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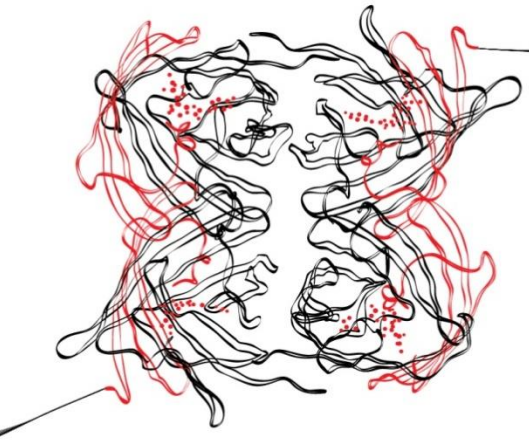

UNIVERSITEIT TWENTE.

The influence of an appraiser switch on the valuation of Dutch real estate

A quantitative data research for Bouwinvest on the variances in the valuation of Dutch Real Estate caused by appraiser switching

SCHOOL OF MANAGEMENT AND GOVERNANCE
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ABSTRACT

This research is focused on investigating the effect of an appraiser switch on the valuation of Dutch Real Estate. Empirical evidence suggested that there would be a negative effect on the value of a real estate object at the moment that is switched from appraiser.

By the means of an quantitative data analysis an answer is provided to the main question:

"What is the effect of an appraiser switch on the valuation of Dutch Real Estate?"

The research has been set up as an event study, were the switching of appraiser was defined as the event. The study was conducted with data of Bouwinvest REIM, with a data range from 2009 until 2013. For the purpose of the event study, seven samples were constructed in the data set. The effect that was measured, was the percentage of change in real estate value per real estate object. The analysis of the effect were conducted on portfolio level, which means that the average value change was the input for the statistical analysis.

In order to control for the market circumstances, there were two groups constructed in each sample. The control group functioned as a benchmark for the actual market developments at the measurement moment, and the change group was the group from which the real estate objects were actually changed from appraiser. The analysis focussed on three measurement moments per sample, two moments were there were no appraiser switches in both groups, and one measurement moment in which the real estate objects in the change group were actually switched from appraiser. This was done in order to investigate whether there was already a structural difference between the two groups and that any variance at T=0 was due to the actual appraiser switch. Also a qualitative analysis of the two groups was performed for all the samples, in order to ensure that the groups had the same qualitative characteristics.

The results of the research confirmed the empirical evidence that there would be a negative effect on the value of a real estate object at the moment that is switched from appraiser. The main conclusion of the performed research is that there is an significant, negative effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level. Also the relative small effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level, could have a relative big effect on real estate object level.

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Enschede, May 2014,

Léon Kerver Bsc.

INHOUD

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1.0 INTRODUCTION

Since the beginning of the financial crisis in 2008 most of the financial markets are under a microscope. Many scholars and researchers have been trying to identify the causes of the financial crisis, as well as they tried to predict the “end moment” of the crisis. Major companies, banks and several different institutions are seen as the “victim” of the recent financial crisis. Some big firms and banks went bankrupt, or had to rely on government support, house prices dropped to historically low prices and even some pension funds and insurance companies could not met the reserve standards and were forced to raise their contributions and lowered their payments. The financial crisis had a severe impact on not only the involved firms, but also on society in general. Firms are more and more under a microscope of the society in general, as well as their own shareholders and the governmental institutions. Therefore there is an increasing focus on explaining en justifying fluctuations in the results of firms, as well as the financial institutions like banks, insurance companies and pension funds.

1.1 BPF BOUW AND BOUWINVEST REIM

bpfBOUW is a Dutch pension funds for the employees and employers in the Dutch construction business. More than 200.000 employees and employers are contributing to the bpfBOUW pension funds each month in order to build up a pension provision for their future. Almost 217.000 retired employees are currently provided with their rightful pension each month. The provided contribution to the bpfBOUW pension funds by the current working society is not enough to cover all the pension payments at this moment, and also not enough to cover the pension payments in the future. Therefore the bpfBOUW pension fund is investing a part of the capital provided by the participants in the pension fund. In order to maximize the profit, at a relative low risk rate, the bpfBOUW pension fund has divided their investments over several investment assets. At this moment about 20% of the capital of the bpfBOUW pension fund is invested into real estate.

The investments in real estate by the bpfBOUW pension funds are divided over three different Real Estate Investment Funds:

- Dutch Institutional Residential Fund NV
- Dutch Institutional Retail Fund NV
- Dutch Institutional Office Fund NV

These Real Estate Investment Funds are management by a management company Bouwinvest REIM, which is also a 100% owned by the bpfBOUW pension fund. Bouwinvest Real Estate Investment Management (REIM) is a specialized asset management company for institutional investors. The total assets under management by Bouwinvest REIM at this moment is approximately 5,6 billion Euro.

As the fund manager of the three real estate investment funds, Bouwinvest REIM is accountable for the daily operation of the funds. The responsibilities of Bouwinvest REIM, on behalf of the Real Estate Investment Funds, include:

- The purchase of Real Estate objects
- The disposition of Real Estate objects
- The exploitation of Real Estate objects
- The maintenance of Real Estate objects
- The administration of the Real Estate Investment Funds

Based on the above presented responsibilities of Bouwinvest REIM, and the management contract with the Real Estate Investment Funds, the Real Estate Investment Management (REIM) company is also responsible, and accountable, for the returns generated by the Real Estate Investment Funds.

1.2 RESEARCH GOAL

Bouwinvest REIM as management company of the Real Estate Investments Funds is responsible for the generated return of the three investment funds. The aim of Bouwinvest REIM is that the Real Estate Investment Funds will generate a stable and sufficient return throughout the time. The total realized returns of the funds are however fluctuating, as can be seen in Graph 11, Graph 12 and Graph 13 presented in 8.1 Appendix I: Returns of the Real Estate Investment Funds.

The total returns of the investment funds are based on the direct return and the indirect return on the investment properties. The direct return of a Real Estate Investment Fund is based on the exploitation results of the real estate objects in the fund's portfolio.

The indirect return of a Real Estate Investment Fund is based on the valuation of the real estate objects which are in the portfolio of the fund. This means that when an real estate object is valued at a lower price than the quartile before, it will result in a negative indirect return on the investment made in the real estate object.

Based on the graphs presented in 8.1 Appendix I: Returns of the Real Estate Investment Funds it can be seen that the Direct Return on the investment properties remains relatively stable throughout time. The fluctuations in the Total Return on the investment properties is therefore mainly caused by fluctuations the indirect returns of the Real Estate Investment Funds.

The main determinant of the Indirect Return of a Real Estate investment Funds is the valuation of the real estate objects which are in the portfolio of the Fund. The valuation of the real estate objects is done every quartile for all the real estate object in the portfolio, and is carried out by external appraisers. The indirect return of a Real Estate Investment Funds is therefore a direct result of the valuations made by the external appraisers. A fluctuation in the value of the real estate object that are in the portfolio of the Real Estate Investment Fund, will there lead to a fluctuation of the indirect return of the fund.

Due to regulation Bouwinvest REIM have to work with external appraisers for the valuation of the real estate objects. Regulation also prescribes that every three year, the real estate object have to be valued by a different appraiser than the years before. This results in a circulation of appraisers every three year for all the real estate objects in the three Real Estate Investment Funds that are managed by Bouwinvest REIM.

The Business- and Corporate Controllers at Bouwinvest REIM, as well as the management of Bouwinvest REIM, have the presumption that the circulation of appraisers is related with a significant depreciation of the real estate objects. According to their opinion *"….when a real estate object is switched from appraiser, it will be depreciated".* Because the fluctuation in the indirect return of a Real Estate investment Funds is the direct result of a fluctuation in the valuation the real estate object, there is the need to research the presumed effect of an appraiser switch on the valuation of real estate objects. Also the current scientific literature provides no answer to the question if there is indeed a significant effect when a real estate object is valued by a different appraiser throughout time.

Therefore the research goal of this master thesis is to investigate the influence of an appraiser switch on the valuation of Dutch real estate. This research goal was formulated as such, in order to contribute to the existing scientific research on real estate valuation, as well as in order to provide a useful insight for Bouwinvest REIM on the presumed effect.

1.3 RESEARCH QUESTION

Based on the formulated research goal, to investigate the influence of an appraiser switch on the valuation of Dutch real estate, the following main research question was formulated:

"What is the effect of an appraiser switch on the valuation of Dutch Real Estate?"

Based on the presumption of the Corporate and Business controllers at Bouwinvest REIM there is expected to be a significant effect of an appraiser switch on the valuation of Dutch real estate objects.

The research strategy that will be used in order to answer the formulated research questions is presented in the next section.

1.4 RESEARCH STRATEGY

In order to structure both the research and the presentation of the research in this paper, a research strategy is developed. This research strategy is aimed to provide an answer to the research question, which is in line with the research goal of this master thesis. A brief overview of the research strategy is presented below, which is based on similar scientific research in the research field performed.

