Master thesis:

Real estate investments in the Dutch public healthcare sector

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Abstract

The healthcare sector in the Netherlands is facing a large investment challenge in the coming years. Up to € 6 billion of investments per year will be necessary, while many organizations do not have the financial opportunities to make these investments. Margins have been declining for years and many healthcare providers are dependent on their reserves. Healthcare firms in the public domain rely on the four healthcare laws in the Netherlands for their source of income: the health insurance law, the long-term healthcare law, the youth help law and the social support law. Modern portfolio theory suggests that income diversification could lead to a more optimal and less risky business model, generating higher or similar results with less risk. This could lead to a higher level of real estate investments. In this context, this dissertation analyses how income diversification by healthcare providers influences the real estate investments that these firms make. Possible effects are estimated with an ordinary least squares regression model, from a dataset containing financial information about 582 large healthcare firms in 2020. The main independent variable in this dissertation is a Herfindahl–Hirschman Index that measures the magnitude of diversification of the income, scores ranging from 2,500 points for perfectly diversified firms to 10,000 points for firms that gain all of their income from one source. The results indicate that for each point increase on the Herfindahl-Hirschman Index, the dependent variable decreases with 0.0117%. This suggests that firms with less income diversification invest less in their real estate portfolio, which is consistent with literature on the topic. The findings of this study may inform the design of public policies with programs or incentives to stimulate strategies related to income diversification of healthcare firms.

1. Introduction

Many healthcare institutions are facing a large investment challenge on the shorter or longer term, while many do not have the financial leeway to afford these investments. The characteristics that are needed from healthcare organisations to make and afford these necessary investments (Cleary, 1999; Mayer, 1990), may depend on their diversification strategies as Modern Portfolio Theory (Markowitz, 1952) suggests. In the Netherlands, healthcare providers may diversify their income among four different healthcare laws: 1) the health insurance law, 2) the long-term healthcare law, 3) the social support law and 4) the youth help law. Each of these laws provide a different source income for all public healthcare providers. In this research, we examine the effect of income diversification between the four healthcare laws on the magnitude of real estate investments for healthcare providers.

Investors or investment firms in the usual sense invest in real estate by buying properties and renting them out, taking profit from the rental income and the appreciation of the property. When considering healthcare firms, investing in real estate is done with a different perspective. Real estate for healthcare firms is the housing for their business practices. Therefore, in the case of buying new real estate, the purpose is to increase the amount of provided healthcare for a firm. Renovating properties is also considered as an investment, this is done with the purpose of increasing the quality of the provided healthcare, to make the building more sustainable or to provide better working conditions for the employees. Existing studies have clearly established the large investment sum in the healthcare sector that is going to be necessary in the coming years. Den Engelsen (2021) describes four specific opportunities that require real estate investments of healthcare institutions: finding a solution for the discrepancy between the modern-day healthcare processes and the aged housing, sustainability opportunities, future-proofing the real estate stock and the possible new demand for overcapacity in times of crisis. A recent report from financial consultant Deloitte shows that in the coming 5 years, € 6 billion per year is needed in investments across the whole healthcare sector, even though the healthcare providers do not have the financial means to fund these investments with the financial health of the sector declining for years. The margins have been getting slimmer and many organisations are dependent on their reserves (Leeijen, Ruiter, Vuijk & Gemke, 2022). What existing studies and reports lack is a deeper understanding of the differences in investment opportunities that the income diversification strategies of healthcare firms can provide.

The ability of healthcare providers to meet their previously described real estate needs may vary along with the diversification strategy that they pursue. A publication from advisory

firm McKinsey & Company shows that diversification into different healthcare fields can help healthcare providers protect their core operations and achieve stronger returns. It enables firms to better manage (unsystematic) population risks and better tailor to the needs of their patients (Reddy, Kurdziel & Sanfilippo, 2021). The findings of this paper can be related to the more fundamental concept from Modern Portfolio Theory (Markowitz, 1952). Although this concept is mostly used to optimize a portfolio of assets, a healthcare organization can also optimize results and reduce its unsystematic risks by diversifying into different healthcare fields. We may relate the findings from Reddy, Kurdziel & Sanfilippo (2021) to relevant literature from the field of finance to explain the underlying mechanism to be researched in this paper. In perfect capital markets, a firm's financing and investment decisions are independent of one another as laid out by Modigliani & Miller (1958). In practice however, where the assumptions of perfect capital markets are violated, finance literature shows that certain firm characteristics affect the investments into said firm. Cleary (1999) finds that a firm's investments are relatively highly correlated with its liquidity, having the most impact for firms with high creditworthiness. The findings in this paper on a firms' behavior support the findings from other papers from the field, such as Mayer (1990) who shows that the dominant source of financing for most firms is internal financing, independent of their creditworthiness. Thus, making cash flow a relevant variable when considering investment patterns. Furthermore, the amount of leverage that a firm is using may be of influence on the investment decisions. Soumaya (2012) shows from empirical evidence that debt has a negative effect on the relationship between investment and cash flow. The author shows that this is in line with the pecking order theory, which argues that the order of adoption of financing sources is first of all internal financing, when this is depleted, a firm will attract long-term debt and when it is not sensible or possible to issue more debt, equity is issued. These papers are mostly focused on the relationship between financial performance and investments. They provide evidence that there are internal factors that influence the ability to make investments in said firm. However, the current literature in the field of sensitivity analyses lacks insight in how a firm's unsystematic risk profile relates to their investments. In this paper, we aim to bridge the gap between current publications on income diversification and real estate investments. We research if income diversification as an additional measure of risk management and market adaptability influences the amount of real estate investments that a healthcare provider makes.

Healthcare providers in the Netherlands can diversify their income along the four aforementioned healthcare laws. The healthcare laws distinguish partly the types of provided

healthcare, and partly the context in which they are provided as many (similar) conditions can be treated through different healthcare laws. One example may be children with a handicap, or children in need of mental healthcare. They can receive an indication from either the long-term healthcare law or from the youth help law. Or for adults, handicapped care and mental healthcare can be provided through both the long-term healthcare law and the health insurance law (Ministerie van Volksgezondheid, Welzijn en Sport, 2022d).

This dissertation argues how the income diversification strategy of (public) healthcare providers restricts or provides opportunities for firms to make investments in their real estate portfolio. This is done with the following main research question:

How does the income diversification strategy of Dutch public healthcare firms influence the amount of investments in their real estate portfolio?

This paper uses a quantitative approach to answer the research question. More specifically, an Ordinary Least Squares regression model is constructed that estimates the effect of the diversification between each law and the amount of real estate investments that a firm makes. The degree of diversification is calculated using a Herfindahl-Hirschman Index, this is used as the main independent variable. The model contains numerous control variables such as information on the legal structures and variables that represent the financial health of the firms. The data that is used for the analysis is a publicly available aggregate of all financial annual reports of Dutch healthcare providers in 2020. The raw dataset contains information of 4,500 firms on, among others, healthcare production numbers (the amount of provided healthcare from a particular field) and financials. This empirical method builds on existing sensitivity analyses that estimate the effect of several different (financial) parameters on the amount of investments that a firm makes, such as liquidity, cash flow and debt levels. The expected effect of the analysis can be described in light of portfolio theory. This dissertation aims to provide new insights by applying the sensitivity analysis methodology to healthcare firms and their diversification strategy regarding their streams of income. We expect that firms with a higher level of income diversification invest more in their real estate portfolio due to having a favorable risk profile, compared to firms with a low level of income diversification. The findings of this study may inform the design of public policies with programs or incentives to stimulate strategies related to income diversification of healthcare firms.

In the following chapters, the main research question will be answered. Chapter 2 covers a description of the context, data and methods with the empirical model. Chapter 3 describes

the results of the analysis. Chapter 4 covers a discussion of the main results and chapter 5 concludes.

2. DATA & METHODS

2.1 Context

In the Netherlands, all (public) healthcare can be gathered under four different healthcare laws. These laws are the different income streams for healthcare providers among which they can diversify their operations. Healthcare organisations can receive compensation for the provided healthcare from different laws, in some cases it may even be that multiple laws apply for the same patient. The four laws that are connected to public healthcare are the health Insurance Law, the social support law, the youth help law and the long-term healthcare law. This paragraph briefly describes the contents, context and relevant developments of each law.

Health insurance law (Zorgverzekeringswet, Zvw)

The health insurance law is organized on a national level. The law takes care of everything that is related to the health insurance system in the Netherlands. The health insurance covers mostly medical expenses such as medical treatments and medically necessary resources. It also covers certain therapies such as physiotherapy and occupational therapy. Furthermore, nursing and caretaking at home is covered under health insurance if it is meant for recovery (temporary) (Ministerie van Volksgezondheid, Welzijn en Sport, 2022b).

Information center Vektis (2021) shows that the health insurance law has, between the four laws, the largest costs associated with it. In 2020, of the € 90.9 billion total healthcare costs, € 48.1 billion was invoiced through the health insurance law.

Social support law (Wet maatschappelijke ondersteuning, Wmo)

One of the responsibilities that Dutch municipalities carry is to make sure that their residents can keep living at home for as long as possible. Municipalities provide support for this through the social support law (Wet maatschappelijke ondersteuning, Wmo). With this law the municipalities are responsible for support of people that are not self-reliant. Examples of care from the social support law are coaching and daytime activities, help to relieve the (informal) caregiver (often family), to provide a protected residence for people with a psychiatric condition or asylum in cases of domestic violence and homelessness. The municipality can either provide the support directly to the client or provide them with a personal budget (Persoonsgebonden

budget, pgb) with which the client can choose the support and hire the support themselves (Ministerie van Algemene Zaken, 2022).

With the implementation of the social support law in 2015, the national government saved € 1.1 billion in 2015 and € 1.3 billion in the years afterwards for the healthcare in this sector (de Koster, 2019b). However, these savings are felt in many municipalities. Municipalities that are dealing with an above-average amount of ageing see the social support law budget as a large constraint for the execution of this healthcare. These municipalities cannot organize the necessary amounts of day-care activities, specialized living facilities and other measures that are aimed at delaying and/or preventing other forms of, more intensive and expensive, healthcare (de Koster, 2019a).

Youth help law (Jeugdwet)

Another responsibility that lies with local municipalities is youth help. Municipalities are responsible for organizing all forms of youth help. This can be help at home if there are problems within a family, but also with mental health and behavioral problems among children and teenagers. The responsibilities and tasks for the municipality are secured in the youth help law (Jeugdwet) (Ministerie van Volksgezondheid, Welzijn en Sport, 2022c).

Municipalities receive subsidies from the national government to provide this youth care, of which the total budgeted amount was cut with 15% with the implementation of the new law (Spigt, 2018). The tariffs for healthcare from the youth help law are determined by municipalities, for this there is no national intervention (PerSaldo, 2022). At the same time, there is a national discourse progressing where municipalities indicate that there is a structural budget shortage for this sector, which often results in lower compensations for the healthcare providers to (partially) make up for these shortages (Bezemer, 2018). In practice, the decentralization of youth care caused a higher workload for municipalities with more new employees such as policy officers, buyers and contract managers to implement the youth care. These structural extra employees have to be paid from the same fund that is meant for providing healthcare. In this structure, the total budget that remains for healthcare is reduced significantly more than the initial budget cut of 15% that was realized with the implementation (Spigt, 2018).

