's total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t-1, scaled by lagged total assets in year t-1. $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t-1, scaled by lagged total assets. $TA_{i,t-1}$ are hospital i's lagged total assets of year t (total assets in year t-1). $\Delta REV_{i,t}$ is hospital's i change in revenue from year t-1 to t (calculated as revenue in year t – revenue in year t-1), scaled by lagged total assets. $PPE_{i,t}$ are hospital i's tangible fixed assets in year t, scaled by lagged total assets. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

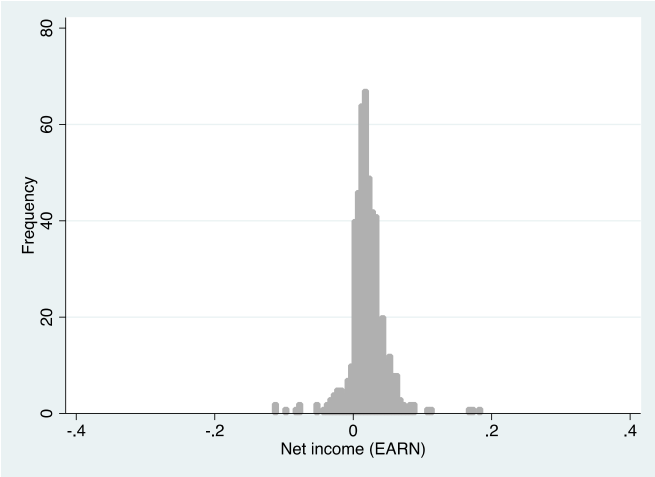



*Figure 4.1 Frequency distribution of reported net income ($EARN_{i,t}$), scaled by the lagged total assets, 2012 - 2018*

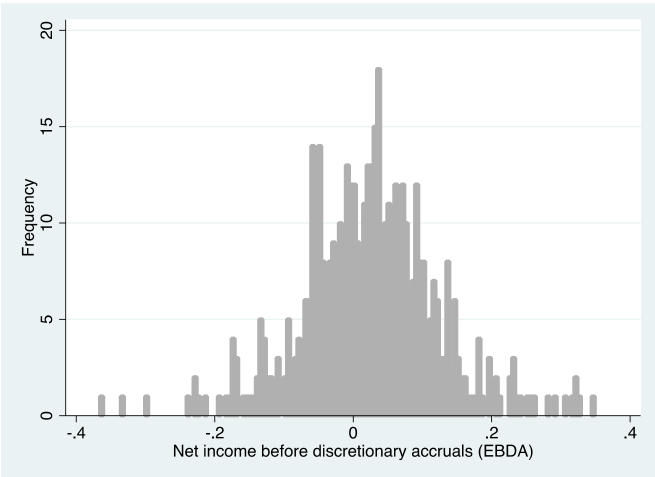



*Figure 4.2 Frequency distribution of the unmanaged earnings as earnings before discretionary accruals ($EBDA_{i,t}$), scaled by the lagged total assets, 2012-2018*

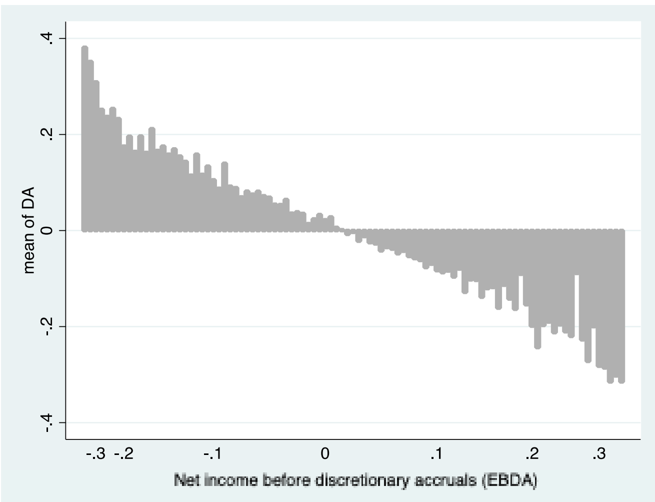



*Figure 4.3 Average discretionary accruals ($DA_{i,t}$), for the unmanaged earnings in figure 4.2 ($EBDA_{i,t}$), for at least one observation per bar, scaled by the lagged total assets, 2012-2018*