The first step in this research is to examine the process of valuation by appraisers and constructing a theoretical framework on real estate valuation. This is done by researching :

- Existing scientific literature and research
- The real estate valuation method used by the appraisers
- The calculation model for real estate valuation of Bouwinvest
- Empirical literature and research on real estate valuation

The aim of this theoretical framework is to research the valuation method used by the appraisers and gain insight into the parameters that might have an influence on the valuation or on the presumed effect of an appraiser switch. Based on the constructed theoretical framework, hypothesis will be formed in order to examine the effect of an appraiser switch on the valuation of Dutch real estate.

The second step involves selecting the appropriate methodology in order to test the formulated hypothesis. The methodology selection, as well as a realistic plan for data collection will be the foundation for the eventual testing of the hypothesis in a scientific valid manner.

When the data is collected the descriptive statistics of data will be analysed in order to detect and eliminate excessive deviations in the data set. Several statistical methods of testing the formulated hypothesis will be used in order to draw scientifically significant conclusions, based on the results of the statistical tests.

The conclusions will be discussed in the light of the constructed framework, in order to answer the research questions. Based on the discussed conclusions, the last part of the research will consist of recommendations for further research on this subject.

2.0 THEORETICAL FRAMEWORK

In order to research the variances in the value of Dutch Real Estate, the definition of real estate value must be defined. Multiple journal articles, literature and valuation standards are researched and explained to determine the definition of real estate value for this research.

2.1 REAL ESTATE VALUE

In order to research the variances in the value of Dutch Real Estate, the definition, as well as the underlying assumptions, of real estate value must be defined. Multiple journal articles, literature and valuation standards are researched and explained to determine the definition of real estate value for this research.

2.1.1 Literature on Real Estate Value

The value of a real estate object will not always be the same for every organization or natural person according to French and Gabrielli (2005). *"Each possible bid for the property will be determined by the bidders particular circumstances."* (French & Gabrielli, 2005). Every organization or natural person will "*carry out a 'calculation of worth', which is the individual bidder's assessment of worth to them."* (French & Gabrielli, 2005). The value of the real estate object "*will be dependent upon the particular bidders assessment of the property and their own forecasts of the benefits of ownership."* (French & Gabrielli, 2005). Also not every real estate object is valued at the same price. *"There is a certain price for any asset in the transaction because of its unique characteristics"* (Wang, 2011).

When determining the value of a real estate object, *"the valuation attempts to identify and estimate all the benefits and liabilities of ownership and, relative to the current market, assess the highest and best bid for the property….. As with all markets, a property will be offered to the market and individuals will bid for its purchase. The property will trade at the highest bid, not at the level where there are most bids The valuation attempts to identify this figure; this is an estimate of price."* (French & Gabrielli, 2005)

According to Wang (2011) the value determination of real estate is "*an estimation of real estate in the state of materialization on the monetary value. Real estate prices are not given, but the value of the objective reality of real estate activities are correctly reflected through the assessment. It is a reflection of the economic value of real estate which represents the market in general.* "(Wang, 2011)

The value of a real estate object is therefore defined by French and Gabrielli (2005) and Wang (2011) as the best estimate of the price of a real estate object on the market on the date of the valuation.

2.1.2 Standards on Real Estate Value

The Royal Institution of Chartered Surveyors (RICS) publishes every year the so called "Red Book'. This Red Book contains the international valuation standards for real estate valuation. The purpose of the RICS standards is *"to provide users of valuation services with confidence that a valuation provided by an RICS qualified valuer has been undertaken in compliance with the highest professional standards."* (Royal Institution of Chartered Surveyors, 2012). The RCIS standards also aim that if the standards are followed, the *"…valuation is independent, objective and consistent with internationally recognised standards set by the International Valuation Standards Council"* (Royal Institution of Chartered Surveyors, 2012).

According to the RCIS standards, when the value of real estate is determined, one must determine the basis of value that is appropriate for the valuation of the real estate object. The basis of value is defined by the Royal Institution of Chartered Surveyors (2012) as *"a statement of the fundamental measurement*

assumptions of a valuation, and for many common valuation purposes these standards stipulate the basis (or bases) of value that is appropriate". According to the RCIS standards there are four bases of value for the determination of real estate value:

- market value
- market rent
- worth (investment value)
- fair value

These bases for valuation are also recognized in the IVS framework constructed by the International Valuation Standards Council (2011). In the IVS framework value is defined as not to be fact but an opinion of either:

- the most probable price to be paid for an asset in an exchange, or
- the economic benefits of owning an asset.

According to the IVS framework the bases of value, as also described in the RCIS standards, can fall into one off three principal categories:

a) *The first is to indicate the most probable price that would be achieved in a hypothetical exchange in a free and open market.* ***Market value*** *as defined in these standards falls into this category.*
b) *The second is to indicate the benefits that a person or an entity enjoys from ownership of an asset. The value is specific to that person or entity, and may have no relevance to market participants in general.* ***Investment value*** *and special value as defined in these standards fall into this category.*
c) *The third is to indicate the price that would be reasonably agreed between two specific parties for the exchange of an asset. Although the parties may be unconnected and negotiating at arm's length, the asset is not necessarily exposed in the market and the price agreed may be one that reflects the specific advantages or disadvantages of ownership to the parties involved rather than the market at large.* ***Fair value*** *as defined in these standards falls into this.*

According to the annual report of the Dutch Institutional Residential Fund NV, which is managed by Bouwinvest REIM, the assets (the real estate) are valued at Fair Value:

"Investment property is measured initially at its cost, including related transaction costs, such as advisory costs, notary costs, transfer taxes and borrowing costs…… After initial recognition, investment property is stated at ***fair value****. Fair value is based on active market prices, adjusted, if necessary, for any difference in the nature, location or condition of the specific asset."* (Bouwinvest REIM, 2013a)

This would imply that the base of value used for the valuation of the real estate by Bouwinvest REIM, is the fair value base as described above. However, according to the International Valuation Standards Counsil (2011), the fair value base as described in the IVS framework is not the same as the IFRS standards on fair value, which is used by Bouwinvest REIM for the annual reports of the Dutch Institutional Residential Fund NV. The International Valuation Standard Council "*considers that the definitions of fair value in IFRS are generally consistent with market value"* (International Valuation Standards Counsil, 2011).

Therefore we can assume that the value of real estate as determined by Bouwinvest REIM for the Dutch Institutional Residential Fund NV, is based on the Market Value base as defined by the International Valuation Standards Counsil (2011) and the Royal Institution of Chartered Surveyors (2012). The base of this valuation used by Bouwinvest REIM is in accordance with both the above mentioned standards.

2.1.3 Market Value of Real Estate

According to the RCIS standards, the valuations of real estate objects based on market value need to adopt the definition and the conceptual framework as settled by the International Valuation Standards Council (IVSC):

*"**The estimated amount** for which an asset or liability should exchange **on the valuation date** between **a willing buyer and a willing seller** in an **arm's length transaction** after proper marketing and where the parties had each acted **knowledgeably, prudently and without compulsion**." (Royal Institution of Chartered Surveyors, 2012)*

This definition of market value is in line with "The Uniform Standards of Professional Appraisal Practice" (USPAP), published by the Appraisal Standards Board in the United States. In the USPAP standard, market value is defined as:

"The most probable price that property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions, whereby:

1. *buyer and seller are typically motivated,*
2. *both parties are well informed or well advised and acting in what they consider their best interests,*
3. *a reasonable time is allowed for exposure in the open market,*
4. *payment is made in terms of cash in US dollars or in terms of financial arrangements comparable thereto and*
5. *The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. " (Appraisal Standards Board, 2012-2013)*

These definitions of Market Value consist of several elements. These elements are in line with the conceptual framework in the IVS as described by The International Valuation Standards Council. The IVSC prescribes in the IVS framework how these elements of the definition of market value should be interpreted. The main points of how the elements of the Market Value definition should be interpreted according to the IVSC are mentioned below, the complete description is attached in 8.2 Appendix II: Conceptual framework on Market Value.

The main points on the interpretation of the definition of Market Value by the IVSC are:

- "The estimated amount" refers to a price expressed in terms of money payable for the asset in an arm's length market transaction
- Market Value is the most probable price on the valuation date
- It is the best price obtainable by the seller and the most advantageous price reasonably obtainable by the seller.
- "An asset should exchange" refers to the fact that the value of an asset is an estimated amount and not a predetermined price or an actual sales price.
- The valuation amount will reflect the actual market state and circumstances as of the effective valuation date.
- The assumed buyer is one who purchases in the reality of the current market and would not pay a higher price than the market requires.
- The seller is neither an over eager nor a forced seller who is prepared to sell at any price. The "willing seller" should be motivated to sell the asset at market terms for the best price attainable.
- "In an arm's length transaction" is a transaction between parties who do not have a particular relationship.

- The market value transaction is presumed to be between unrelated parties, acting independently.