Long-term healthcare law (Wet langdurige zorg, Wlz)

The long-term healthcare law is, as the name suggests, aimed towards long-term healthcare with stay in an institution or at home. The law is organized on a national level. Healthcare within an

institution or residence can be receiving healthcare in a nursing home or living in a facility for disabled care. Clients can also choose to receive the healthcare at their own home. One is eligible for care from the long-term healthcare law if they have a condition, disorder or handicap and need 24-hour per day care or permanent supervision in close proximity for the rest of their lives. To receive healthcare from the long-term healthcare law, patients need an indication from the Centre for Healthcare Indications (Centrum Indicatiestelling Zorg, CIZ). The indications range from lightly intensive forms of (day) care to heavily intensive forms of care and housing (Centrum Indicatiestelling Zorg, 2022b).

There is a difference in the structure from the long-term healthcare law, compared to the aforementioned laws. All specific types of healthcare (or: indications) have a corresponding tariff that healthcare organisations can claim, these are specified by the Dutch Healthcare Authority (Nederlandse Zorgauthoriteit, 2021). For 2022, there are 283 different codes in total. All with a different tariff ranging from less than 40 euros per daypart, to over 700 euros per daypart for less to more intensive forms of healthcare respectively. The tariff of every indication is made up of four components: salary (A), materials (B), Normative Housing Component (NHC, C), Normative Inventory Component (NIC, D). A more in-depth exploration of the structure of the long-term healthcare law and its components can be found in appendix A.

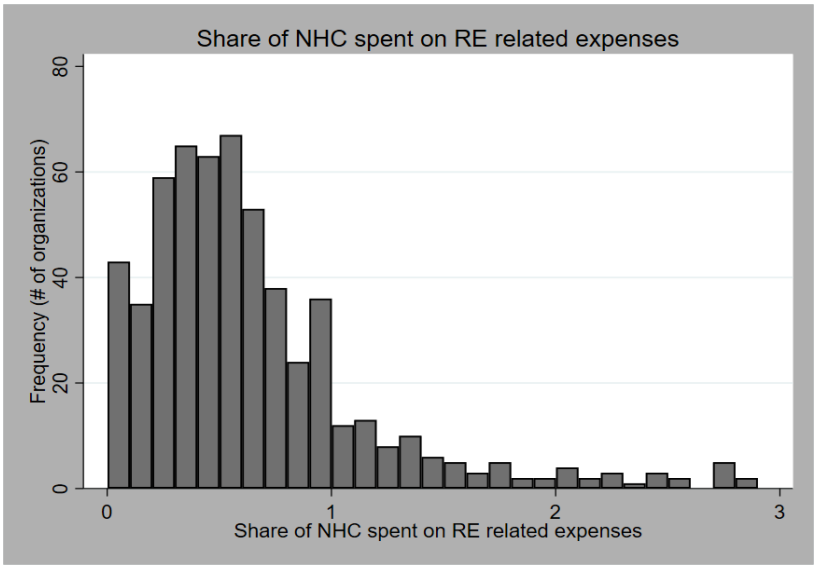

Figure 1: NHC income vs expenses

It is relevant for this research to take a closer look at the NHC as it shows how firms active in this field are managing their real estate expenses. Organisations active in providing care from the long-term healthcare law receive a specific compensation to fund all of their expenses related to housing (such as depreciation, interest costs and energy costs). However, they are not

obliged to spend this income for this purpose. They could also choose to spend less on housing and use this money to fund other expenses. Combining a dataset with information on production numbers with information on the tariffs, the actual expenses related to housing can be compared to the received income for housing. The method for this analysis is described in appendix B. With this information, it is possible to get a grasp of how healthcare organisations are currently managing their real estate related income from the NHC. The results of this analysis are summarized in figure 1. In this figure, the X axis shows the ratio between real estate expenses and real estate related income from the NHC. If the ratio is 1, a firm has equal real estate expenses as NHC income. If it is below 1, a firm has less real estate expenses than NHC income. If it is above 1, a firm has more real estate expenses than NHC income. The Y axis indicates the amount of firms in each category. Even though the results are based on average compensations in the field, the analysis shows a clear pattern where most organisations spend (far) less on real estate related expenses than their NHC income would suggest (all organizations with a ratio <1). This indicates that many organizations are spending less than the dictated norm on real estate. This is alarming, as investments are necessary to keep the real estate stock sustainable and up to date. These findings are consistent with literature on this topic. Waterman and Laarhoven (2021) come to the same conclusions, showing that most healthcare organisations in this sector have to compensate non-real estate related expenses with NHC income. This shows signs for concern, as apparently there is not enough room to do extra investments in realizing sustainable and functionally up-to-date housing, as the depreciation of these investments would raise the housing expenses considerably.

2.2 *Empirical model*

In the analysis, the goal is to estimate to which extent the amount of real estate investments depend on the income diversification of healthcare providers. With this objective, we test the null hypothesis that there is no relationship between the degree of income diversification and the real estate investments of the firm. To measure the magnitude of diversification of the income, we apply the Herfindahl–Hirschman Index as the main independent variable and name it ‘Income concentration’. The Herfindahl-Hirschman Index is a commonly accepted measure of market concentration, in this application it is calculated by squaring the share of income of each law and then summing the resulting numbers (United States Department of Justice, 2018). With 4 possible sources of income, the minimum is 2,500 points (25 percent of each law), and the maximum is 10,000 points (100 percent of income from one law). The preliminary statistical model to test the null hypothesis, is the following:

$$Investments\_RE(log) = \beta_0 + \beta_1 income\_concentration + \beta_2 balance\_buildings\_terrains + \beta_3 rent\_lease\_expenses + \beta_4 current\_ratio + \beta_5 solvency + \beta_6 free\_cash\_flow + \sum_{j=1}^{5} \alpha_j legal\_form_j + \varepsilon$$

Where:

Investments real estate (log)	Dependent variable is the amount of investments in real estate and terrains (in €, 2020 end of year). Investments are buying new real estate and doing renovations and works in properties already in the portfolio. Real estate for healthcare organizations functions as the housing for their operations, so generally investing is done to increase the volume of provided healthcare or to increase the quality of the provided healthcare.
Income concentration	Herfindahl-Hirschman Index calculated from the share of income from each healthcare law.
Balance buildings & terrains	Balance on the financial annual report of the buildings and terrains, from tangible fixed assets (in €, 2020 end of year). It is the total fiscal value of buildings & terrains that a healthcare organization owns. This variable is included to correct for the size of the portfolio: a large real estate portfolio will by definition need more renovations than a small portfolio.
Rent & lease expenses	Total expenses related to renting and leasing properties. This variable is included to correct for the amount of real estate in use. Healthcare organizations also have to make investments in rental properties. They have to invest in self-applied facilities (Zelf Aangebrachte Voorzieningen, ZAV) to make a property suitable for healthcare purposes.
Current ratio	Ratio that measures a firm's liquidity by measuring the ability to pay short-term obligations or those due within one year. Relevant variable for investments as described by Cleary (1999).
Solvency	Solvency, ratio between equity and (long-term) debt. Calculated by dividing the equity by the total assets. Relevant variable for investments as described by Soumaya (2012).

Free cash flow	Cash left over after a company pays for its operating expenses and capital expenditures (in €, 2020 end of year). Relevant variable for investments as described by Mayer (1990).
Legal form	Legal form of the firm, where: 1: Foundation 2: Other 3: Partnership 4: Private company with Supervisory Board 5: Private company without Supervisory Board This variable is included to capture possible ownership incentives. Private companies are allowed to pay out profits as dividends to shareholders, while foundations cannot pay out profits. This may create different incentives to invest funds back into the company.

The aim of this research is to test the hypothesis for the statistical significance of the coefficient related to the income concentration (β_1), and to estimate its magnitude (economic significance). Appendix C presents a correlation matrix for the variables. We see that almost all control variables are significantly correlated with the dependent variable, the natural logarithm of real estate investments, at the 5% significance level. Only the variable solvency does not correlate significantly with the dependent variable. The variable does contribute to the final model, where control variables are present.

The final model is constructed as an ordinary least squares (OLS) regression model. Various model specifications were considered, such as different sets of control variables. These models were found to be less suitable as expanded upon in appendix D. In the same appendix, the assumptions for the final model are also tested. The model is constructed with the help of the statistical software package STATA, the syntax of the analysis is included in appendix E.

2.3 Descriptive analysis

The data that is used for the analysis contains the financial records from all Dutch healthcare firms in 2020, as published by the Ministry of Health, Wellbeing and Sports (Ministerie van Volksgezondheid, Welzijn en Sport, 2022d). It is an aggregate from the financial annual reports of 2020, which healthcare organizations have an obligation to publish. The raw dataset contains 4,527 observations (firms). The Dutch Healthcare authority makes a difference in micro and

non-micro healthcare organizations, which is also referred to in the dataset. A micro-organization (the below definition valid up until 2021) has two or more of the following characteristics (Ministerie van Volksgezondheid, Welzijn en Sport, 2021):

- Net revenue of less than € 700,000.
- On average, less than 10 employees.
- The balance of all assets is not more than € 350,000.

Micro-organizations do not have to report their detailed financial information. Therefore, the decision was made to exclude micro-organizations from the analysis. Furthermore, firms that did not have cash mutations and firms that did not have an income from either of the four laws were dropped from the dataset to exclude inactive firms. Also, of interest are the firms that have made investments in their buildings and terrains in the year 2020. Therefore, we keep only the firms that have made investments in this category. Lastly, one influential variable was dropped from the dataset which was determined using Cook's distance. This results in a remaining 582 firms for the analysis.

The raw dataset was also cleaned in the columns, as the whole dataset with 6500 variables is too large to import directly to STATA (max +/- 2000 variables). After assessing the main categories of all variables, the grid could be reduced to the maximum allowable size for STATA using Excel macros. See appendix B for further information on the syntax used for the analysis and data cleaning.

Table 1 (on the following page) presents the descriptive statistics of the main variables in the model. All variables have the same number of observations, as all of the missing values have been dropped. Even though the spread between the minimum and maximum is large in some variables, there is no reason to believe that there are errors in the data. Real estate is expensive and often makes up a large part of the balance sheet and yearly costs for firms, the maximum values in table 1 seem to be realistic. The minimum values are also realistic, values that cannot be negative have a minimum value of 0. It is possible that firms do not have any properties on their balance sheet in case they lease all of their properties. Or vice versa, they do not have any rent and lease expenses in case they own all the properties. The financial year reports of the firms corresponding to the maximum and minimum values as reported in table 1 were reviewed as a final control measure but did not result in any irregularities.