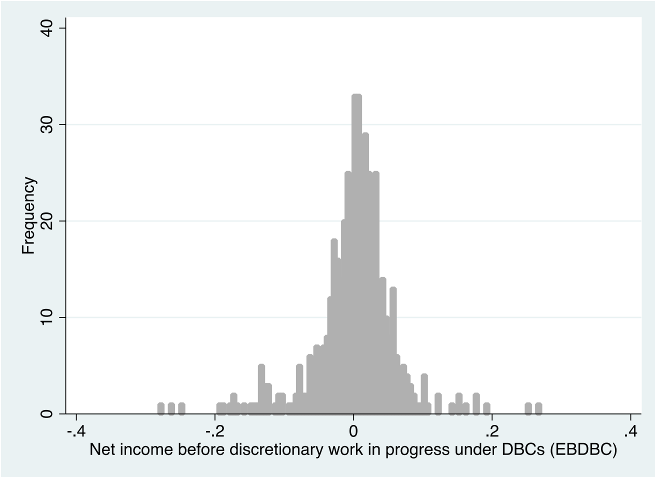



*Figure 4.4 Frequency distribution of the unmanaged earnings as earnings before discretionary work in progress under DBCs ($EBDBC_{i,t}$), scaled by lagged total assets, 2012-2018*

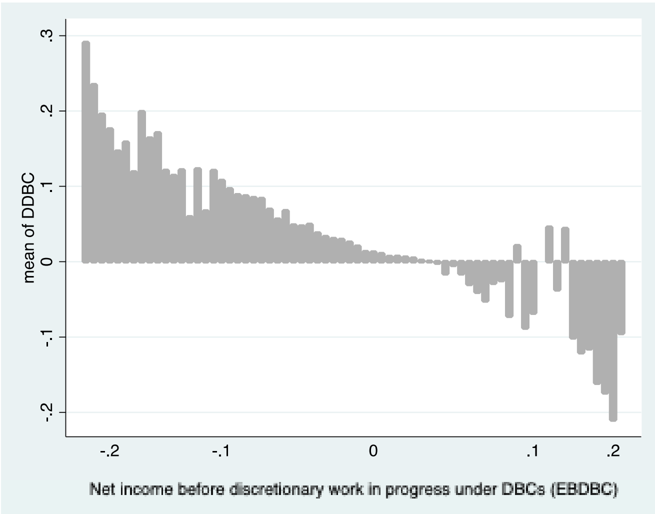



*Figure 4.5 Average discretionary work in progress under DBCs ($DDBC_{i,t}$) for the unmanaged earnings in figure 4.2 ($EBDBC_{i,t}$), for at least one observation per bar, scaled by the lagged total assets, 2012-2018*

Table 4.6 Comparison of earnings management in 2013 and 2018

**Panel A: Coefficients ($\beta_1$) for the 2013 and 2018 regressions of Model (2), (3) and (4)**

(2) $DA_{i,t} = \beta_0 + \beta_1 EBDA_{i,t} + \beta_2 DA_{i,t-1} + \beta_3 TA_{i,t-1} + \varepsilon_{i,t}$

(4) $DDBC_{i,t} = \beta_0 + \beta_1 EBDBC_{i,t} + \beta_3 TA_{i,t-1} + \omega_{i,t}$

| | **2013** | **2018** | **Difference** |
|---|---|---|---|
| (2) $\beta_{EBDAi,t}$ | -0.910*** | -0.947*** | -0.037 |
| (4) $\beta_{EBDBCi,t}$ | -0.606*** | -0.576*** | 0.030 |

**Panel B: Regressions to examine whether the discretionary component is smaller in magnitude in 2013 than in 2018.**

(8) $DA_{i,t} = \beta_0 + \beta_1 DYEAR + \beta_2 DA_{i,t-1} + \beta_3 TA_{i,t-1} + \varepsilon_{i,t}$

(9) $DDBC_{i,t} = \beta_0 + \beta_1 DYEAR + \beta_3 TA_{i,t-1} + \omega_{i,t}$

| | **(8) $DA_{i,t}$ Unmanaged earnings ($EBDA_{i,t}$)** | | **(9) $DDBC_{i,t}$ Unmanaged earnings ($EBDBC_{i,t}$)** | |
|---|---|---|---|---|
| | **Negative** | **Positive** | **Negative** | **Positive** |
| $Constant$ | 0.087*** | -0.047*** | 0.029*** | -0.008* |
| | (0.010) | (0.011) | (0.008) | (0.005) |
| $DYEAR_i$ | -0.016 | 0.006 (0.011) | 0.001 | 0.014** |
| | (0.013) | | (0.007) | (0.006) |
| $TA_{i,t-1}$ | -3.26e$^{-11}$* | -2.84e$^{-12}$ | -1.33e$^{-11}$ | -7.21e$^{-12}$ |
| | (1.85e$^{-11}$) | (2.07e$^{-11}$) | (1.31e$^{-11}$) | (9.37e$^{-12}$) |
| $DA_{i,t-1}$ | -0.033 | -0.042 | | |
| | (0.049) | (0.043) | | |
| $DDBC_{i,t-1}$ | | | 0.410*** | 0.238*** |
| | | | (0.069) | (0.051) |
| $R^2$ | 4.39% | 1.60% | 38.38% | 23.90% |
| N | 45 | 95 | 60 | 80 |