Additional to this prescription on how to interpret the definition, the IVS framework describes two more important elements regarding the definition and interpretation of the concept market value:

1. The concept of Market Value assumes a price witch is negotiated in an **open** and **competitive market**.
2. The Market Value of an asset will reflect its **highest and best use**. To establish whether a use is possible, regard will be had to what would be considered reasonable by market participants.

When determining the Market Value of Real estate, the definition of Market value, as well as the underlying principles and the interpretation of these principles, should be considered and followed according to the International Valuation Standards Counsil (2011), the Appraisal Standards Board (2012-2013) and the Royal Institution of Chartered Surveyors (2012).

2.1.4 Definition of Real Estate Value

In order to research the variances in real estate value, as a result of an appraiser switch, the definition of real estate should be defined. Based on the researched relevant literature and the standards on (real estate) valuation, real estate value could be defined as the Market Value of a real estate object. In the context of the IFRS framework, used by Bouwinvest REIM for the annual reports (Bouwinvest REIM, 2013a), the real estate value could be assumed to be comparable with the Fair Value of a real estate object.

For determining the market value of a real estate object the definition of Market value, as well as the underlying principles and the interpretation of these principles as defined by the IVSC, the ASB and the RICS, should be considered and followed.

Valuation is often said to be "an art not a science" . This however *"relates to the techniques employed to calculate value not to the underlying concept itself"* (French & Gabrielli, 2004). However, different circumstances or interpretations by appraisers on the underlying principles of the concept of market value and the definition of market value could lead to a variance in the value of a real estate object.

For the purpose of this research however, is assumed that most of the variance in the value of real estate object is caused by the methodology used by appraisers. This is in line with the last comment of French and Gabrielli (2004) on the scientific level of real estate valuation. Therefore, in this research, the underlying concept of real estate valuation, the definition of Market value, as well as the underlying principles and the interpretation of these principles as defined by the IVSC, the ASB and the RICS, are considered not to be influential on the real estate valuations, and the variance in real estate valuations, at Bouwinvest REIM.

2.2 REAL ESTATE VALUATION METHODS

The determination of the value of a real estate object, or real estate objects, if often carried out by an appraiser. There are several approaches and methods available to the appraiser for calculating/determining/estimating the value of a real estate object. The aim of this section twofold. The first aim of this section is to provide an overview of the valuation approaches and research the principles that underlie these approaches. The second aim of this section is to research the valuation method that is prescribed to the appraisers by Bouwinvest REIM for the valuation of the real estate of the Dutch Institutional Residential Fund NV. This research will focus on the principles of the method itself, as well as on the calculating that is used in this method and the identification of the parameters used in the calculation.

2.2.1 Valuation Approaches

The evaluation of the underlying properties is a key performance measure for property portfolios and this monitoring is usually based on individual property valuations (Boyd, 2003). The market value of an individual real estate object can be determined, or estimated, through various valuation approaches. In the relevant scientific literature on real estate valuation, as well as in several valuation standards, these different approaches are prescribed and explained. The aim of this section is to provide an overview of the different valuation approaches, based on the literature and the valuation standards.

Guo (2010) distinguish three approaches which are commonly used for property and land valuation; the cost approach, the sales comparison approach and the income approach. The **cost approach** estimates the value of a real estate object by *"…summing the land value and the depreciated value of any improvements"* (Guo, 2010) . The **sales comparison approach** estimates the value of a real estate by comparing *"…the characteristics of a subject property with those of comparable properties sold in similar transactions"* (Guo, 2010). The third approach is the **income approach**. One of the models used to estimate the value of a real estate object through the income approach is the **Discounted Cash Flow model**. The discounted cash flow model *"…is one of income approaches were appraisers determine the most probable use of the land, appraise the property according to the use, and then discount the future value, such as rental rate for condominiums and capital gain in the real estate market, to the present"* (Guo, 2010).

Another method to estimate the value of a real estate object, based on the income approach, is the **capitalisation of income method** according to Myers, Reed, and Robinson (2007). The *"…market value can be determined through various valuation methods; the most commonly used for office buildings are the capitalisation of income and the discounted cash flow approaches*" (Myers et al., 2007). Besides the income approach, Myers et al. (2007) identify four other valuation approaches for the valuation of real estate:

1. Comparison Approach;
2. Contractor's cost, or summation approach;
3. Residual method or developer's test;
4. Profits method; and
5. Income or investment approach, including direct capitalisation and discounted cash flow analysis.

According to French and Gabrielli (2005), *"The purpose of any Valuation is to determine the present value of a future cash flow".* This approach to valuation of real estate objects is in line with the described income approach by Guo (2010) and Myers et al. (2007). French and Gabrielli (2005) state that *"The value of an investment is the discounted value of all estimated future liabilities and benefits. Value is therefore based on future forecasts, which can be modelled either implicitly or explicitly"*. French and Gabrielli (2005) distinguish two different models, implicitly and explicitly, to model the future forecasts in order to determine the value of a real estate object. Both models are explained on the next page.

Implicit Valuation Models

When an implicit model is used to forecast future cashflows, the capitalisation model is used according to French and Gabrielli (2005). This model is also distinguished by Myers et al. (2007). *"In using the traditional implicit capitalisation model, the valuer is deriving the appropriate all risks yield (initial yield) from market evidence of other property transactions"* (French & Gabrielli, 2005). Any variation or change in the outcome of the implicit model is due to adjustments in the risk yields, which "…*reflect differences between comparables and the subject property, and are made subjectively"* (French & Gabrielli, 2005).

The outcome of the implicit model "…*has to reflect a multitude of factors from return on capital, security of income, ease and cost of selling, management costs, depreciation and rental growth*" (French & Gabrielli, 2005). Therefore the outcome of the implicit model is only reliable when there are sufficient sales transactions on similar properties in the market. Only then it is possible to "…*build up a picture of market sentiment to be reflected in the choice of an appropriate all risks yield for the subject property*" (French & Gabrielli, 2005).

Explicit Valuation Models

The most common explicit valuation model is the Discounted Cash Flow model. The Discounted Cash Flow model, as applied to property, has been developed in response to the perceived shortcomings of the all risks yield method (the implicit valuation model), which, although a useful method of analysis and pricing, fails to explain the implicit assumptions contained within it (French & Gabrielli, 2005). The basis of a Discounted Cash Flow valuation is that *"…the value of the property investment will be equal to the Gross Present Value (GPV) of the projected rental income flow, at the market's required rate of return (discount rate)"* (French & Gabrielli, 2005).

According to French and Gabrielli (2005), one of the advantages of the Discounted Cash Flow model, compared to the implicit valuation, is that it makes the valuation more transparent. The Discounted Cash Flow technique is based on *"…explicit the assumptions (market expectations) on future rental growth, holding period, depreciation, refurbishment, redevelopment, costs of management and transfer, taxation and financing arrangements"* (French & Gabrielli, 2005). Therefore, by making these assumptions explicit, it will allow questioning the certainty of each of the input variables.

The explicit Discounted Cash Flow model, as well as the implicit capitalisation model, will produce both a capital value. However, the Discounted Cash Flow model *"…incorporates more variables and, as such, in terms of uncertainty this increases the need for analysis of the inputs"* (French & Gabrielli, 2005). The main advantage of using an explicit Discounted Cash Flow model to analyse the mentioned uncertainty is that it *"…disaggregate the input variables and allows the valuer to question the inputs on an individual basis by expanding or contracting the range and varying the skewness according to market conditions and their professional judgement"* (French & Gabrielli, 2005).

Wang (2011) also mentions the importance of the Discounted Cash Flow model for real estate valuation; *"Real estate investors who buy real estate are not for their own enjoyment, but for the return on investment. The investment capital is the money paid to purchase real estate and the investment gains in the future is the real estate net income generated by capital. Income approach, 'The Discounted Cash Flow model ', is to assess the real estate prices from the relation of real estate value and investment income"* (Wang, 2011).

According to Wang (2011) the Discounted Cash Flow model is *"…one of the most important methods to assess real estate prices"* and *"…is widely used in the fields of real estate and land assessment in domestic and foreign country"* (Wang, 2011).

Not only the scientific literature on real estate valuation distinguishes several different valuation approaches. Also the International Valuation Standards Counsil (2011) distinguishes three different valuation approaches in the International Valuation Standard framework; the **Market Approach**, the **Income Approach** and the **Cost Approach**. According to the International Valuation Standards Counsil (2011), *"one or more valuation approaches may be used in order to arrive at the valuation defined by the appropriate basis of value…"* . The three approaches described and defined in the International Valuation Standard Framework are *"…the main approaches used in valuation"* and are all *"…based on the economic principles of price equilibrium, anticipation of benefits or substitution"* (International Valuation Standards Counsil, 2011).

Market approach

The International Valuation Standards Counsil (2011) defined the market approach of valuation as *"…an indication of value by comparing the subject asset with identical or similar assets for which price information is available"*. This definition is in line with the **comparison approach** as defined by Myers et al. (2007) and the **sales comparison approach** as defined by Guo (2010).