Table 1: Descriptive statistics

VARIABLES	(1) N	(2) Mean	(3) Standard deviation	(4) Minimum	(5) Maximum
Investments in properties & terrains	582	1,404,000	3,448,000	604	29,950,000
Income concentration	582	8,380	1,948	3,668	10,000
Total balance of properties & terrains (€)	582	22,620,000	42,820,000	0	386,400,000
Rent & lease expenses (€)	582	2,124,000	3,411,000	0	33,450,000
Current Ratio	582	23.28	159.2	0	3,480
Solvency	582	30.16	45.60	-50.80	941
Free Cash Flow (€)	582	5,003,000	10,510,000	-27,470,000	96,230,000
Legal form (cat.)	582	1.533	1.161	1	5

The dataset also contains the addresses of the healthcare providers. This brings a possible spatial dimension into the analysis, as plotted in figure 2.

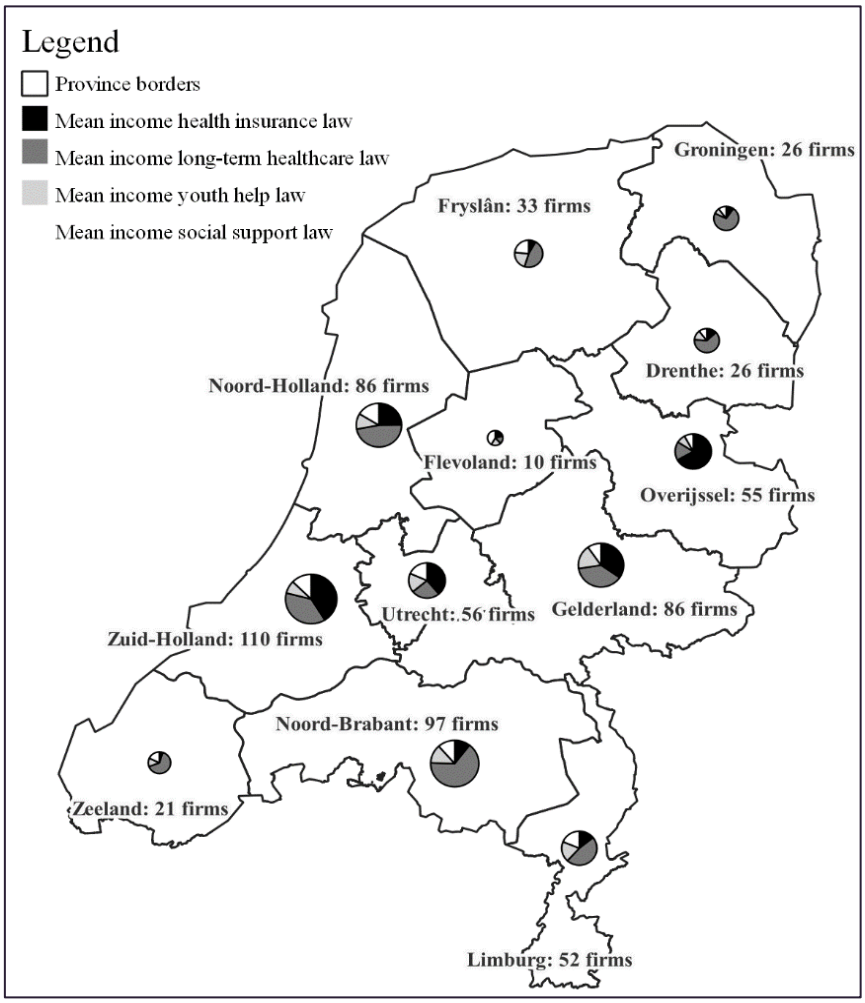

Figure 2: spatial distribution

The data has been distributed among the twelve provinces of the Netherlands to explore the spatial differences in the dataset. Noord- and Zuid-Holland and Noord-Brabant contain the most firms within the (remaining) dataset, while Flevoland, Zeeland and Drenthe contain the least amount of firms. Furthermore, the average share of income from each healthcare law has been plotted for each province in pie charts (of which the size represents the amount of firms in the province). This makes some provinces stand out, as firms in Noord-Brabant, Drenthe and Groningen have, on average, a relatively high income from the long-term healthcare law. Overijssel stands out with a relatively high share of income from the health insurance law. The spatial dimension was also considered for the final regression model, as expanded upon in appendix D.

3. RESULTS

The main results from the analysis are described in table 2, in which the results for the main empirical model are reported. As mentioned in section 2, other model specifications were also considered in this analysis. They were found to be less suitable for the aim of the analysis. Appendix D presents the results of all model specifications, together with a motivation for the use of the final model (model 3).

Table 2: regression results - final model

VARIABLES	Model 3: Coefficients	Model 3: Standard error
Income concentration	-0.000117***	(3.96e-05)
Balance of the buildings and terrains at the end of 2020	8.90e-09**	(4.19e-09)
The amount of expenses related to rent and lease	7.20e-08***	(2.22e-08)
Current ratio	-0.00107***	(0.000245)
Solvency	0.00195*	(0.00112)
Free Cash Flow	5.68e-08***	(1.36e-08)
Legal form of organization = 2, Other	-1.208**	(0.481)
Legal form of organization = 3, Partnership	-0.945***	(0.360)
Legal form of organization = 4, Private company with Supervisory Board	-0.867***	(0.261)

Legal form of organization = 5, Private company without Supervisory Board	-0.810**	(0.409)
Constant	12.71***	(0.383)
Observations	582	
Adjusted R-squared	0.333	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: the dependent variable is the natural logarithm of the investments in real estate and terrains in 2020. The variable Income concentration is a Herfindahl-Hirschman Index, calculated from the shares of income from each healthcare law. The reference category for dummy variable "Legal form of organization" is "Foundation". The final model is an OLS regression model.

To interpret the results from the final model, a confidence interval of 10% is used to determine whether or not variables make a statistically significant contribution to the model. The final model has an explanatory power of 33%, as measured by the adjusted R-squared.

The key independent variable, the income concentration, shows a statistically significant, negative effect on the dependent variable. For each point (0.01) increase on the index, the dependent variable decreases with 0.0117%. In this context, the index has a range from 2,500 to 10,000. A high level of income concentration indicates little income diversification. Therefore, we may state that firms that are less diversified in their means of income, invest less capital in their real estate portfolio.

When we consider the control variables, we see that they all contribute significantly to the final model. The balance of buildings and terrains has a positive effect on the amount of investments in the real estate portfolio. This variable corrects for the magnitude of the real estate portfolio, as bigger portfolios require more investments (such as renovations and sustainability measures). The amount of expenses related to rent and lease have a positive effect on the amount of investments in the real estate portfolio. In healthcare real estate, it is not uncommon that firms have to invest in the interior and healthcare related facilities in rental accommodations. These investments are called self-applied facilities (Zelf Aangebrachte Voorzieningen, ZAV). The current ratio has a negative effect on the investments in the real estate portfolio. This ratio is calculated by dividing the current assets by the current liabilities. The current assets are cash and other (liquid) assets that are expected to be converted to cash within a year. The current liabilities are amounts due to be paid to creditors within a year. Thus, if a firm has a relatively high amount of current assets (cash and liquid assets) compared to its current liabilities (short term debts), it influences the amount of investments in the real estate portfolio negatively. This

result may seem counterintuitive, therefore in the discussion this result will be explained in further detail. Solvency has a positive effect on the investments in the real estate portfolio. This is a ratio that is calculated by dividing the equity (value of assets minus liabilities) by the total assets of the firm (equity and loan capital). If a firm has a high solvency ratio, it has a relatively high amount of equity compared to loan capital. In the analysis we see that firms with a relatively high amount of equity compared to the long-term debts invest more in their real estate portfolio. This is an indication that firms with a high loan-to-value ratio have more restrictions in attracting new capital to make their real estate investments. Free cash flow also has a positive effect on the investments in the real estate portfolio. Free cash flow is the cash a company generates after deducting operating costs and capital expenditures. With this result we see that internal financing sources for investments are of importance, as also indicated by Mayer (1990). Lastly, the legal form of the healthcare provider has a large economic significance when considering investments in real estate. Private companies and partnerships invest less than half the amount compared to the base category (foundation). This may be related to the fact that foundations are not allowed to pay out profits in the form of dividends to shareholders, but they have to use the profit for the goal of the organization (Belastingdienst, 2021). They may thus be more prone to invest in their real estate portfolio. Private companies are allowed to pay out profits to shareholders, this may create a different incentive.

4. DISCUSSION

4.1 Findings & literature

Comparing the effects found in the analysis to the literature, we see that the decrease in investments as the income concentration index rises is consistent with literature. Reddy, Kurdziel & Sanfilippo (2021) describe how diversification into different healthcare fields enables firms to better manage (unsystematic) population risks and better tailor to the needs of their patients. It can help healthcare providers protect their core operations and achieve stronger returns. In this light we may also consider Modern Portfolio Theory (Markowitz, 1952) as a relevant concept, as it describes how investors can optimize an investment portfolio by selecting the right combination of risky and less risky assets to reduce the risk for a certain level of expected return. Existing sensitivity analyses on firm investments are mostly focused on the correlation with a firm's financial health, as the dominant source of financing investments for most firms is internal financing (Mayer, (1990). In this research we consider income diversification among healthcare fields as a measure of unsystematic risk management and market adaptability. We see the impact on real estate investments as an additional variable to

existing sensitivity analyses on firm investments. A lower score on the Herfindahl-Hirschman Index in this analysis indicates that a firm is more diversified in its field of work. In this context, the income diversification may provide possibilities for a business model with less unsystematic risk and an optimization of results with right combination of risky and less risky income sources. It must be stated that this analysis measures the income concentration with the share of income from each healthcare law. It is possible that healthcare providers could have other sources of income such as providing private care, leasing out real estate or providing any other services. Within the scope of this analysis, we see that the income-diversified firms invest more capital in their real estate portfolio than firms with less income diversification.

The measured effects of most control variables seem also to be in line with theory from Mayer (1990) and Cleary (1999). The measured effect of the current ratio is the only one that seems to be counterintuitive. We measure a statistically significant effect with a negative coefficient. An increase in the current ratio is an increase in the current assets, relative to the current liabilities. In principle, a high current ratio is an indicator of a better financial situation as a firm is in a more solid position to cover its short-term debts. However, a current ratio that is too high may also be an indicator that a firm is not making efficient use of its current assets. In the context of this analysis, we see that firms with a high current ratio are indeed not making efficient use of their current assets as they invest less in their real estate portfolio than firms with a lower current ratio.

4.2 COVID-19 effect in investments

The analysis in this paper is performed with the financial information of healthcare providers from 2020, this may be a basis for critique on the generalizability of this research. 2020 will have been an out of the ordinary year for many organizations in the dataset, as it was the first year of COVID-19 within The Netherlands. Buchheim, Dovern, Krolage & Link (2020) estimate the effect of COVID-19 on firms in the German market. They find that a large share of the firms, especially ones who are in bad shape prior to the crisis are more likely to choose stronger mitigation strategies. In particular, these mitigation strategies are cutting employment and investments. Even though Germany has had stricter policies to control COVID-19 compared to the Netherlands, we may expect a similar effect for firms in the Dutch market as numerous restrictions were still implemented. To find if there is an effect in investments related to COVID-19 in our dataset, we compare the investment numbers from 2020 to earlier publications of the dataset. In these datasets, we see mean investments in real estate and terrains of € 1,613,618 (n=854) in 2018 and € 1,500,807 (n=818) in 2019. In these averages, the same

population was defined as in the analysis (active non-micro firms that have made real estate investments in the year of interest and had income from at least one of the healthcare laws).