*Note*: Standard errors are in the parentheses (Robust standard errors are used when Breusch-Pagan and Cook-Weisberg tests for heteroskedasticity show variances are not constant for the dependent variable (p<10%) ; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level; Where $EBDA_{i,t}$ is hospital i's net income before discretionary accruals in year t, scaled by lagged total assets ($TA_{i,t-1}$). $EBDBC_{i,t}$ is hospital i's net income before discretionary work in progress under DBCs in year t, scaled by lagged total assets. The difference between 2013 and 2018 is calculated as $\beta_{2018} - \beta_{2013}$. $DA_{i,t-1}$ are hospital i's discretionary accruals in year t-1, as estimated by the Jones model, scaled by lagged total assets. $DDBC_{i,t}$ is hospital i's discretionary work in progress in year t, scaled by lagged total assets.

$DYEAR$ is a dummy variable that equals 0 for 2013 and 1 for 2018. $TA_{i,t-1}$ are hospital i's lagged total assets of year t (total assets in year t-1). All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Table 4.7. Regression analysis for the relation between earnings and the number of contracts by health insurers

$$(10)\quad CONT = \beta_0 + \beta_1 POSEARN_{i,2018} + \beta_2 POSEARN_{i,2017} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i$$

$$(11)\quad CONT = \beta_0 + \beta_1 POSEBDA_{i,2018} + \beta_2 POSEBDA_{i,2017} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i$$

$$(12)\quad CONT = \beta_0 + \beta_1 POSEBDBC_{i,2018} + \beta_2 POSEBDC_{i,2017} + \beta_3 TC_{i,2018} + \beta_4 TA_{i,2017} + \omega_i$$

| **Variable** | **Reported earnings** | **Unmanaged earnings** | |
|---|---|---|---|
| | **Model (10)** | **Model (11)** | **Model (12)** |
| *Constant* | 55.211*** | 53.605*** | 57.297*** |
| | (2.702) | (7.810) | (4.963) |
| $POSEARN_{i,2018}$ | -5.415 | | |
| | (37.953) | | |
| $POSEARN_{i,2017}$ | -2.605 | | |
| | (19.526) | | |
| $POSEBDA_{i,2018}$ | | 27.132 | |
| | | (14.007) | |
| $POSEBDBC_{i,2018}$ | | | 8.540 |
| | | | (35.296) |
| $TC_{i,2018}$ | -0.519 | -4.186 | -3.011 |
| | (2.249) | (2.981) | (3.086) |
| $TA_{i,2017}$ | -4.16e$^{-9}$*** | -5.79e$^{-9}$*** | -4.26e$^{-9}$*** |
| | (1.51e$^{-9}$) | (2.80e$^{-9}$) | (1.84e$^{-9}$) |
| Adj. $R^2$ | 6.17% | 9.04% | 8.23% |
| N | 59 | 47 | 33 |

*Note:* Standard errors are in the parentheses; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level.Where $POSEARN_{i,2018}$ is hospital i's net income in 2018, scaled by lagged (2017) total assets, excluding hospitals who reported a loss. $POSEARN_{i,2017}$ is hospital i's net income in 2017, scaled by lagged (2016) total assets, excluding hospitals who reported a loss. $TC_{i,t}$ are hospital i's total costs in 2018, scaled by the lagged (2017) total assets. $TA_{i,2017}$ are hospital i's total assets in 2017. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