The first step in the market approach is *"…to consider the prices for transactions of identical or similar assets that have occurred recently in the market"* (International Valuation Standards Counsil, 2011). If only a few recent transactions have occurred in the market, it may also be appropriate, according to the International Valuation Standards Counsil (2011), to *"…consider the prices of identical or similar assets that are listed or offered for sale provided the relevance of this information is clearly established and critically analysed"*. It may also be necessary to *"…adjust the price information from other transactions to reflect any differences in the terms of the actual transaction and the basis of value and any assumptions to be adopted in the valuation being undertaken"* (International Valuation Standards Counsil, 2011). Another influential factor in the market approach, pointed out by The International Valuation Standards Counsil (2011), is that there may also be *"…differences in the legal, economic or physical characteristics of the assets in other transactions and the asset being valued".*

Cost approach

According to the International Valuation Standards Counsil (2011), the cost approach *"provides an indication of value using the economic principle that a buyer will pay no more for an asset than the cost to obtain an asset of equal utility, whether by purchase or by construction"*. This is in line with the definition of the **Contractor's Cost approach**, or **summation approach** as defined by Myers et al. (2007) and the **Cost approach** as defined by Guo (2010).

The cost approach is based on the principle *"that the price that a buyer in the market would pay for the asset being valued would, unless undue time, inconvenience, risk or other factors are involved, be not more than the cost to purchase or construct an equivalent asset"* International Valuation Standards Counsil (2011). An influential factor that was pointed out by the International Valuation Standards Counsil (2011) is that sometimes *"the asset being valued will be less attractive than the alternative that could be purchased or constructed because of age or obsolescence"*. Where this is the case, the International Valuation Standards Counsil (2011) prescribes that *"adjustments may need to be made to the cost of the alternative asset depending on the required basis of value"*.

Income approach

The income approach is defined by the International Valuation Standards Counsil (2011) as *"…an indication of value by converting future cash flows to a single current capital value"*. This definition is in line with the **income or investment approach** as defined by Myers et al. (2007), the **implicit valuation model** as defined by French and Gabrielli (2005) and the **Discounted Cash Flow model** (explicit valuation model) as defined by French and Gabrielli (2005), and by Wang (2011).

According to the International Valuation Standards Counsil (2011), the income approach *"…considers the income that an asset will generate over its useful life and indicates value through a capitalisation process."* The capitalisation process *"…involves the conversion of income into a capital sum through the application of an appropriate discount rate"* (International Valuation Standards Counsil, 2011). The income stream could be derived *"…under a contract or contracts, or be non-contractual, eg the anticipated profit generated from either the use of or holding of the asset"* (International Valuation Standards Counsil, 2011).

The International Valuation Standards Counsil (2011) distinguished three models for valuation that fall under the defined income approach, which are in line with the model distinctions made by Myers et al. (2007) and French and Gabrielli (2005);

- The Income Capitalisation model, *"where an all-risks or overall capitalisation rate is applied to a representative single period income".*
- The Discounted Cash Flow model, *"where a discount rate is applied to a series of cash flows for future periods to discount them to a present value"*.
- Various Option Pricing models.

The income approach, as defined by International Valuation Standards Counsil (2011), Myers et al. (2007) and French and Gabrielli (2005), is also prescribed by the Investment Property Databank (IPD) in their valuation standards (IPD BeNeLux, 2013). The IPD is a provider of real estate performance and risk analysis and the data provided by the IPD is also used by De Nederlandsche Bank for the parameter determination for the Minimum Capital Requirements for pension funds and insurance companies (De Nederlansche Bank, 2006) . Most Real Estate Investment Management companies are registered at the IPD and therefore follow the standards as set by the IPD for real estate valuation. Bouwinvest REIM is also a registered company at the IPD and quarterly provides data on their real estate performance to the IPD.

For the valuation of the real estate portfolio of the Dutch Institutional Residential Fund NV, Bouwinvest REIM prescribes to the appraisers the use of the income approach. Within the income approach, several models are distinguished by the literature and the valuation standards. Bouwinvest REIM prescribes to the appraisers in their valuation manual and valuation agreements with appraisers, that the Discounted Cash Flow model must be used for all the valuations of the real estate of the Dutch Institutional Residential Fund NV (Bouwinvest REIM, 2013b).

For the purpose of this research is therefore assumed that the valuations, and the variance in the valuations at Bouwinvest REIM and the Dutch Institutional Residential Fund NV, are not influenced by the existence of the different valuation approaches as described above. All the real estate objects of the Dutch Institutional Residential Fund NV are valued through the income approach, by using the Discounted Cash Flow model, so therefore the different valuation approaches, and the difference between the different valuation approaches, are considered to be not influential for this research. In the next section the Discounted Cash Flow model, as well as the calculation and the parameters of the model will be researched more in depth.

2.2.2 Discounted Cash Flow Method

Before the days of hand held calculators the principles of discounted cash flow method were known and used (Boyd, 2003). However, "…*the early use of DCF exercises for valuation purposes, particularly in the 1960's and 1970's, was often highly criticised and lacked credibility, particularly in legal cases"* (Boyd, 2003). The reason for the poor reputation was, according to Boyd (2003), due to unprofessional use by appraiser who did not fully understand the process. The growing sophistication of the financial markets in the 1990's saw the revival of the analysis of cash flows using the discounted cash flow method as a supplementary approach to the capitalisation approach (Boyd, 2003). The discounted cash flow method *"…is no longer a possible alternative but an essential approach for major property valuations"* (Boyd, 2003).

Nowadays the market demands, according to Boyd (2003), that cash flow analysis is used for major property valuations. This statement is confirmed by Myers et al. (2007), which state that nowadays *"…the discounted cash flow approach is a common investment analysis tool to determine the value of any income producing investment"*. However, the discounted cash flow methods used by appraisers are *"far from consistent"* (Boyd, 2003). Legal case history about valuation, as well as public valuation documents provide *"continuous evidence of incompetent usage of the DCF approach"* (Boyd, 2003). Another remark about the use of the discounted cash flow method by appraisers is placed by French and Gabrielli (2005), which state that *"..one of the paramount concerns of the profession is the need to ensure that valuations are presented to a client in a clear and unambiguous manner"*.

The discounted cash flow method is the projection of cash flow expected from an investment (in particular an income producing building) over a particular period of time (Myers et al., 2007). The discounted cash flow method enables *"the present value of an income producing investment over a period of time to be determined"* (Myers et al., 2007). The rationale of the discounted cash flow method relies on the theory that *"the present value of an investment that an investor has paid to purchase the investment to receive the future net benefits (monetary) obtained in the future"* (Whipple, 1995). The cash flows over time of the income producing investment are predicted for a particular period, they are then adjusted or discounted for the time value of money over time (Myers et al., 2007).

When the value of a property is analysed, the discounted cash flow method takes into account the major cash flows such as;

- The initial purchase
- The income over the time period (often 10 years)
- Any capital expenditures over the time

And finally the sale of the asset at the end of the period (Myers et al., 2007).

These cash flows are then discounted by a discount rate, which allows for the changing value of money over time. Therefore, calculating the total cash flows over the period enables the Net Present Value of the asset to be determined (Myers et al., 2007). The discounted cash flow method can take into account varying levels of, for example:

- Rental growth
- Inflation
- Operating expenses
- Capital expenditure
- Depreciation

The depth of this technique is extensive and its application to sustainable buildings is potentially the most appropriate, according to Myers et al. (2007). In the next section the discounted cash flow model as applied by Bouwinvest is explained, as well as the underlying parameters of the discounted cash flow model.

2.2.3 Discounted Cash Flow Model

For the valuation of the real estate object in the portfolio of the Dutch Institutional Residential Fund NV, Bouwinvest REIM developed a valuation model, Dream III, in conjunction with Reasult consultancy. This valuation model is based on the discounted cash flow method as described in the previous section, and is required to be used by the external appraisers for the valuation of real estate objects in the portfolio of the Dutch Institutional Residential Fund NV. This requirement is part of the valuation agreement between the external appraisers and Bouwinvest REIM (Bouwinvest REIM, 2013b). The requirement to use the prescribed model aims to increase transparency in the real estate valuations, as well as it ensures the consistency of the valuations and allows the comparison of the real estate valuations.

The aim of this section is to describe the discounted cash flow model that is prescribed by Bouwinvest REIM to be used by the external appraisers for the valuation of real estate objects in the portfolio of the Dutch Institutional Residential Fund NV. The complete discounted cash flow model is presented in Figure 1, on the next page.

The model is described by starting at the end value of a real estate object as calculated by the appraiser, and describing the followed calculating back into the discounted cash flow calculation. In the figures presented, the blue shapes are defined as outcomes of calculations, were the pink shapes are defined as parameters inputted by the appraiser in the discounted cash flow model.