In the dataset used in the analysis, the mean investments in real estate and terrains in 2020 is € 1,404,020 (n = 582). A t-test comparing this statistic to the mean amount of investments in the most recent year (2019) shows that the null hypothesis that the mean amount of investments is equal to € 1,500,807 cannot be rejected at the 5% confidence interval level. Therefore, based on this additional evidence beyond the present study's scope we may conclude that there is no substantially relevant difference from 2019 to 2020 in the amount of investments in real estate and terrains. This reinforces the generalizability of the conclusion as it provides evidence that COVID-19 did not significantly influence the results of this study.

4.3 Reference for public policies

In the introduction of this dissertation, we have established that there lies a large investment challenge ahead for the public healthcare sector. The healthcare real estate stock is ageing, there are sustainability opportunities and capacity problems (Den Engelsen, 2021). At the same time, we see that many healthcare providers are not able to afford the necessary investments to solve these problems and future-proof their real estate portfolio, as the financial health of the sector has been declining for years (Leeijen et al., 2022). The healthcare in the scope of this research is a public good. As a society we have an interest in affordable and high-quality healthcare, for which housing can provide a supporting role for both the patient and the healthcare professional. The results of this dissertation show how some healthcare firms are more able to meet their real estate specific needs than others. We see that the financial performance of healthcare firms impacts their real estate related investments. Performance measures such as free cash flow and solvency positively contribute to the amount of real estate investments that a healthcare provider can make. Furthermore, we see that the main variable income diversification can also positively contribute to the amount of real estate investments. This can be a reference for public policy, as it would be in the interest of the public to introduce incentives (or other forms of government intervention) to stimulate the diversification of income for healthcare firms. Subsidies or low-interest loans could be an impulse for business expansion into diversification. Furthermore, a government-initiated task force that healthcare providers can reach for information on diversification strategies can be useful. While diversification in itself is not the goal, we see that certain specific strategies can provide financial benefits. The task force can bring financial know-how to firms that may not have this knowledge in-house.

5. CONCLUSION

This dissertation investigates the context of the four different healthcare laws in the Netherlands and applies those findings to find a relationship between the income diversification strategies and the amount of investments in real estate and terrains from healthcare firms in the Netherlands. The final effects are estimated with an ordinary least squares regression model, where the main independent variable is constructed as a Herfindahl–Hirschman Index that scores each firm on the magnitude of their income concentration. Possible scores range from 2,500 points for firms that are perfectly diversified to 10,000 points for firms that gain all of their income from only one healthcare law. Our findings indicate that a one-point increase on the Herfindahl-Hirschman Index decreases the dependent variable with 0.0117%. This indicates that less diversified healthcare firms invest less in their real estate portfolio. These results are consistent with literature on the subject, as Modern Portfolio Theory as explored by Markowitz (1952) describes how investors can optimize an investment portfolio by selecting the right combination of risky and less risky assets to reduce the risk for a certain level of expected return. In relation to this, various sources suggest that certain firm characteristics influence the amount of investments that a firm makes, with current literature being mostly focused on indicators for financial performance. As Reddy, Kurdziel & Sanfilippo (2021) show that income diversification reduces unsystematic population risks and brings opportunities to optimize results, in this dissertation we view income diversification as an additional measure of risk management and market adaptability. Within the scope of this analysis, we see that the income-diversified firms invest more capital in their real estate portfolio than firms with less income diversification. The findings of this study may inform the design of public policies with programs or incentives to stimulate strategies related to income diversification of healthcare firms.

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APPENDIX A: Actors & structure of the long-term healthcare law

In the long-term healthcare law, there are five actors that play a role in the compensation that a specific healthcare provider receives. These are the client, the healthcare provider, the Healthcare offices ("Zorgkantoren"), the Center for Healthcare Indications ("Centrum Indicatiestelling Zorg") and the Dutch Healthcare Authority (Nederlandse Zorgauthoriteit). In this process, as described by the Center for Healthcare Indications (Centrum Indicatiestelling Zorg, 2022a), the client with a need for long-term healthcare has to first of all receive an indication that fits within the Law for long-term healthcare ("Wet Langdure Zorg") from the Center for Healthcare Indications. Clients can make this request by themselves, with help from friends or family or with support (free of charge) from their municipality. If the request is granted, the client receives one or multiple specific codes for the healthcare of which they have a right to receive. With this code or these codes, the client can contact the Healthcare office in their region. The Healthcare office is responsible for placing the clients in a suitable healthcare provider in their region that can provide the required type of long-term healthcare connected to the earlier granted code (Zorgverzekeraars Nederland, n.d.). The maximum rates and descriptions for these codes are determined by the Dutch Healthcare Authority (Ministerie van Volksgezondheid, Welzijn en Sport, 2022a).

The total amount of compensation that long-term care providers receive depends on the amount and type of healthcare provided during the year. Healthcare providers keep track of this and receive the compensation based on the amount of actual provided healthcare. Each type of long-term healthcare has a specific code, named ZZP (Zorg Zwaarte Pakket), to which a specific compensation is connected. In 2022 there are 283 different codes with a large variety in compensations, they are laid out in a policy document from the Dutch Healthcare Authority (Nederlandse Zorgauthoriteit, 2021). The codes with the least amount of compensation may have a total compensation of less than 40 euros per daypart and are related to forms of relatively less intensive healthcare, such as day care for

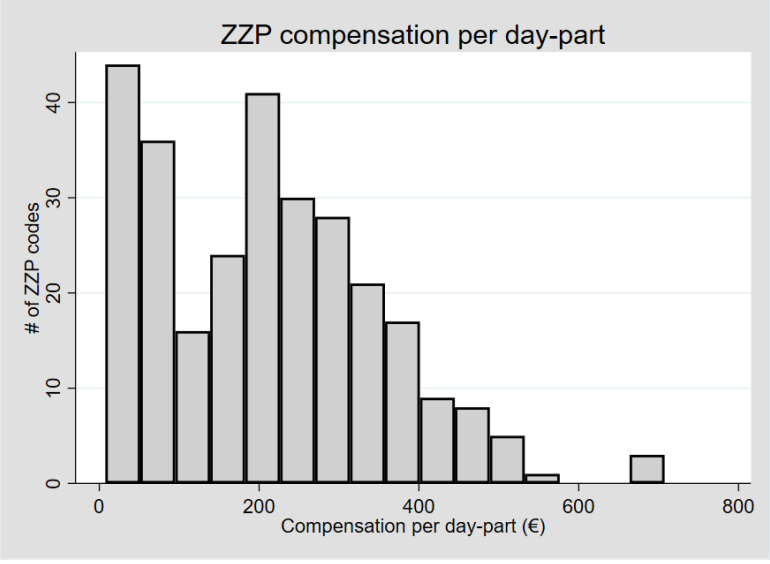

Figure 3: Total compensations from ZZP codes

patients with a light handicap or costs related to transport. The codes with the most amount of compensation is for highly intensive types of healthcare and can be more than 700 euros per daypart, such as the compensation for clinical intensive care. Figure 3 shows the distribution of the compensation determined by the ZZP codes. The majority of ZZP's have less than € 300 of total compensation per daypart. The compensations that are higher than this becomes increasingly less common. In the highest category of more than € 700 per daypart, there are only two ZZP codes.

Every ZZP code is made up of four components:

- Component A: salary
- Component B: materials
- Component C: NHC (Normative Housing Component)
- Component D: NIC (Normative Inventory Component)

Breaking down the ZZP codes into their respective components shows that salary compensation is the biggest contributor to the total costs. Figure 4 shows the distribution of the salary component (A) within the ZZP codes. In healthcare types where clients need relatively light care and/or are in big groups, the salary compensation per client is low (below €50 per daypart). As the level of required care or specialization rises, the amount of salary compensation rises quickly and makes up the bulk of the total compensation for most ZZP codes.

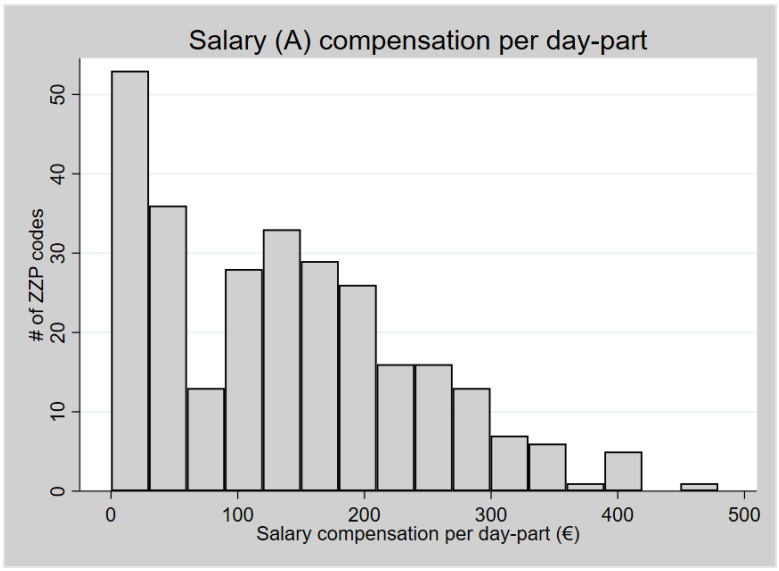

Figure 4: Salary compensation from ZZP codes

Component B, the material compensation, shows less variety. The majority of ZZP codes have less than € 60 per daypart as compensation for materials as shown in figure 5. Again, the compensation increases as the intensiveness of the provided healthcare rises. The outlier in this figure at € 155 per daypart is connected to the code for Clinical Intensive Care.