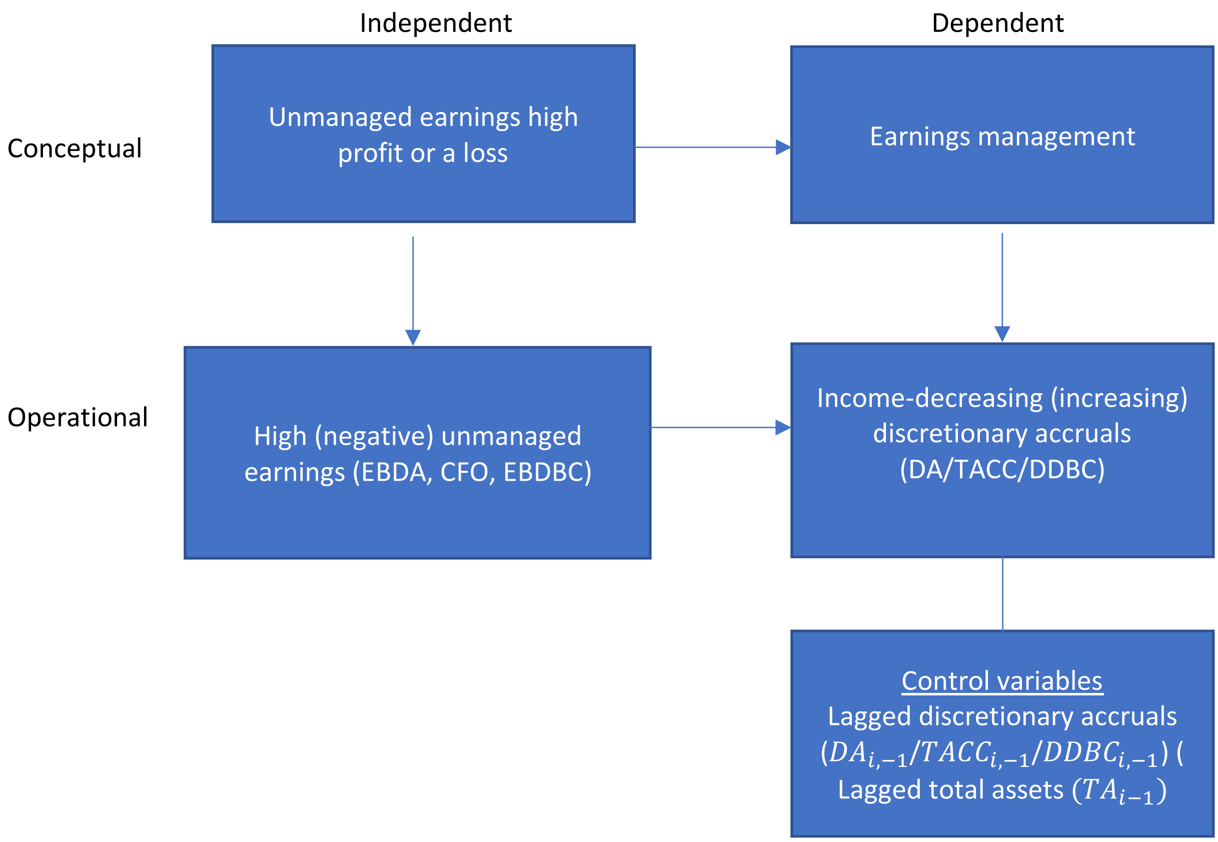
# Appendices

## Appendix A: Variable Definitions

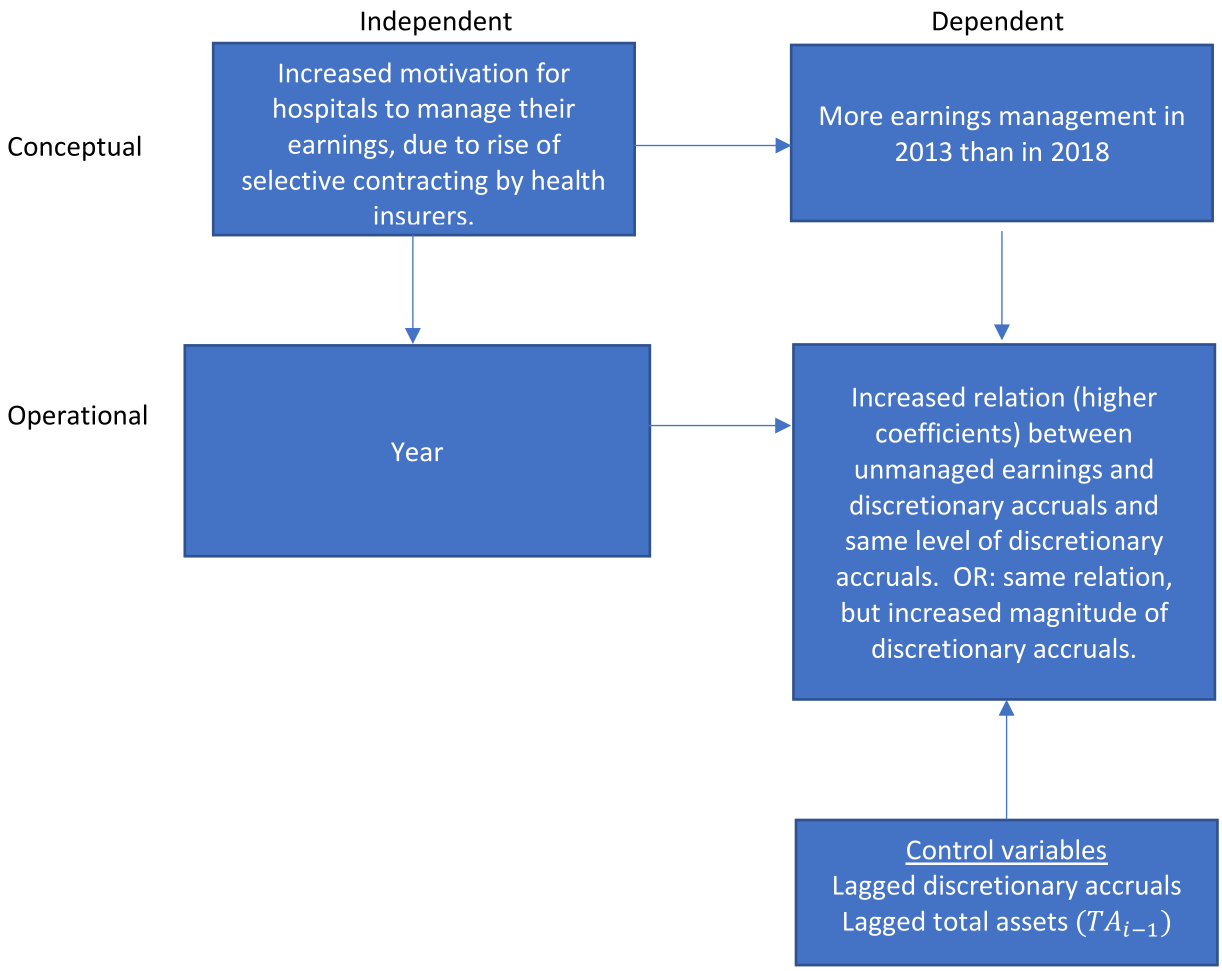
| | |
|---|---|
| $CFO_{i,t}$ | Hospital i's cash flows from operations in year t, scaled by lagged total assets. |
| $CONT_{i,2020}$ | Hospital i's number of contracts with health insurers in 2020 (linked to 2018, with a maximum of 57 as there are 57 health insurance policies in the Netherlands). |
| $EARN_{i,t}$ | Hospital i's net income (after nonoperating adjustments) in year t, scaled by lagged total assets. |
| $EBDA_{i,t}$ | Hospital's net income before discretionary accruals, scaled by lagged total assets: unmanaged income proxy. |
| $EBDBC_{i,t}$ | Hospital i's net income before discretionary work in progress under DBCs in year t, scaled by lagged total assets: unmanaged income proxy. |
| $IBC_{i,t}$ | Hospital i's operating income in year t, scaled by lagged total assets. |
| $PPE_{i,t}$ | Hospital i's tangible fixed assets (property, plant and equipment as described in the Jones model) in year t, scaled by lagged total assets. |
| $PROFIT_{i,t}$ | Hospital i's net income (after nonoperating adjustments) in year t. |
| $REV_{i,t}$ | Hospital i's revenue in year t, scaled by lagged total assets. |