For the purpose of this research is therefore assumed that all valuations are done by the use of the described discounted cash flow model, which and is required by Bouwinvest REIM to be used by the external appraisers for the valuation of real estate objects in the portfolio of the Dutch Institutional Residential Fund NV.

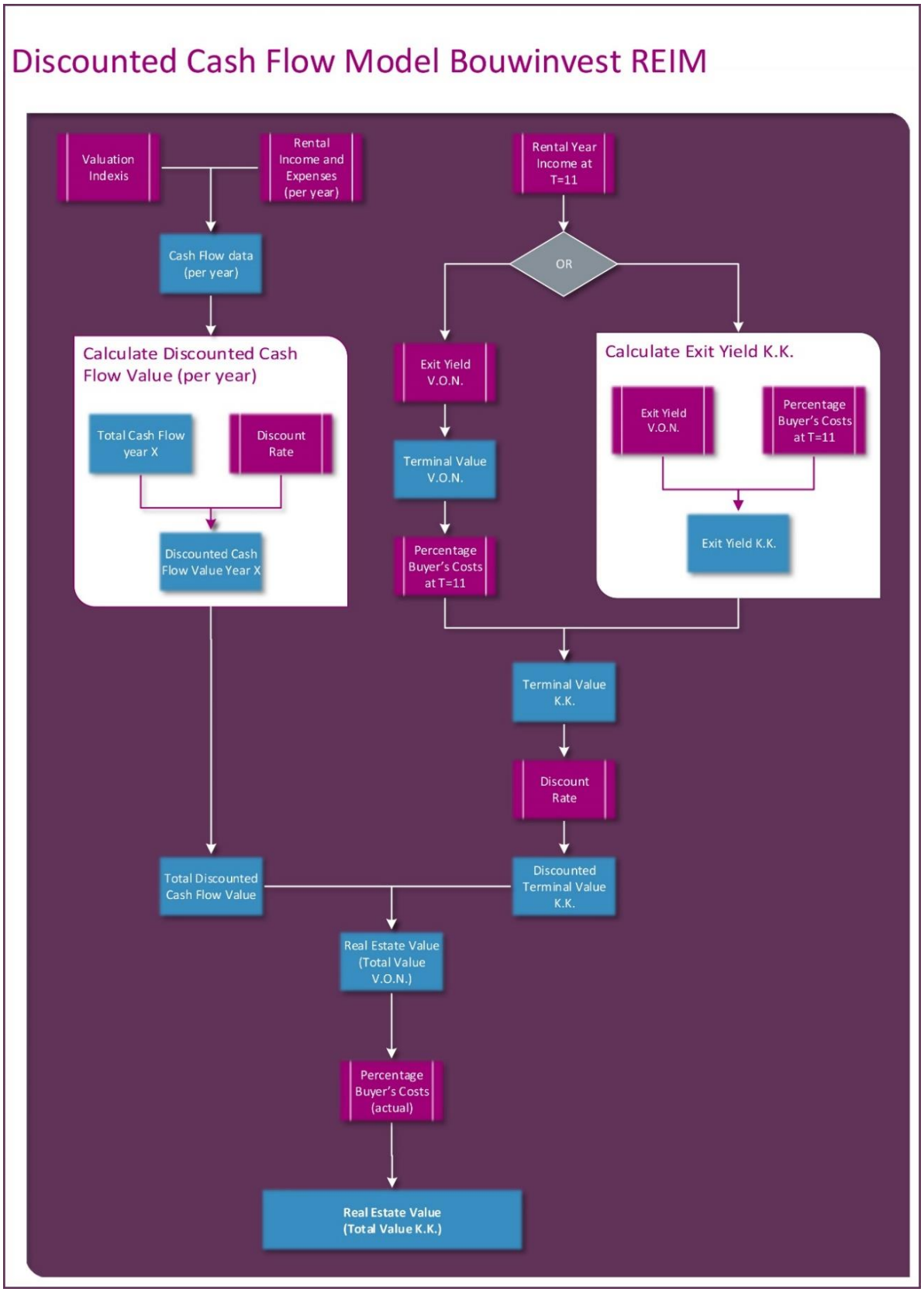


Figure 1 Discounted Cash Flow Model Bouwinvest REIM

Present Real Estate Value

The aim of the real estate object valuations is determine *"…the present value of an income producing investment over a period of time"* (Myers et al., 2007). The present value of a real estate object, which is the final reported value by the appraiser and the book value for Bouwinvest REIM, is defined as the "Real Estate Value k.k.", were "k.k." stands for "kosten koper" in Dutch, which means that the (presumed) buyer of the real estate object is responsible for the additional costs concerning the (presumed) transaction. These additional costs consist for example out of transfer tax and notary fees, and are referred to as "Buyers Costs".

To calculate the "Real Estate Value k.k.", the costs corning the (presumed) transaction are subtracted from the "Real Estate Value v.o.n."., were "v.o.n." stands for "vrij op naam" in Dutch and is the value of the real estate object when the costs concerning the (presumed) transaction are paid by the selling party. The costs concerning the (presumed) transaction, the "Buyers Costs" are calculated by taking an (by the appraiser estimated) percentage from the Real Estate Value v.o.n.". This leads to the following formula's and casual relations, which are presented below in Figure 2:

$$\boldsymbol{Real\ Estate\ Value\ k.k.} = Real\ Estate\ Value\ v.o.n. - Buyers\ Costs$$
$$\boldsymbol{Buyers\ Costs} = Estimated\ \%\ Buyers\ Costs * Real\ Estate\ Value\ v.o.n.$$

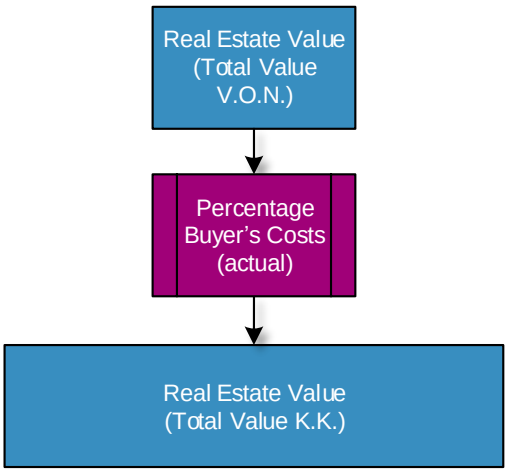


Figure 2 Calculation of the "Real Estate Value k.k."

Real Estate Value v.o.n.

The “real estate value v.o.n.” is the basis for the eventual value calculation of a real estate object, the “real estate value k.k.”. The discounted cash flow method is based on the two value calculations, the value of the future cash flows and the terminal value of the real estate object, which together are the “real estate value v.o.n.”. These two values are both already discounted, by the appraiser determined discount rate, for the time value of money over time.

Therefore the “real estate value v.o.n.” is the sum of the present value of the future cash flows a real estate object generates and the present value of the terminal value of the real estate object. The present value of the future cash flows is referred to as the “Total Discounted Cash Flow Value”. The present value of the terminal value is referred to as the “Discounted Terminal Value k.k.”, were “k.k.” stands again for “kosten koper” in Dutch, which means that the (presumed) buyer of the real estate object is responsible for the additional costs concerning the (presumed) terminal transaction. This leads to the following formula’s and casual relations, which are presented below in Figure 3:

$$\boldsymbol{Real\ Estate\ Value\ v.o.n.} = Total\ Discounted\ Cash\ Flow\ Value\ +\ Discounted\ Terminal\ Value\ k.k.$$

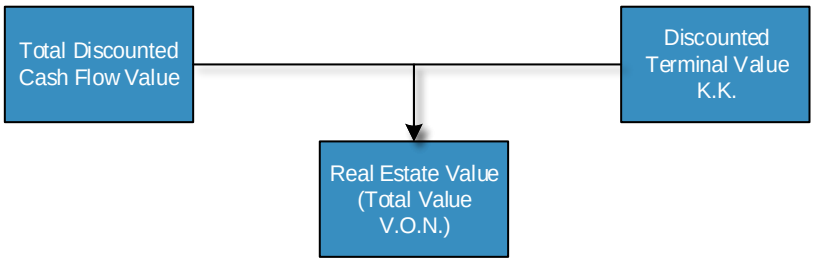


Figure 3 Calculation of the “Real Estate Value v.o.n.”

Valuation Scenarios

According to the regulations in the International Valuation Framework as presented by the International Valuation Standards Counsil (2011), *“the Market Value of an asset will reflect its **highest and best use**”*. In order to determine the highest and best use of a real estate object, the appraiser should determine *“what would be considered reasonable by market participants”* (International Valuation Standards Counsil, 2011).