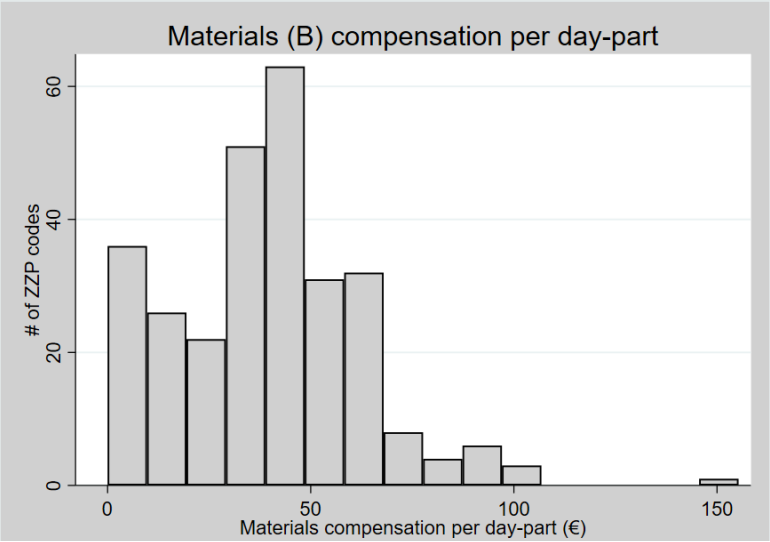

Figure 5: Materials compensation from ZZP codes

Component C, the Normative Housing Component (NHC), is a compensation for the investments for (new) construction works and the upkeep (maintenance) of buildings. The component is a yearly indexed contribution to the integral compensation that is (or should be) sufficient to cover the interest-, depreciation- and maintenance expenses related to a specific healthcare code. Many codes do not provide a compensation for the housing, they are mostly codes for client transport and specific premiums. Most codes have a housing compensation between € 26 and € 40 per daypart, as illustrated in figure 6. This shows that the variance among the NHC compensation is much smaller than, for example, the salary compensation. As the complexity and intensity of the healthcare increases, the share that is taken up by the housing compensation compared to the whole compensation decreases. The difference in housing costs for low-intensive healthcare and high-intensive healthcare is far less great than the difference in salary costs.

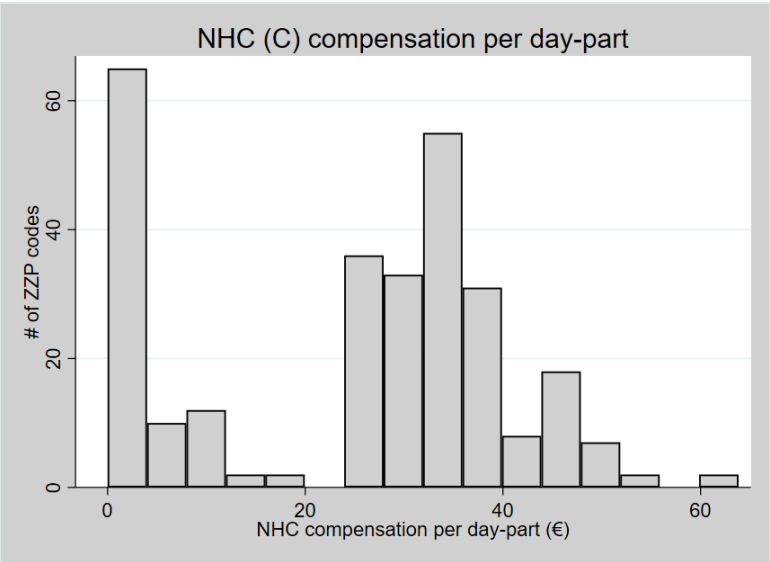

Figure 6: NHC compensation from ZZP codes

The last component, D, consists of the Normative Inventory Component (NIC). This is a compensation for investments in the inventory. It consists of a contribution that is or should be sufficient to cover the interest- and depreciation costs across the entire lifecycle of the inventory. Figure 7 shows that the NIC compared to the total compensation is relatively low, the codes with the highest absolute amount are still below € 10 per daypart per client. The distribution of NIC compensation between the lowest and the highest factors is relatively even, we do not see the same pattern as the other components where a more intensive form of healthcare drastically increases the attributed costs.

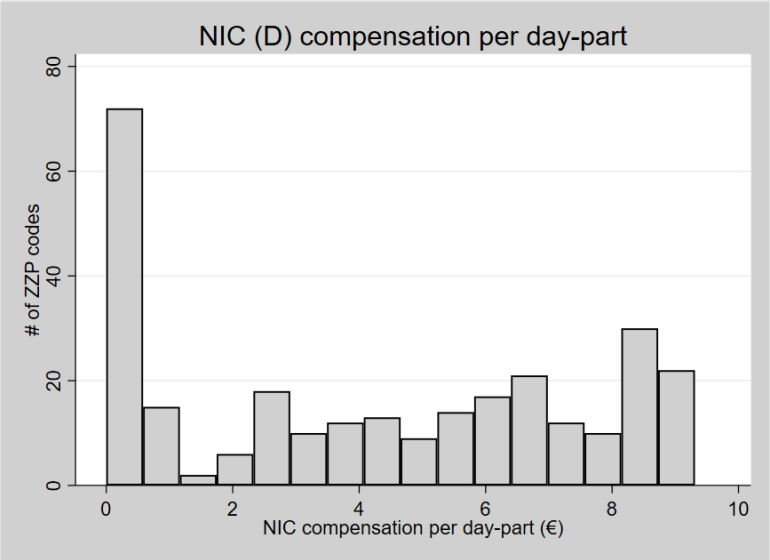

Figure 7: NIC compensation from ZZP codes

The component that is most of interest for this research is component C (Normative Housing Component). It was already laid out in the introduction that even though healthcare providers receive a specific amount of money that should be sufficient to provide housing for the healthcare they provide, they are not obligated to spend the money for this purpose. Instead, they are free to spend the integral compensation however way they see most fit for their business (Nederlandse Zorgauthoriteit, 2012). This leaves the responsibility for investing in adequate healthcare housing with the market.

APPENDIX B: NHC income vs NHC expenses

This appendix describes the method of the analysis that was performed to compare the NHC income vs the NHC expenses that apply to healthcare institutions that operate in the long-term healthcare law.

1. Dataset roughly cleaned using Excel VBA macro's: whole dataset with 6500 variables is too large to import to STATA (max +/- 2000). VBA syntax:

```
Sub CleanData1()

    'delete columns on imagaging diagnostics
    Columns("HDI:HXW").Delete

    'delete columns with too specific information on youth healthcare
    Columns("FRY:FXX").Delete

    'delete columns with too specific information of loans to and from other organisations
    Columns("DIU:FFH").Delete

    'delete columns containing organisations that organisations provided outsourced healthcare to
    Columns("BVV:CRZ").Delete

    'delete columns containing organisations of outsourced healthcare
    Columns("SP:BVS").Delete

    'delete columns with partnered associations
    Columns("EZ:SM").Delete

End Sub
```

2. Calculate average income for NHC per sector using excel =averageif() function from the indication descriptions (Nederlandse Zorgauthoriteit, 2021).
   - Average compensation NHC per day long-term mental healthcare: € 32,33
   - Average compensation NHC per day in handicapped care sector:
     - Including stay & daytime activities: € 37,56
     - Including stay, excluding daytime activities: € 28,30
     - At-home care: € 4,64
     - Daytime activities per daypart: € 7,62
   - Average compensation NHC per day in nursing sector:
     - Nursing: € 32,32
     - At-home nursing: € 4,01

3. Calculate expenses that fall within the NHC for the Wlz sector, for each firm of interest. Remove outliers and make histogram. STATA syntax:

```
*clear the memory
clear all

*change the directory
cd "C:\Users\Gebruiker\Documents\Uni\Scriptie\Data\STATA analyse\NHC expenses analysis"

* tell Stata to smoothly run through the code without stopping at long parts
set more off

*importing the data file from the directory to Stata
import excel "Dataset_2020_JvdZ_clean.xlsx", sheet("RowData_clean") firstrow

*Step 0: destring relevant variables & replace missing with 0
destring (jeu11460_jeu11460), replace
destring (jeu10000_jeu10000), replace
destring (jeu126021_jeu126021), replace
destring (jeu126061_jeu126061), replace
destring (jeu126071_jeu126071), replace
destring (jeu12308_jeu12318), replace force
destring (jeu12303_jeu12313), replace
destring (jeu12221_jeu12221), replace
destring (jeu13371_jeu13371), replace
destring (jeu13341_jeu13341), replace
destring (qPercPatCliWlz_qPercPatCliWlz), replace
destring (qad17501_qad17501), replace
destring (qav19411_qav19411), replace
destring (qav19412_qav19412), replace
destring (qav19413_qav19413), replace
destring (qad19401_qad19401), replace
destring (qav17511_qav17511), replace
destring (qav17513_qav17513), replace
destring (qPercPatCliWlz_qPercPatCliWlz), replace
destring (jeu13871_jeu13871), replace

replace jeu11460_jeu11460 = 0 if missing(jeu11460_jeu11460)
replace jeu10000_jeu10000 = 0 if missing(jeu10000_jeu10000)
replace jeu126021_jeu126021 = 0 if missing(jeu126021_jeu126021)
replace jeu126061_jeu126061 = 0 if missing(jeu126061_jeu126061)
replace jeu126071_jeu126071 = 0 if missing(jeu126071_jeu126071)
replace jeu12308_jeu12318 = 0 if missing(jeu12308_jeu12318)
replace jeu12303_jeu12313 = 0 if missing(jeu12303_jeu12313)
replace jeu12221_jeu12221 = 0 if missing(jeu12221_jeu12221)
replace jeu13371_jeu13371 = 0 if missing(jeu13371_jeu13371)
replace jeu13341_jeu13341 = 0 if missing(jeu13341_jeu13341)
replace qPercPatCliWlz_qPercPatCliWlz = 0 if missing(qPercPatCliWlz_qPercPatCliWlz)
replace qad17501_qad17501 = 0 if missing(qad17501_qad17501)
replace qav19411_qav19411 = 0 if missing(qav19411_qav19411)
```

```
replace qav19412_qav19412 = 0 if missing(qav19412_qav19412)
replace qav19413_qav19413 = 0 if missing(qav19413_qav19413)
replace qad19401_qad19401 = 0 if missing(qad19401_qad19401)
replace qav17511_qav17511 = 0 if missing(qav17511_qav17511)
replace qav17513_qav17513 = 0 if missing(qav17513_qav17513)
replace qPercPatCliWlz_qPercPatCliWlz = 0 if missing(qPercPatCliWlz_qPercPatCliWlz)
replace jeu13871_jeu13871 = 0 if missing(jeu13871_jeu13871)



*Step 1: generate finanical parameter.

*Interest expenses of RE
generate interest_bearing_st_loans = jeu126021_jeu126021 + jeu126061_jeu126061 +
jeu126071_jeu126071
generate perc_lt_loans =  jeu10000_jeu10000 / (jeu10000_jeu10000 +
interest_bearing_st_loans)
generate interest_lt_loans = jeu11460_jeu11460 * perc_lt_loans

replace interest_bearing_st_loans = 0 if missing(interest_bearing_st_loans)
replace perc_lt_loans = 0 if missing(perc_lt_loans)
replace interest_lt_loans = 0 if missing(interest_lt_loans)


*Depreciation expenses of RE
generate perc_buildings = jeu12303_jeu12313 /( jeu12308_jeu12318 +
jeu12303_jeu12313)
generate depr_buildings = jeu12221_jeu12221 * perc_buildings

replace perc_buildings = 0 if missing(perc_buildings)
replace depr_buildings = 0 if missing(depr_buildings)


*Maintenance component of RE
rename jeu13371_jeu13371 maintenance_energy

*Rent expenses (alternative for investing & depreciation)
rename jeu13341_jeu13341 rent_lease

*Total NHC costs
generate NHC_costs = interest_lt_loans + depr_buildings + maintenance_energy + rent_lease
replace NHC_costs = 0 if missing(NHC_costs)

*Total NHC costs corrected for Wlz
generate Perc_Wlz = qPercPatCliWlz_qPercPatCliWlz/100
generate NHC_costs_wlz = NHC_costs * Perc_Wlz
replace NHC_costs_wlz = 0 if missing(NHC_costs_wlz)

*Step 2: generate production parameter
```

```
*Income NHC for GGZ-B
generate NHC_GGZB = qad17501_qad17501 * 32.33
replace NHC_GGZB = 0 if missing(NHC_GGZB)

*Income NHC for GZ
generate NHC_GZ = qav19411_qav19411 * 37.56 + qav19412_qav19412 * 28.3 +
qav19413_qav19413 * 4.64 + qad19401_qad19401 * 7.62
replace NHC_GZ = 0 if missing(NHC_GZ)

*Income NHC for VV
generate NHC_VV = qav17511_qav17511 * 32.32 + qav17513_qav17513 * 4.01
replace NHC_VV = 0 if missing(NHC_VV)

*Total income NHC for Wlz

generate NHC_income_wlz = NHC_GGZB + NHC_GZ + NHC_VV
replace NHC_income_wlz = 0 if missing(NHC_income_wlz)

*Step 3: comparison income vs expenses

*Show expenses as part of the income
generate NHC_costs_v_income = NHC_costs_wlz / NHC_income_wlz
replace NHC_costs_v_income = 0 if missing(NHC_costs_v_income)

*Step 4: keep relevant institutions & visualisation

*Keep all institutions that have clients with Wlz indications
keep if qPercPatCliWlz_qPercPatCliWlz > 0

*Keep all institutions that are not micro-institutions & have a mutation in cash
keep if jeu13871_jeu13871 != 0

*drop outliers
drop if NHC_costs_v_income > 3
drop if NHC_costs_v_income <= 0

*Show in histogram
histogram NHC_costs_v_income, freq width(0.1)
```