| $TA_{i,t-1}$ | Hospital i's lagged total assets of year t (total assets in year t-1) |
| $TACC_{i,t}$ | Hospital i's total accruals (calculated as $IBC_{i,t}$ - $CFO_{i,t}$) in year t, scaled by lagged total assets in ($TA_{i,t-1}$) |
| $TC_{i,t}$ | Hospital i's total costs in year t, scaled by lagged total assets |
| $DDBC_{i,t}$ | Hospital i's discretionary work in progress in year t, calculated as the reported work in progress under DBCs minus the advances paid by health insurers, scaled by lagged total assets. |
| $DA_{i,t}$ | Hospital i's discretionary accruals in year t, as estimated by the Jones model, scaled by lagged total assets. |
| $\Delta REV_{i,t}$ | $\Delta REV_{i,t}$ is hospital's i increase in revenue from year t-1 to t, scaled by lagged total assets (calculated as revenue in year t – revenue in year t-1) |
| $DYEAR$ | A dummy variable that equals 0 for 2013 and 1 for 2018. |
| $POSEARN_{i,t}$ | Hospital i's $EARN_{i,t}$ in year t, if this is positive, scaled by lagged total assets |
| $POSEBDA_{i,t}$ | Hospital i's $EBDA_{i,t}$ in year t, if this is positive, scaled by lagged total assets |
| $POSEBDBC_{i,t}$ | Hospital i's $EBDBC_{i,t}$ in year t, if this is positive, scaled by lagged total assets |