In the case of real estate objects, which generally consist of multiple individual houses in the case of the Dutch Institutional Residential Fund NV, there are two possible scenarios that an appraiser should consider when valuation a real estate object. The first scenario is the “Uitpond” scenario, which means that during the time of the discounted cash flow model period, every year a part of the individual houses of the real estate object are sold. A graphical representation of this scenario is presented in 8.3 Appendix III: Discounted Cash Flow Model Scenarios, in Figure 9. The other possible scenario is the “Exploitatie” scenario, which means that all the individual houses remain part of the real estate object, all the houses are exploited throughout the discounted cash flow model period and no individual houses are sold during the discounted cash flow model period. A graphical representation of this scenario is presented in 8.3 Appendix III: Discounted Cash Flow Model Scenarios, in Figure 10.

The difference between the two scenarios returns in the ratio between the Total Discounted Cash Flow Value and the Discounted Terminal Value. In the “Uitpond” scenario, the cash flow during the discounted cash flow model period will be higher due to sales occur during the discounted cash flow model period, in comparison with the “Exploitatie” scenario. On the other hand, when all the houses remain exploited, as in the “Exploitation” scenario, the terminal value will be higher due to the fact that there are at the end of the discounted cash flow model period more houses still in the real estate object.

Total Discounted Cash Flow Value

The “Total Discounted Cash Flow Value” is sum of the discounted cash flow values per year. Therefore, in order to calculate the “Total Discounted Cash Flow Value”, the discounted cash flow value for each year included in the discounted cash model should be calculated.

The basis of the discounted cash flow value for year x are the rental income in year x and the operating expenses in year x for a real estate object. To calculate the rental income in a year, as well as for calculating the operating expenses in a year, several indexes are used. The indexes include a forecast of, for example, the future occupancy rate, the inflation, the market rent and the rental increase. These indexes are inputted by the appraiser in the valuation model.

Based on the indexes and the actual rent, the operating expenses and rental income are calculated and the net cash flow is determined for year x. This net cash flow is then discounted with a, by the appraiser determined discount rate, for the time value of money over time. This is done for each year that is included in the discounted cash flow model. The sum of these net discounted cash flows is the “Total Discounted Cash Flow Value”.

This leads to the following formula’s and casual relations, which are presented on the next page in Figure 4:

$$\boldsymbol{Total\ Discounted\ Cash\ Flow\ Value} = \sum Net\ Discounted\ Cash\ Flows$$

$$\boldsymbol{Net\ Discounted\ Cash\ Flow\ (in\ year\ X)} = \frac{Rental\ Income - Rental\ Expense}{(1 + Discount\ Rate)^{Time}}$$

In case the “Uitpond” scenario is used by the appraiser in the discounted cash flow model, the revenue of the sale of houses during the discounted cash flow model period is included in the cash flow value. The formula’s used to determine the Total Discounted Cash Flow Value when the “Uitpond” scenario is used, are therefore:

$$\boldsymbol{Total\ Discounted\ Cash\ Flow\ Value} = \sum Net\ Discounted\ Cash\ Flows$$

$$\boldsymbol{Net\ Discounted\ Cash\ Flow\ (in\ year\ X)} = \frac{(Rental\ Income - Rental\ Expense) + Revenue\ from\ sales}{(1 + Discount\ Rate)^{Time}}$$

The casual relations between the parameters in the “Uitpond” scenario are presented on the next page in figure 4.

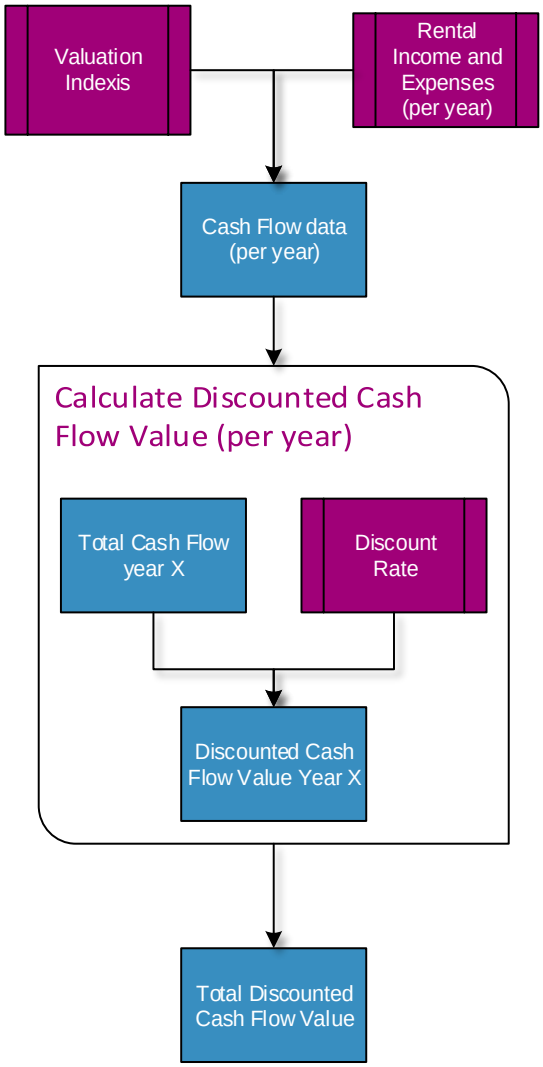


Figure 4 Calculation of the "Total Discounted Cash Flow" in the "Exploitatie" scenario

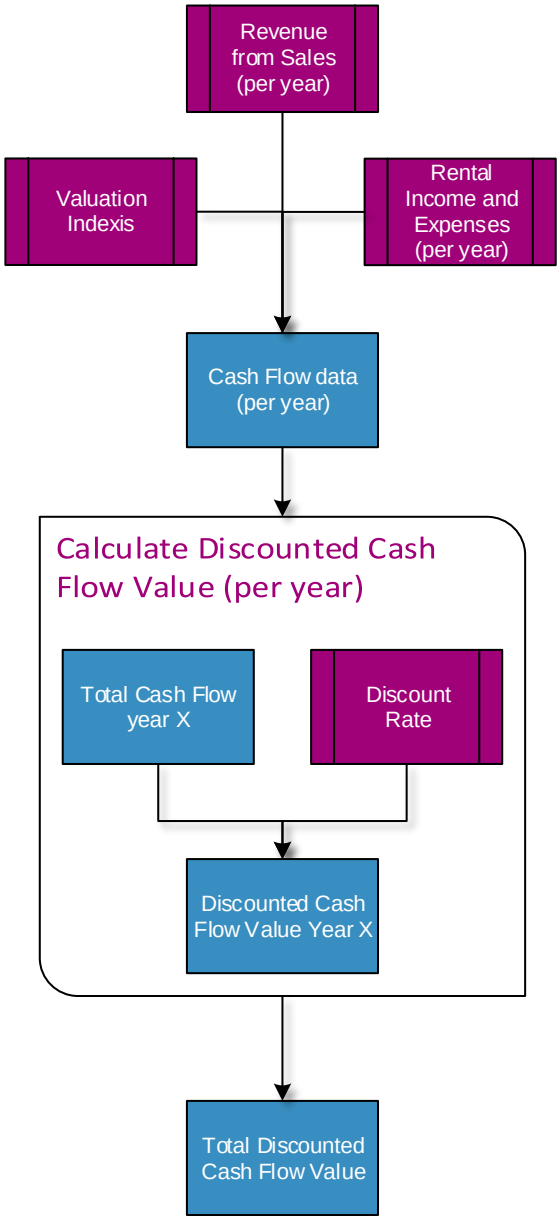


Figure 5 Calculation of the "Total Discounted Cash Flow" in the "Uitpond" scenario

Discounted Terminal Value k.k.

The “Discounted Terminal Value k.k.” is the present value of the terminal value of the real estate object at the end of the discounted cash flow model period. In the case of the “Exploitatie” scenario, the number of houses at the end of the discounted cash flow model period will be the same as in the year that the valuation is done. In the “Uitpond” scenario, there will be less houses at the end of the discounted cash flow model period due to sales throughout the period.

The “Discounted Terminal Value k.k.” is calculated by discounting the “Terminal Value k.k.” . with a, by the appraiser determined discount rate, for the time value of money over time. The formula for the discounting is:

$$Discounted\ Terminal\ Value\ k.k. = \frac{Terminal\ Value\ k.k.}{(1 + Discount\ Rate)^{Time}}$$

The basis of the “Terminal Value k.k.” calculation, is the rental income in the first year after the discounted cash flow model period. In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the rental income in the first year after the discounted cash flow model period will be the rental income in year 11, which is estimated by the appraiser. The “Terminal Value k.k.” can then be calculated in two ways:

- The first way to calculate the “Terminal Value k.k.” is the rental income in the first year after the discounted cash flow model period divided by the “Exit Yield k.k.”. The “Exit Yield k.k.” is calculated by multiplying the “Exit Yield v.o.n.” with the percentage buyers costs at the end of the discounted cash flow model period. The Exit Yield is a parameter which is estimated by the appraiser.