Appendix C: Pairwise correlations

Pairwise correlations

Variables	Investments RE (log)	Income concentration	Balance buildings & terrains	Rent & lease expenses	Current ratio	Solvency	Free cash flow	Legal form
Investments RE (log)	1.000							
Income concentration	-0.147*	1.000						
Balance buildings & terrains	0.496*	-0.091*	1.000					
Rent & lease expenses	0.405*	-0.190*	0.533*	1.000				
Current ratio	-0.087*	0.026	-0.018	-0.029	1.000			
Solvency	0.060	-0.005	0.007	0.022	0.036	1.000		
Free cash flow	0.502*	-0.025	0.764*	0.483*	-0.024	0.008	1.000	
Legal form	-0.264*	-0.032	-0.223*	-0.238*	-0.048	-0.092*	-0.192*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Appendix D: three model specifications

To come to the most optimal model as presented in paragraph 2.3, three model specifications are considered in this research to check for robustness. In all models, the dependent variable is the natural logarithm of investments in real estate and terrains in 2020.

The first model is an OLS regression model, with only the variable related to the Herfindahl-Hirschman Index as the independent variable. The second model is also an OLS regression model, with added financial control variables. The control variables in this model are the balance of buildings and terrains, rent and lease expenses, current ratio, solvency, fixed charge coverage and free cash flow. The final model includes also a qualitative aspect of the firm, namely the legal form. Other control variables were also considered; however, they were found to not be statistically nor economically significant. The variables that were intentionally left out of the model for this reason are: total income, profitability ratio, debt ratio, net profit margin, fixed charge coverage & province (as dummy variable). For the final model, the OLS assumptions are tested:

1. *Error term assumptions:*
    a. *Error term has conditional mean of zero:* the conditional mean was tested to be different from zero. Including the constant β_0 in the model resolves this violated assumption.
    b. *Homoscedasticity:* the model has a heteroskedasticity problem. However, including a robust option in the regression command resolves this violated assumption.
    c. *No autocorrelation:* assume no autocorrelation among the error terms. This might be an issue for time-series data; however, this analysis is performed with cross-sectional data.
    d. *Exogeneity:* using instruments we could find whether or not the main variable is endogenous, however theoretically grounded instrumental variables would be necessary. The dataset does not provide opportunities for possible instruments that are correlated with the independent variable, but not with the dependent variable. Therefore, testing for exogeneity is not possible in this analysis.
    e. *Normally distributed errors:* residuals are not normally distributed. However, with large samples we consider normality as a given. With our large dataset, it should not be an issue.

2. *Model is correctly specified, linearity between dependent and independent variables:* test for appropriate functional form is violated, however there are no theoretical bases to add a higher order function into the model. Transforming the model with the variable of interest to a linear-linear or log-log relationship still violates this assumption. The model is therefore assumed to be linear.
3. *Absence of multicollinearity:* no VIF values above 5, there is no multicollinearity problem in this model.
4. *Absence of influential observations:* two influential observations are present in the dataset (exceeding Cook's Distance), these observations are dropped before the final analysis.

The results of the two model specifications as described above, as well as the results from the final model described in the main text, is described in the table on the next page.

Regression results: 3 model specifications

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3
Income concentration	-0.000164***	-0.000102**	-0.000117***
	(4.59e-05)	(4.02e-05)	(3.96e-05)
Balance of the buildings and terrains at the end of 2020		9.98e-09**	8.90e-09**
		(4.31e-09)	(4.19e-09)
The amount of expenses related to rent and lease		9.27e-08***	7.20e-08***
		(2.31e-08)	(2.22e-08)
Current ratio		-0.000988***	-0.00107***
		(0.000242)	(0.000245)
Solvency		0.00264**	0.00195*
		(0.00134)	(0.00112)
Free Cash Flow		5.73e-08***	5.68e-08***
		(1.35e-08)	(1.36e-08)
Legal form of organization = 2, Other			-1.208**
			(0.481)
Legal form of organization = 3, Partnership			-0.945***
			(0.360)
Legal form of organization = 4, Private company with Supervisory Board			-0.867***
			(0.261)
Legal form of organization = 5, Private company without Supervisory Board			-0.810**
			(0.409)
Constant	13.59***	12.32***	12.71***
	(0.399)	(0.378)	(0.383)
Observations	582	582	582
Adjusted R-squared	0.020	0.312	0.333

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: the dependent variable is the natural logarithm of the investments in real estate and terrains in 2020. The variable Income concentration is the Herfindahl-Hirschman Index, calculated from the shares of income from each healthcare law. The reference category for dummy variable “Legal form of organization” is “Foundation”. All models are OLS regression models.

We see that model specification 1 has a weak explanatory power with an adjusted R-squared of 0.020. The explanatory power is improved as control variables are added in model 2, with an adjusted R-squared of 0.312. This in itself would make the model relatively strong, although we have not yet added any qualitative control variables. Even though various other control

variables were considered, the legal form of the organization was found to be a both statistically and economically significant addition to the model. The explanatory power of the final model improves to 0.333.

Appendix E: STATA syntax OLS regression analyses

```
*Do-file regression analysis
log using healthcare_investments_logfile
*clear the memory
clear all
*change the directory
cd "C:\Users\Gebruiker\Documents\Uni\Scriptie\Data"

* tell Stata to smoothly run through the code without stopping at long parts
set more off

*before importing the excel file, some manual changes were made to the variable names as they exceeded the 32 character limit of STATA. Changes are the following:
*1. bulk of amount of variables reduced, see appendix 1
*2. ent_Rentabiliteit_ent_Rentabiliteit was renamed to ent_Rentabiliteit
*3. ent_Liquiditeit_ent_Liquiditeit was renamed to ent_Liquiditeit
*4. ent_Solvabiliteit_ent_Solvabiliteit was renamed to ent_Solvabiliteit
*5. jeu10200_schuldover_jeu10200_schuldover was renamed to jeu10200_jeu10200
*6. entMain_Typering_ent_Typering_DigiMVRAV was renamed to entMain_Typering_ent_amb
*7. entMain_Typering_ent_Typering_DigiMVBAZ was renamed to entMain_Typering_ent_btlnd
*8. entMain_RechtsVorm_ent_RechtsVorm was renamed to entMain_RechtsVorm_ent_RV


*importing the data file from the directory to Stata
import excel "data_2020_clean_01052022.xlsx", firstrow

*variable that indicates the mutations in resources for all non-micro healthcare providers. Drop if 0 drops all micro org and ones that were not active in 2020.
destring (jeu13871_jeu13871), replace
replace jeu13871_jeu13871 = 0 if missing(jeu13871_jeu13871)
drop if jeu13871_jeu13871 == 0
rename jeu13871_jeu13871 mutations_resources

*keep only the relevant variables
keep  mutations_resources Name StreetName HouseNumber HouseNumberAdd PostalCode Town province jeu11460_jeu11460 jeu10000_jeu10000 jeu126021_jeu126021 jeu126061_jeu126061 jeu126071_jeu126071 jeu12308_jeu12318 jeu12303_jeu12313 jeu12221_jeu12221 jeu13371_jeu13371 jeu13341_jeu13341 jeu12313_jeu12313 jeuRopbr_10_jeuRopbr_101 jeu75211_jeu75211 jeuRopbr_20_jeuRopbr_201 jeu75221_jeu75221 jeuRopbr_30_jeuRopbr_301 jeuRopbr_40_jeuRopbr_401 jeu12303_jeu12313 jeu10000_jeu10000 jeu10200_jeu10200
```

jeu09300_jeu09300 jeu11210_jeu11210 jeu11410_jeu11410 jeu10800_jeu10800 jeu11520_jeu11520 jeu11520_jeu11520 jeu13821_jeu13821 qPersTotLoonTot_AantalFte ent_Rentabiliteit ent_Liquiditeit ent_Solvabiliteit entMain_Typering_ent_Typering_0 entMain_Typering_ent_Typering_2 entMain_Typering_ent_Typering_3 entMain_Typering_ent_Typering_41 entMain_Typering_ent_Typering_5 entMain_Typering_ent_Typering_4 entMain_Typering_ent_Typering_8 entMain_Typering_ent_Typering_74 entMain_Typering_ent_Typering_10 entMain_Typering_ent_Typering_75 entMain_Typering_ent_Typering_13 entMain_Typering_ent_Typering_15 entMain_Typering_ent_Typering_51 entMain_Typering_ent_Typering_71 entMain_Typering_ent_Typering_72 entMain_Typering_ent_Typering_12 entMain_Typering_ent_Typering_52 entMain_Typering_ent_Typering_53 entMain_Typering_ent_Typering_54 entMain_Typering_ent_Typering_55 entMain_Typering_ent_Typering_56 entMain_Typering_ent_Typering_35 entMain_Typering_ent_Typering_32 entMain_Typering_ent_amb entMain_Typering_ent_btlnd entMain_Typering_ent_Typering_31 entMain_Typering_ent_Typering_33 entMain_Typering_ent_Typering_34 entMain_RechtsVorm_ent_RV qeu70300_omzet_qeu70300_omzet