Appendix B: Libby boxes

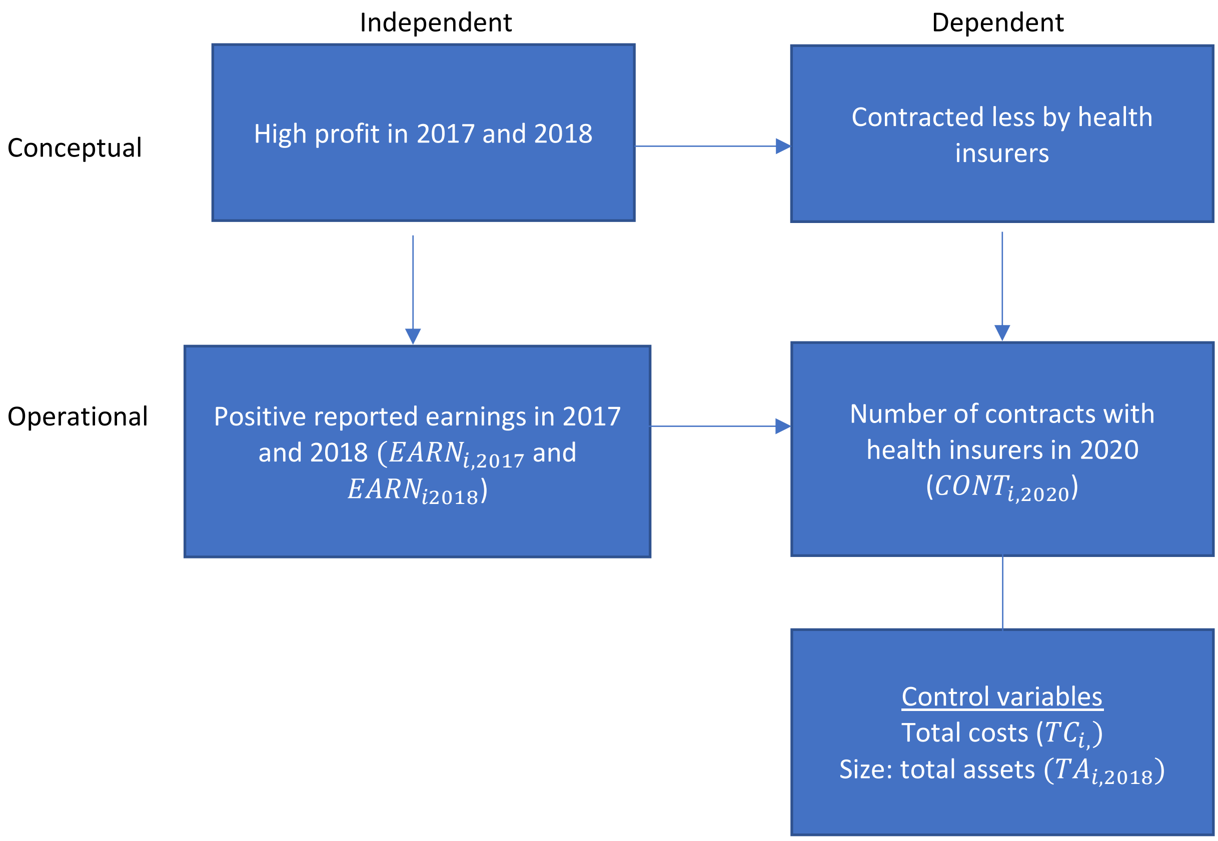
*H1: Dutch hospitals manage their earnings upwards when unmanaged earnings are negative and downwards when unmanaged earnings are high*



*H2: Over time, the earnings management of Dutch hospitals has increased*



*H3: Controlling for the level of costs, hospitals with profits just above zero are more likely to be contracted by health insurers than hospitals with a high profit*



Appendix C1: Overview of hospitals in 2019 and M&A in the period 2012-2019

| | Name hospital organization 2019: | Merger between: | | Since: |
|---|---|---|---|---|
| 1 | Admiraal De Ruyter Ziekenhuis | | | |
| 2 | Albert Schweitzer Ziekenhuis | | | |
| 3 | Alrijne Zorggroep | Rijnland Zorggroep (69) | Diaconessenhuis Leiden (70) | 01-01-2015 |
| 4 | Amphia Ziekenhuis | | | |
| 5 | BovenIJ Ziekenhuis | | | |
| 6 | Bravis Ziekenhuis | Franciscus Ziekenhuis Roosendaal (71) | Lievensberg (72) | 01-01-2015 |
| 7 | Canisius-Wilhelmina Ziekenhuis | | | |
| 8 | Catharina Ziekenhuis | | | |
| 9 | Deventer Ziekenhuis | | | |
| 10 | Diakonessenhuis | | | |
| 11 | Dijklander Ziekenhuis (renamed in 2019) | Westfries Gasthuis (73) | Waterlandziekenhuis (74) | 01-04-2017* |
| 12 | Elisabeth-TweeSteden Ziekenhuis | Elisabeth (75) | TweeSteden (76) | 01-01-2016 |
| 13 | Elkerliek Ziekenhuis | | | |
| 14 | Flevoziekenhuis | | | |
| 15 | Franciscus Gasthuis & Vlietland Groep | Franciscus Gasthuis (77) | Vlietland Ziekenhuis (78) | 01-01-2015 |
| 16 | Gelre Ziekenhuizen | | | |
| 17 | Groene Hart Ziekenhuis | | | |
| 18 | Haaglanden Medisch Centrum | Bronovo (79) | Haaglanden Medisch Centrum (80) | 01-01-2015 |