  In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, it is the percentage buyers costs at year 10, the last year of the discounted cash flow model period. This percentage is also estimated by the appraiser for all the years of the discounted cash flow model period. The formula’s for these calculations are:

  $$\boldsymbol{Terminal\ Value\ k.k.} = \frac{Rental\ income\ (at\ t = 11)}{Exit\ Yield\ k.k.}$$

  $$\boldsymbol{Exit\ Yield\ k.k.} = Exit\ Yield\ v.o.n.\ * \left(1 + percentage\ buyers\ costs(at\ t = 10)\right)$$

- The second way to calculate the “Terminal Value k.k.” is to calculate the “Terminal Value v.o.n.” at first and then calculate the “Terminal Value k.k.” by dividing the “Terminal Value v.o.n.” by the percentage buyers costs at the end of the discounted cash flow model period. In order to calculate the “Terminal Value v.o.n.” the rental income in the first year after the discounted cash flow model period divided by the “Exit Yield v.o.n.”. The formula’s for these calculations are:

  $$\boldsymbol{Terminal\ Value\ k.k.} = \frac{Terminal\ Value\ v.o.n.}{\left(1 + Percentage\ buyers\ costs\ (at\ t = 11)\right)}$$

  $$\boldsymbol{Terminal\ Value\ v.o.n.} = \frac{Rental\ income\ (at\ t = 11)}{Exit\ Yield\ v.o.n.}$$

The causal relations between the parameters are graphically presented in Figure 6 on the next page.

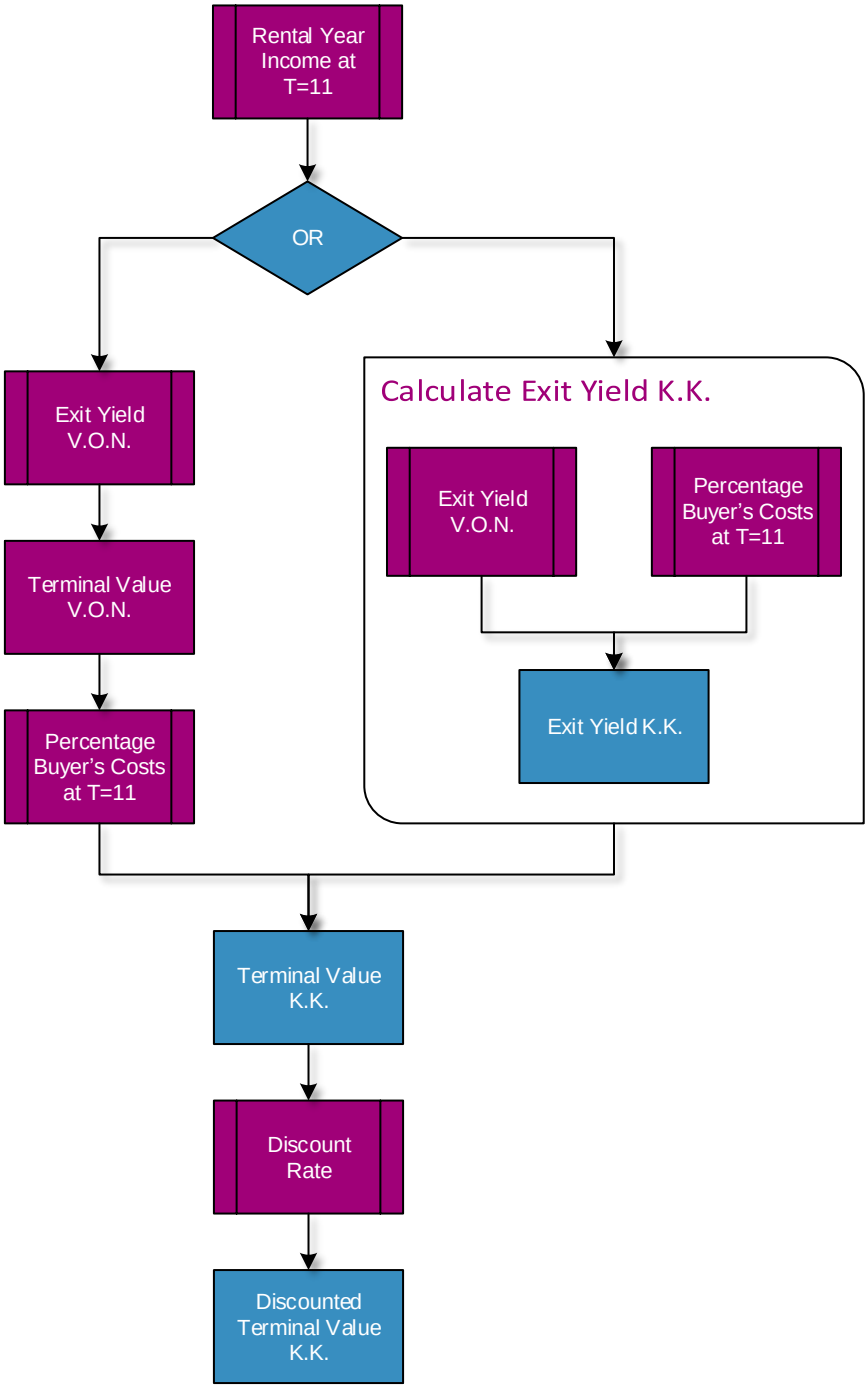


Figure 6 Calculation of the Discounted Terminal Value k.k.

2.3 VARIANCE IN VALUATION

The aim of this section is to research how the main parameters used in the discounted cash flow model, are estimated/determined by an appraiser when a real estate object is valuated. Besides this research, relevant scientific literature is researched in order to investigate other elements that influence the use and outcome of the discounted cash flow model. This is done to examine possible, theoretical explanations for any variance in real estate valuation due to an appraiser switch.

Based on the discounted cash flow model as presented in the previous chapter, several outcomes and main parameters can be identified that are used in the discounted cash flow model. The outcomes are a result of the presented calculations in the previous section, and the main parameters inputted by the appraisers are used in these calculations. A short summary of these outcomes and the main parameters is presented below:

Calculation Outcomes:

- Real Estate Value k.k.
    - Real Estate Value v.o.n.

- Total Discounted Cash Flow Value
    - Discounted Cash Flow Value (per year)
        - Total Cash Flow Value (per year)
            - Cash Flow data (per year)

- Discounted Terminal Value
    - Terminal Value k.k.
        - Terminal Value v.o.n.
        - Exit Yield k.k.

Main parameters:

- Percentage Buyers Costs (at valuation date)
- Percentage Buyers Costs (during the discounted cash flow model period)
- Discount Rate
- Exit Yield v.o.n.
- Rental income and –expenses
- Revenue from Sales (during the discounted cash flow model period)
- Valuation indexes

Bases on the scientific literature and previous scientific research (Boyd, 2003; Wang, 2011) a distinction is made between four main categories of influential factors and parameters in the discounted cash flow model:

- Timing Elements
- Terminal Value Determination
- Net Income Calculation
- Effective Rates

Based on these four categories the influence and establishment of the main elements and parameters in the discounted cash flow model is researched in this section. Also the variance in these main elements and parameters is researched in relation to the variance in valuation and the appraiser switching.

2.3.1 Timing Elements

The discounted cash flow model examines future cash flows over a limited period of time. The cash flows in the discounted cash flow model are located at specific moments in the time period. According to Boyd (2003) there are three components of timing that must be taken into account in the discounted cash flow model:

- The duration of the discounted cash flow model period
- The time intervals in the discounted cash flow model
- The positioning of the cash flows within the time intervals

It is important to select an appropriate duration of the time period for the discounted cash flow model, and apply the chosen time period consistent throughout the use of multiple valuations. Boyd (2003) suggests that the standard duration of a discount cash flow model period should be between 5 and 10 years. In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the duration for the discounted cash flow model period is set at 10 year for all valuations. This duration is incorporated in the developed discounted cash flow model, which external appraisers are obligated to use according to the taxation manual and the taxation agreement (Bouwinvest REIM, 2013b).

The time intervals in the discounted cash flow model are usually annual or monthly periods. According to Boyd (2003);*"…monthly intervals are more accurate than annual intervals because most properties receive regular income on a monthly basis"* . However, as Boyd (2003) suggests, discounted cash flow models with *"…a longer duration are, at times, undertaken on an annual basis for simplicity sake*". In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the timing interval is determined at annual base. This timing interval, is also incorporated in the developed discounted cash flow model, which external appraisers are obligated to use according to the taxation manual and the taxation agreement (Bouwinvest REIM, 2013b).

The positioning of the cash flows within the time intervals is also distinguished by Boyd (2003) as an important element when using a discounted cash flow model. Boyd (2003) suggests that this important element *"…is not given sufficient attention by many practitioners"*. Traditionally the appraisers selected either the 'in advance' or 'in arrears' option as a position for the cash flows within the time intervals (Boyd, 2003). According to Boyd (2003), *"…many practitioners have used the arrears option in annual studies, but this is not reasonable as it infers that no income or outgoings are received, or expended, until one year after the purchase date of a property".*

Boyd (2003) suggest that more recently the alternative of selecting the 'mid-point' of a time interval is used. This alternative approach, *"of bunching all income and outgoings into the middle of a time interval is a reasonable proxy for the actual situation",* according to Boyd (2003). In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, this alternative is also used. The positioning of the cash flows at the "mid-point" of a time interval is also incorporated in the developed discounted cash flow model, which external appraisers are obligated to use according to the taxation manual and the taxation agreement (Bouwinvest REIM, 2013b).