36.
37. *destring relevant variables & replace missing with zero (dataset leaves cell empty if the amount is 0)
38.
39. *ratio variables to calculate housing expenses:
40. destring (jeu11460_jeu11460), replace
41. destring (jeu10000_jeu10000), replace
42. destring (jeu126021_jeu126021), replace
43. destring (jeu126061_jeu126061), replace
44. destring (jeu126071_jeu126071), replace
45. destring (jeu12308_jeu12318), replace force
46. destring (jeu12303_jeu12313), replace
47. destring (jeu12221_jeu12221), replace
48. destring (jeu13371_jeu13371), replace
49. destring (jeu13341_jeu13341), replace
50.
51. replace jeu11460_jeu11460 = 0 if missing(jeu11460_jeu11460)
52. replace jeu10000_jeu10000 = 0 if missing(jeu10000_jeu10000)
53. replace jeu126021_jeu126021 = 0 if missing(jeu126021_jeu126021)
54. replace jeu126061_jeu126061 = 0 if missing(jeu126061_jeu126061)
55. replace jeu126071_jeu126071 = 0 if missing(jeu126071_jeu126071)
56. replace jeu12308_jeu12318 = 0 if missing(jeu12308_jeu12318)
57. replace jeu12303_jeu12313 = 0 if missing(jeu12303_jeu12313)
58. replace jeu12221_jeu12221 = 0 if missing(jeu12221_jeu12221)

```
59. replace jeu13371_jeu13371 = 0 if missing(jeu13371_jeu13371)
60. replace jeu13341_jeu13341 = 0 if missing(jeu13341_jeu13341)
61.
62. *ratio variables for regression
63. destring (jeu12313_jeu12313), replace
64. destring (jeuRopbr_10_jeuRopbr_101), replace
65. destring (jeu75211_jeu75211), replace
66. destring (jeuRopbr_20_jeuRopbr_201), replace
67. destring (jeu75221_jeu75221), replace
68. destring (jeuRopbr_30_jeuRopbr_301), replace
69. destring (jeuRopbr_40_jeuRopbr_401), replace
70. destring (jeu12303_jeu12313), replace
71. destring (jeu10000_jeu10000), replace
72. destring (jeu10200_jeu10200), replace
73. destring (jeu09300_jeu09300), replace
74. destring (jeu11210_jeu11210), replace
75. destring (jeu11410_jeu11410), replace
76. destring (jeu10800_jeu10800), replace
77. destring (jeu11520_jeu11520), replace
78. destring (jeu11520_jeu11520), replace
79. destring (jeu13821_jeu13821), replace
80.
81. destring (qPersTotLoonTot_AantalFte), replace
82.
83. destring (ent_Rentabiliteit), replace
84. destring (ent_Liquiditeit), replace
85. destring (ent_Solvabiliteit), replace
86.
87. *calculate housing expenses for healthcare firms
88.
89. *interest component
90. generate interest_bearing_st_loans = jeu126021_jeu126021 + jeu126061_jeu126061 +
    jeu126071_jeu126071
91. generate perc_lt_loans =  jeu10000_jeu10000 / (jeu10000_jeu10000 + interest_bearing_st_loans)
92. generate interest_lt_loans = jeu11460_jeu11460 * perc_lt_loans
93.
94. replace interest_bearing_st_loans = 0 if missing(interest_bearing_st_loans)
95. replace perc_lt_loans = 0 if missing(perc_lt_loans)
96. replace interest_lt_loans = 0 if missing(interest_lt_loans)
97.
```

```
98.  *depreciation component
99.  generate perc_buildings = jeu12303_jeu12313 /( jeu12308_jeu12318 + jeu12303_jeu12313)
100. generate depr_buildings = jeu12221_jeu12221 * perc_buildings
101.
102. replace perc_buildings = 0 if missing(perc_buildings)
103. replace depr_buildings = 0 if missing(depr_buildings)
104.
105. *maintenance component
106. rename jeu13371_jeu13371 maintenance_energy
107.
108. *rent
109. rename jeu13341_jeu13341 rent_lease
110.
111. *total housing costs
112. generate NHC_costs = interest_lt_loans + depr_buildings + maintenance_energy + rent_lease
113. replace NHC_costs = 0 if missing(NHC_costs)
114.
115. *generate key regression variables
116.
117. rename jeu12313_jeu12313 Investments_RE
118.
119. generate  income_zvw = jeuRopbr_10_jeuRopbr_101 + jeu75211_jeu75211
120. replace income_zvw = 0 if missing(income_zvw)
121.
122. generate  income_wlz = jeuRopbr_20_jeuRopbr_201 + jeu75221_jeu75221
123. replace income_wlz = 0 if missing(income_wlz)
124.
125. rename  jeuRopbr_30_jeuRopbr_301 income_jw
126. replace income_jw = 0 if missing(income_jw)
127.
128. rename  jeuRopbr_40_jeuRopbr_401 income_wmo
129. replace income_wmo = 0 if missing(income_wmo)
130.
131. generate  income_total_laws = income_zvw + income_wlz + income_jw + income_wmo
132. replace income_total_laws = 0 if missing(income_total_laws)
133.
134. generate  income_perc_zvw = income_zvw / income_total_laws
135. replace income_perc_zvw = 0 if missing(income_perc_zvw)
136.
137. generate  income_perc_wlz = income_wlz / income_total_laws
```

```
replace income_perc_wlz = 0 if missing(income_perc_wlz)

generate  income_perc_jw = income_jw / income_total_laws
replace income_perc_jw = 0 if missing(income_perc_jw)

generate  income_perc_wmo = income_wmo / income_total_laws
replace income_perc_wmo = 0 if missing(income_perc_wmo)


*generate non-financial control regression variables

*type hospital
generate hospital = "nee"
replace hospital = "ja" if entMain_Typering_ent_Typering_0 == "ja"
replace hospital = "ja" if entMain_Typering_ent_Typering_2 == "ja"
replace hospital = "ja" if entMain_Typering_ent_Typering_3  == "ja"
replace hospital = "ja" if entMain_Typering_ent_Typering_41 == "ja"

*type independent treatment center
rename entMain_Typering_ent_Typering_5 ind_treatment_center

*type rehabilitation center
rename entMain_Typering_ent_Typering_4 rehab_center

*type mental healthcare center
generate mental_healthcare = "nee"
replace mental_healthcare = "ja" if entMain_Typering_ent_Typering_8 == "ja"
replace mental_healthcare = "ja" if entMain_Typering_ent_Typering_74 == "ja"

*type handicapped care provider
generate handicapped_care = "nee"
replace handicapped_care = "ja" if entMain_Typering_ent_Typering_10 == "ja"
replace handicapped_care = "ja" if entMain_Typering_ent_Typering_75 == "ja"

*type nursing provider
rename entMain_Typering_ent_Typering_13 nursing

*type youth care
generate youth_care = "nee"
replace youth_care = "ja" if entMain_Typering_ent_Typering_51 == "ja"
```

```
replace youth_care = "ja" if entMain_Typering_ent_Typering_71 == "ja"
replace youth_care = "ja" if entMain_Typering_ent_Typering_72 == "ja"

*type probation and forensic care
generate forensic_probation_care = "nee"
replace forensic_probation_care = "ja" if entMain_Typering_ent_Typering_12 == "ja"
replace forensic_probation_care = "ja" if entMain_Typering_ent_Typering_52 == "ja"
replace forensic_probation_care = "ja" if entMain_Typering_ent_Typering_53 == "ja"

*educational institution
rename entMain_Typering_ent_Typering_35 education_institution

*societal support (WMO) center
rename entMain_Typering_ent_Typering_32 societal_support

*all other types of healthcare
generate other_care = "nee"
replace other_care = "ja" if entMain_Typering_ent_amb == "ja"
replace other_care = "ja" if entMain_Typering_ent_btlnd == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_31 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_33 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_34 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_54 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_55 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_56 == "ja"
replace other_care = "ja" if entMain_Typering_ent_Typering_15 == "ja"


*amount of FTE in organisation
rename qPersTotLoonTot_AantalFte FTE

*legal form of organisation
rename entMain_RechtsVorm_ent_RV legal_form

*how much was provided by healthcare subcontractors
rename qeu70300_omzet_qeu70300_omzet healthcare_subcontractors
replace healthcare_subcontractors = "%0" if missing(healthcare_subcontractors)

*Generate financial control variables
```

```
*balance of tangible property
rename jeu12303_jeu12313 balance_build_ter

*expenses related to all owned properties
generate  ownership_expenses = interest_lt_loans + depr_buildings + maintenance_energy


*profitability: ratio of the realised profit against the invested capital
rename ent_Rentabiliteit profitability

*current ratio: liquidity ratio that measures a company's ability to pay short-term obligations or those due within one year
rename ent_Liquiditeit current_ratio

*Solvency: ratio between own capital and loaned capital
rename ent_Solvabiliteit Solvency

*debt ratio: measures the amount of leverage used by a company in terms of total debt to total assets
generate debt_ratio = (jeu10000_jeu10000 + jeu10200_jeu10200) / jeu09300_jeu09300
replace debt_ratio = 0 if missing(debt_ratio)

*fixed charge coverage: measures a firms ability to cover its fixed charges, such as debt payments, interest expense and equipment lease
generate fixed_charge_cov = (jeu11210_jeu11210 + rent_lease) / (rent_lease + jeu11410_jeu11410)
replace fixed_charge_cov = 0 if missing(fixed_charge_cov)

*net profit margin: measures how much net income or profit is generated as a percentage of revenue
generate net_profit_margin = jeu11520_jeu11520 / jeu10800_jeu10800
replace net_profit_margin = 0 if missing(net_profit_margin)

*free cash flow: cash left over after a company pays for its operating expenses and capital expenditures
generate free_cash_flow = jeu11520_jeu11520 - jeu13821_jeu13821
replace free_cash_flow = 0 if missing(free_cash_flow)

*label the variables
label variable Investments_RE "investments in company real estate and terrains"

label variable income_zvw "income from the health insurance law"
label variable income_wlz "income from the long-term healthcare law"
label variable income_jw "income from the youth help law"
```

```
label variable income_wmo "income from the societal support law"

label variable income_perc_zvw "income from health insurance law as perc of total"
label variable income_perc_wlz "income from the long-term healthcare law as perc of total"
label variable income_perc_jw "income from youth help law as perc of total"
label variable income_perc_wmo "income from the societal support law as perc of total"
label variable income_total_laws "total income from healthcare laws"

label variable province "province of the address in the data"
label variable hospital "Whether or not the institution is a hospital"
label variable ind_treatment_center "Whether or not the institution is an independent treatment center"
label variable rehab_center "Whether or not the institution is a rehabilitation center"
label variable mental_healthcare "Whether or not the institution is a mental healthcare facility"
label variable handicapped_care "Whether or not the institution is a handicapped care facility"
label variable nursing "Whether or not the institution provides nursing"
label variable youth_care "Whether or not the institution provides youth care"
label variable forensic_probation_care "Whether or not the institution provides probation or forensic care"
label variable education_institution "Whether or not the institution is an educational institution"
label variable societal_support "Whether or not the institution provides societal support"
label variable other_care "Whether or not the institution provides other forms of healthcare"
label variable FTE "The amount of Full Time Employees in the organization"
label variable legal_form "The legal form of the organization"
label variable healthcare_subcontractors "How much of the revenue was generated by healthcare subcontractors"

label variable balance_build_ter "Balance of the buildings and terrains at the end of 2020"
label variable ownership_expenses "The amount of expenses related to owned housing and buildings"
label variable rent_lease "The amount of expenses related to rent and lease"
label variable profitability "The ratio between realised profit compared to the invested capital"
label variable current_ratio "Liquidity ratio that measures a company's ability to pay short-term obligations or those due within 1 year"
label variable Solvency "Ratio between own capital and loaned capital"
label variable debt_ratio "Measures the amount of leverage used by a company in terms of total debt to total assets"