| | | | | |
|---|---|---|---|---|
| 19 | Het Van Weel-Bethesda Ziekenhuis (CuraMare) | | | |
| 20 | IJsselland Ziekenhuis | | | |
| 21 | Ikazia Ziekenhuis | | | |
| 22 | Isala klinieken | | | |
| 23 | Jeroen Bosch Ziekenhuis | | | |
| 24 | Laurentius Ziekenhuis | | | |
| 25 | Maasstad ziekenhuis | | | |
| 26 | Martini Ziekenhuis | | | |
| 27 | Máxima Medisch Centrum | | | |
| 28 | Meander Medisch Centrum | | | |
| 29 | Medisch Spectrum Twente | | | |
| 30 | Nij Smellinghe | | | |
| 31 | Noordwest Ziekenhuisgroep | Gemini (81) | Medisch Centrum Alkmaar (82) | 01-01-2015 |
| 32 | Ommelander Ziekenhuis Groep | | | |
| 33 | Onze Lieve Vrouwe Gasthuis | Sint Lucas Andreas (83) | Onze Lieve Vrouwe Gasthuis (84) | 01-01-2013 |
| 34 | Pantein | | | |
| 35 | HagaZiekenhuis (part of Reinier de Graaf) | | | |
| 36 | t Lange Land Ziekenhuis (part of Reinier de Graaf) | | | |
| 37 | Rijnstate Ziekenhuis | | | |
| 38 | Rivas Zorggroep | | | |
| 39 | Rode Kruis Ziekenhuis | | | |
| 40 | Santiz | | | |

| | | | | |
|---|---|---|---|---|
| 41 | Saxenburgh Groep | | | |
| 42 | Spaarne Gasthuis | Kennemer Gasthuis (85) | Spaarne (86) | 22-03-2015 |
| 43 | Spijkenisse Medisch Centrum | Acquisition of Ruwaard van Putten (after bankruptcy) (87) | | 2013 |
| 44 | St. Anna Zorggroep | | | |
| 45 | St. Antonius Ziekenhuis | Zuwe Hofpoort Ziekenhuis (88) | St. Antonius Ziekenhuis (45)** | 01-01-2016 |
| 46 | St. Jans Gasthuis | | | |
| 47 | Tergooiziekenhuizen | | | |
| 48 | Treant Zorggroep (Leveste Middenveld tot 2015) | | | |
| 49 | VieCuri Medisch Centrum | | | |
| 50 | Wilhelmina Ziekenhuis Assen | | | |
| 51 | Zaans Medisch Centrum | | | |
| 52 | Ziekenhuis Amstelland | | | |
| 53 | Ziekenhuis Bernhoven | | | |
| 54 | Ziekenhuis De Gelderse Vallei | | | |
| 55 | Ziekenhuis Rivierenland | | | |
| 56 | Ziekenhuis St. Jansdal | | | |
| 57 | Ziekenhuisgroep Twente | | | |
| 58 | Zorgpartners Friesland | Medisch Centrum Leeuwarden (89) | Tjongerschans (90) | 01-01-2012 |
| 59 | ZorgSaam Zeeuws-Vlaanderen | | | |

| | | | | |
|---|---|---|---|---|
| 60 | Zuyderland Medisch Centrum | Atrium (91) | Orbis (92) | 01-01-2015 |
| 61 | Academisch Medisch Centrum | | | |
| 62 | Erasmus MC | | | |
| 63 | Leids Universitair Medisch Centrum | | | |
| 64 | Maastricht UMC+ | | | |
| 65 | Radboudumc | | | |
| 66 | Universitair Medisch Centrum Groningen | | | |
| 67 | Universitair Medisch Centrum Utrecht | | | |
| 68 | VU medisch centrum | | | |

*Note:* * The data used for the beginning of the year values are on 01-04-2017, however, this is put as 2016 for simplicity. ** Sint Antonius presents their own annual report, not consolidated.

Appendix C2: Data collection

| Year | Number of hospitals in the respective year | Number of hospitals retrieved from datasets | Hand-collected number of hospitals | Number of hospitals missing | Number of hospitals in the dataset |
|---|---|---|---|---|---|
| 2012 | 81 | 77 | 2 | 2 | 79 |
| 2013 | 79 | 67 | 11 | 1 | 78 |
| 2014 | 79 | 68 | 7 | 4 | 75 |
| 2015 | 72 | 69 | 2 | 1 | 71 |
| 2016 | 70 | 68 | 1 | 1 | 69 |
| 2017 | 69 | 68 | 0 | 1 | 68 |
| 2018 | 69 | 0 | 68 | 1 | 68 |
| Total | 519 | 417 | 91 | 11 | 508 |

*Note*: Missing data: Antoni van Leeuwenhoek (all years, does not present an annual report). Ruwaard van Putten (only 2012 data available, while at least two years is needed to determine the lagged total assets and change in revenues). Spaarne (2014, no data available). Bronovo (2014, no data available). Medisch Centrum Alkmaar (2014, no data available).

Appendix D: Regression results for the estimation of discretionary accruals using the Jones model (1991), per year

$$TACC_{i,t} = \alpha_{0,t}\frac{1}{TA_{i,t-1}} + \alpha_{1,t}\Delta REV_{i,t} + \alpha_{2,t}PPE_{i,t} + \omega_{i,t} \quad (1)$$

| ***Variable*** | ***2012*** | ***2013*** | ***2014*** | ***2015*** | ***2016*** | ***2017*** | ***2018*** |
|---|---|---|---|---|---|---|---|
| $1/TA_{i,t-1}$ | -11744421 | 1055360 | -573814 | -1645330 | -1381999 | 3338984* | -736221 |
| | (3278785) | (2453613) | (2922516) | (2491590) | (2527094) | (1744415) | (1581026) |
| $\Delta REV_{i,t}$ | 0.038 | 0.120 | -0.076 | -0.047 | -0.367 | 0.129 | 0.133*** |
| | (0.072) | (0.197) | (0.118) | (0.125) | (0.340) | (0.183) | (0.016) |
| $PPE_{i,t}$ | 0.013 | -0.091*** | -0.095*** | -0.093** | -0.059* | -0.062*** | -0.088*** |
| | (0.032) | (0.023) | (0.032) | (0.037) | (0.031) | (0.019) | (0.018) |
| N | 79 | 78 | 75 | 71 | 69 | 68 | 68 |
| Adj. $R^2$ | 0% | 23.44% | 26.12% | 28.91% | 22.90% | 10.85% | 54.84% |

*Note:* Standard errors are in the parentheses; * Significant at the 10% level, ** significant at the 5% level, ***significant at the 1% level; Where $TACC_{i,t}$ are the total accruals of hospital i in year t (in thousands), scaled by lagged total assets ($TA_{i,t-1}$). $\Delta REV_{i,t}$ is the change in revenue of hospital i from year t-1 to year t, scaled by lagged total assets. $PPE_{i,t}$ is the property, plant and equipment of hospital i in year t, scaled by lagged total assets. $\omega$ is the residual and the measure for the discretionary accruals. All variables are winsorized at 1% and 99% to mitigate the effect of outliers.

Appendix E: Average profit percentage of hospitals over time

| *Year* | *No. of hospitals in the dataset* | *Average profit percentage* |
|---|---|---|
| 2012 | 79 | 1.8% |
| 2013 | 78 | 2.8% |
| 2014 | 75 | 1.3% |
| 2015 | 71 | 1.7% |
| 2016 | 69 | 2.7% |
| 2017 | 68 | 2.1% |
| 2018 | 68 | 2.2% |
| Total | 508 | 2.0% |

*Note*: Where the profit percentage is the hospital's reported earnings scaled by the lagged total assets.

Appendix F: Standardized difference calculation

$$Standardized\ difference = \frac{n_i - \frac{1}{2}(n_{i-1} + n_{i+1})}{SD}$$

where SD = $Np_i(1 - p_i) + \frac{1}{4}N(p_{i-1} + p_{i+1})(1 - p_{i-1} - p_{i+1}) + Np_i(p_{i-1} + p_{i+1})$

Table F Frequencies and probabilities

| *Standardized difference to the left of zero:* | | |
|---|---|---|
| | **Frequency (n)** | **Probability (p)** |
| $n_{i-1}$ | 6 | 0.012* |
| $n_i$ | 11 | 0.022 |
| $n_{i+1}$ | 39 | 0.079 |
| N | 491 | |
| *Standardized difference to the left of zero:* | | |
| | **Frequency (n)** | **Probability (p)** |
| $n_{i-1}$ | 11 | 0.022 |
| $n_i$ | 39 | 0.079 |
| $n_{i+1}$ | 45 | 0.092 |
| N | 491 | |

*Note:* * Calculated as $n_i/N = 6/491$