label variable fixed_charge_cov "Measures a firms ability to cover its fixed charges such as debt payments, interest expenses and lease expenses"
label variable net_profit_margin "Measures how much income or profit is generated as a percentage of revenu"
label variable free_cash_flow "Free Cash Flow"
```

```
290.
291. *keep only relevant variables
292. keep mutations_resources Name StreetName HouseNumber HouseNumberAdd PostalCode Town Investments_RE income_zvw income_wlz income_jw income_wmo income_perc_zvw income_perc_wlz income_perc_jw income_perc_wmo income_total_laws province hospital ind_treatment_center rehab_center mental_healthcare handicapped_care nursing youth_care forensic_probation_care education_institution societal_support other_care FTE legal_form healthcare_subcontractors balance_build_ter ownership_expenses rent_lease profitability current_ratio Solvency debt_ratio fixed_charge_cov net_profit_margin free_cash_flow
293.
294.
295. *replace all missing in investments RE with 0
296. replace Investments_RE = 0 if missing(Investments_RE)
297.
298. *If you want to perform the analysis with only the organisations that did investments in their RE, drop all that have 0 investments
299. drop if (Investments_RE == 0)
300.
301. *histogram of investments show that it is not normally distributed
302. hist Investments_RE, freq normal
303.
304. *create logarithmic variable of investments
305. generate ln_Investments_RE = ln(Investments_RE)
306. drop if missing(ln_Investments_RE)
307. hist ln_Investments_R, freq normal
308.
309. *generate perc variables that are easier to interpret
310. generate income_perc_zvw_100 = income_perc_zvw * 100
311. generate income_perc_wlz_100 = income_perc_wlz * 100
312. generate income_perc_jw_100 = income_perc_jw * 100
313. generate income_perc_wmo_100 = income_perc_wmo * 100
314.
315.
316. hist ln_income_zvw, freq
317. hist ln_income_wlz, freq
318. hist ln_income_jw, freq
319. hist ln_income_wmo, freq
320.
321.
322. *generate new numeric variables with new names from the non-number string variables
```

```
encode province, gen(province_enc)
encode hospital, gen(hospital_enc)
encode ind_treatment_center, gen(ind_treatment_center_enc)
encode rehab_center, gen(rehab_center_enc)
encode mental_healthcare, gen(mental_healthcare_enc)
encode handicapped_care, gen(handicapped_care_enc)
encode nursing, gen(nursing_enc)
encode youth_care, gen(youth_care_enc)
encode forensic_probation_care, gen(forensic_probation_care_enc)
encode education_institution, gen(education_institution_enc)
encode societal_support, gen(societal_support_enc)
encode other_care, gen(other_care_enc)

replace legal_form = "Private company with Supervisory Board" if legal_form == "Besloten vennootschap (BV) met Raad van Toezicht / Raad van Commissarissen"
replace legal_form = "Private company without Supervisory Board" if legal_form == "Besloten vennootschap (BV) zonder Raad van Toezicht / Raad van Commissarissen"
replace legal_form = "Foundation" if legal_form == "Stichting"
replace legal_form = "Partnership" if legal_form == "Vennootschap onder firma (VoF)"
replace legal_form = "Other" if legal_form == "Commanditaire vennootschap (CV)"
replace legal_form = "Other" if legal_form == "Coöperatie en onderlinge waarborgmaatschappij"
replace legal_form = "Other" if legal_form == "Coöperatieve vereniging"
replace legal_form = "Other" if legal_form == "Eenmanszaak"
replace legal_form = "Other" if legal_form == "Maatschap"
replace legal_form = "Other" if legal_form == "Publiekrechtelijke rechtspersoon (bijv. gemeente, zelfstandig bestuursorgaan of universiteit)"
replace legal_form = "Other" if legal_form == "Vereniging met volledige rechtsbevoegdheid"
replace legal_form = "Other" if legal_form == "andere rechtsvorm, namelijk:"
encode legal_form, gen(legal_form_enc)

replace healthcare_subcontractors = "0-10%" if healthcare_subcontractors == "0-10% van de totale omzet"
replace healthcare_subcontractors = "10-20%" if healthcare_subcontractors == "10-20% van de totale omzet"
replace healthcare_subcontractors = "20-30%" if healthcare_subcontractors == "20-30% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "30-40% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "40-50% van de totale omzet"
```

```
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "50-60% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "60-70% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "70-80% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "80-90% van de totale omzet"
replace healthcare_subcontractors = "> 30%" if healthcare_subcontractors == "90-100% van de totale omzet"
encode healthcare_subcontractors, gen(healthcare_subcontractors_enc)

*label & recode the new variables
label variable income_perc_zvw_100 "% of income from the health insurance law"
label variable income_perc_wlz_100 "% of income from long-term healthcare law"
label variable income_perc_jw_100 "% of income from the youth-help law"
label variable income_perc_wmo_100 "% of income from the social support law"

label variable province_enc "province of the address in the data"
label variable hospital_enc "Whether or not the institution is a hospital"
label variable ind_treatment_center_enc "Whether or not the institution is an independent treatment center"
label variable rehab_center_enc "Whether or not the institution is a rehabilitation center"
label variable mental_healthcare_enc "Whether or not the institution is a mental healthcare facility"
label variable handicapped_care_enc "Whether or not the institution is a handicapped care facility"
label variable nursing_enc "Whether or not the institution provides nursing"
label variable youth_care_enc "Whether or not the institution provides youth care"
label variable forensic_probation_care_enc "Whether or not the institution provides probation or forensic care"
label variable education_institution_enc "Whether or not the institution is an educational institution"
label variable societal_support_enc "Whether or not the institution provides societal support"
label variable other_care_enc "Whether or not the institution provides other forms of healthcare"
label variable legal_form_enc "Legal form of organization"
label variable healthcare_subcontractors_enc "% of revenue generated by subcontractors"

*drop influential variable
quiet reg ln_Investments_RE income_perc_zvw_100 income_perc_wlz_100 income_perc_jw_100 income_perc_wmo_100 balance_build_ter rent_lease free_cash_flow fixed_charge_cov current_ratio i.legal_form_enc
predict var, cook
```

```
list var if var > 1 & var !=.
drop if var > 2527

*save dataset for easier use later
save dataset_thesis_02052022, replace

clear all
cd "C:\Users\Gebruiker\Documents\Uni\Scriptie\Data"
set more off
use dataset_thesis_02052022, clear

generate income_concentration = (income_perc_zvw_100 ^ 2) + (income_perc_wlz_100 ^ 2) + (income_perc_jw_100 ^ 2) + (income_perc_wmo_100 ^ 2)

hist income_concentration, freq

drop if income_concentration == 0
drop if ln_Investments_RE == 0

hist income_concentration, freq

drop var

quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency fixed_charge_cov free_cash_flow i.legal_form_enc
predict var, cook

list var if var > 1 & var !=.

drop if var > 1.04

*alle vars
reg ln_Investments_RE balance_build_ter income_total_laws income_concentration rent_lease profitability current_ratio Solvency debt_ratio fixed_charge_cov net_profit_margin free_cash_flow i.province_enc i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*min province
```

```
reg ln_Investments_RE balance_build_ter income_total_laws income_concentration rent_lease profitability current_ratio Solvency debt_ratio fixed_charge_cov net_profit_margin free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*min income total laws
reg ln_Investments_RE income_concentration balance_build_ter rent_lease profitability current_ratio Solvency debt_ratio fixed_charge_cov net_profit_margin free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*min profitability
reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency debt_ratio fixed_charge_cov net_profit_margin free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*min debt ratio
reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency fixed_charge_cov net_profit_margin free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*min net profit margin --> final model?
reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency fixed_charge_cov free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc, r

*check de assumpties
ssc install regcheck
quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency fixed_charge_cov free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc
```

```
i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc
regcheck

*heteroskedasticity problem --> use robust standard errors
*No multicollinearity problem
*residuals are NOT normally distributed --> bias in efficiency. Given our large sample, this is not an issue
*no specification problem
*Functional form problem! --> lin-lin, log-lin and log-log do not solve it. Also, no theoretical foundation to chance. Assumed linear.
*No influential observations

summarize Investments_RE
*linear relationship
quiet reg Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc
regcheck

*log-linear relationship
quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc
regcheck

*log-log relationship
generate ln_income_concentration = ln(income_concentration)
quiet reg ln_Investments_RE ln_income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow i.hospital_enc i.ind_treatment_center_enc i.rehab_center_enc i.mental_healthcare_enc i.handicapped_care_enc i.nursing_enc i.youth_care_enc i.forensic_probation_care_enc i.education_institution_enc i.societal_support_enc i.other_care_enc i.legal_form_enc
regcheck

*=====================================================

*make a correlation matrix (install asdoc package)
```

```
*correlation matrix
ssc install asdoc
asdoc pwcorr ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow legal_form_enc, star(.05) replace nonum

*descriptive statistics
ssc install outreg2
outreg2 using descriptive_statistics.doc, replace sum(log) title(Descriptive statistics) keep(Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow legal_form_enc)


*=====================================================================
======
*run several regressions, and combine them

ssc install outreg2
*Model 1 met alléén de index
quiet reg ln_Investments_RE income_concentration, r
outreg2 using all_models.doc, replace see adjr2 title(Regression results: 3 model specifications) ctitle(Model 1) label

*Model 2 met alle financial regressors
quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow, r
outreg2 using all_models.doc, append see adjr2 ctitle(Model 2) label

*Model 3 final model
quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency free_cash_flow i.legal_form_enc, r
outreg2 using all_models.doc, append see adjr2 ctitle(Model 3) label

*check assumptions
ssc install regcheck
quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency fixed_charge_cov free_cash_flow i.legal_form_enc
regcheck
```

```
495. *test whether error term has conditional mean of zero
496. quiet reg ln_Investments_RE income_concentration balance_build_ter rent_lease current_ratio Solvency
     fixed_charge_cov free_cash_flow i.legal_form_enc
497. predict res, resid
498. ttest res=0
499. *bias in both consistency and efficiency, should be resolved by including the constant in the model
500.
501. *========= Discussion
502. *T-test for average investments in dataset, perhaps there was a covid effect.
503. summarize Investments_RE
504. ttest Investments_RE=1500807
505.
506. summarize current_ratio
507. hist current_ratio, freq
508.
log close
```