For the purpose of this research is therefore assumed that the three main timing elements are held consistent throughout all the valuations in the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV. Any variance in valuation is therefore assumed not to be related to the three described main timing elements.

2.3.2 Terminal Value determination

The (Discounted) Terminal Value is an important element of the discounted cash flow model. Boyd (2003) states that a discounted cash flow model *"…must make allowance for the residual value of the asset at the time of termination of the study".* The terminal value should represent, according to Boyd (2003), "*…the most probable selling price of the asset at that time*", were there is assumed that there is a residual value. The question that the appraiser should consider when valuation a real estate object is *"what will the next purchaser expect to pay at that time?"* (Boyd, 2003). For investment properties, such as real estate objects, the projected income for the year after the termination date should form the basis for the value according to Boyd (2003).

The other factor in the calculation of the terminal value, as can be derived from the previous section, is the terminal capitalisation rate or exit yield. The capitalisation rate should relate, according to Boyd (2003), *"…to the initial capitalisation rate from the property*". However, the initial capitalisation rate, called "BAR (Bruto Aanvangs Rendement)" in Dutch, may be increased because of increased age and poorer condition of the building. On the other hand the initial capitalisation rate could be decreased due to upgrades to the building or that a more favourable market scenario is expected by the appraiser at the time of termination (Boyd, 2003).

In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the terminal capitalisation rate (Exit Yield) , and the income for the year after the discounted cash flow model period, are estimated by the appraiser and used as an input in the discounted cash flow model for the terminal value determination. Any variance in the Exit Yield, or the projected income cash flow, will therefore lead to variation in the terminal value, and thereby lead to variance in the valuation.

Based on that causal relation is, for the purpose of this research on variance in real estate valuation, assumed that variance in real estate valuation is could be caused by variance in the Exit Yield and the projected income cash flow.

2.3.3 Net Income Calculation

The Net Income calculation is of interest for both the Discounted Terminal Value calculation, and the Discounted Cash Flow Value calculation. For the Discounted Cash Flow Value calculation, the Net Income is calculated for each year within the discounted cash flow model period. For the Discounted Terminal Value calculation the Net Income, which refers to the rental income in case of real estate objects, of the year after the discounted cash flow model period is required.

The Net Income is described by Wang (2011) as *"…the profits after deduct(ion) (of) all costs includ(ing) the land or real estate costs"*. According to Wang (2011) this is usually done on annual basis, which is in line with the timing period intervals, as suggested by Boyd (2003). When determining the Net Income, the appraiser should pay attention to the difference between the "actual land or real estate net income" and the "objective net income" (Wang, 2011). The "actual net income" is described by Wang (2011) as the *"…net income actually received under the status quo of land or real estate".* According to Wang (2011) the appraiser should pay attention to the fact that *"…the actual income is due to many factors, and usually cannot be directly used for evaluation"*.

Because assessment results of the influential factors on the actual income are used, such as references of normal market transactions, the appraiser should, according to Wang (2011) *"correct those practical net incomes, excluding the special and incidental factors, and obtain the net income allowed in the land or real estate law under normal market conditions, which should also include the risk of future earnings and reasonable expectations".* Therefore Wang (2011) states that, *"at this time it is the objective net income and only objective net income can be used for evaluation".*

For the calculation of the Net Income, Wang (2011) suggests the following calculation conditions: *"revenue generated by the use of real estate in the normal use of state; because the real estate income has sustainable features, income must be able to continue to produce and only sustained benefits can be capitalized; gains can be predictive"*. In the process of determining the income value, the appraiser should *"compare similar gains to real estate firstly, and then make accurate predictions for the market trends"* (Wang, 2011).

With regard to the calculation of the total costs, which is an important element of the Net Income calculation, Wang (2011) stresses that the calculation of the underlying costs should be objective. Costs such as maintenance fees and management fees, which are normal investment expenses to create income, should be calculated objective and consistent. In addition, real estate object specific costs, should vary with the state and nature of the real estate object (Wang, 2011). These costs should be careful analysed by the appraiser and Wang (2011) suggests that abnormal expenses should be excluded from the calculation. Therefore Wang (2011) suggests that the Net Income "*varies from the specific strike to the actual conditions of real estate*".

In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the Net Income per real estate object is based on a calculated cash flow per year. This calculated cash flows include both the incoming cash flows, as well as the outgoing cash flows. The calculations of these cash flows are based on indexes which are inputted by the appraiser in the discounted cash flow model. These indexes contain estimations of the appraiser on the development of both the incoming cash flows, as well as the outgoing cash flows. This indexes contain for example the appraisers estimation about the inflation, the market rent, the mutation degree and the percentage of buyers costs, throughout the discounted cash flow model period.

For the purpose of this research, is therefore assumed that variance in real estate valuation could be caused by variance in the Net Income calculation, which is caused by variance in the underlying indexes that are inputted by the appraiser and are an estimation of the development of several parameters throughout the discounted cash flow model period.

2.3.4 Effective Rates

The discounted cash flow model accounts for the value of money throughout time. Both the Terminal Value and the Total Cash Flow Value are discounted with a, by the appraiser determined discount rate, for the time value of money over time.

Boyd (2003) suggests *that "…when time intervals used in a DCF exercise are not annual, then the interest and discount rates should represent the effective equivalent rates for the chosen time interval"*. Further Boyd (2003) notices that *"…most interest rates and discount rates are quoted in annual percentage terms and it is (therefore) desirable to make comparisons and identify the selected rate as an annual rate"*. In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the discount rate is set as an annual rate, for all the valuations of the real estate objects. This would imply that the discount rate used for the valuations is comparable with other asset classes than real estate. However, the determination of the discount rate is not prescribed in any international standard or guideline. Boyd (2003) suggests that there should be "*an industry standard that specifies the recommended approach"* for the determination of the applied discount rate in real estate valuations. According to Boyd (2003) "*...it is unfortunate that the International Valuation Standards (IVSC 2001) is not more specific on this point, as it could improve model consistency"*.

In the discounted cash flow model, the effective discount rate is calculated/estimated under the assumption that it remains unchanged. But in real life, as Wang (2011) suggests, the discount rate is changing and affected by several factors such as the interest rate. The interest rate can be *"an important economic indicator of investing in real estate, which is equal to the same rate of return of venture capital"* (Wang,

2011). The factors that could influence the discount rate, according to Wang (2011), are for example the foreign capital interest, lower depreciation due to aging, the increase in property value and income due to inflation and the increase in own funds after repayment. In addition, risk compensations; tax policy and real estate type, locations, age and lease structure also affect the discount rate according to Wang (2011). Among them, the bank interest rates (interest rate loans and own funds) are a major factor in the determination and variance in the discount rate (Wang, 2011).

In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the discount rate is split out in three elements, the Risk-Free Rate, a real estate category raise element and a real estate object specific raise element. For the determination of the Risk-Free Rate, there are no international standards which apply for all real estate valuations. This makes that among different real estate investment companies, different Risk-Free rates could be used for the determination of the discount rate when a discounted cash flow model is applied for real estate valuation. Bouwinvest REIM determines the Risk-Free Rate for each quarter based on the 3-years average interest on the youngest 10-years state bonds. The, by Bouwinvest determined, Risk-Free rate is the basis of the discount rate which is applied in the discounted cash flow model. The appraiser determines/estimates the real estate category raise element and the real estate object specific raise element. Together these elements for the discount rate for a specific real estate object.

When variance in the discount rate occurs, this could be due to all of the three described elements of the discount rate. Were Bouwinvest REIM is responsible for the variance in the Risk-Free Rate element of the discount rate, the appraisers are responsible for any variance in the other elements which lead to the total discount rate. However, the Risk-Free Rate is established each quartile, and is applicable in that quartile for all the real estate valuations. So if there is any variance in the discount rate between different real estate objects in one quartile, this is due to the estimation/determination of the other elements of the discount rate, which is done by the appraisers.

For the purpose of this research we therefore assume that variance in real estate valuations could be caused by variance in the discount rate.

2.3.5 Variance through Appraisers

The valuations the real estate object in the Dutch Institutional Residential Fund NV, managed by Bouwinvest REIM, are done by external appraisers. Every three year a real estate object is valued by a different appraiser for the coming period. As can be derived from the previous section, as well as from this section, the appraiser that values the real estate object, has an important influence on the valuation. Their judgement and estimations about the influential parameters, as well as several macroeconomic developments could lead to variance in the valuations of real estate objects.

According to Guo (2010), *"….appraisers use a great deal of judgment to identify the characteristics (attributes) of properties that relate to property prices*". Appraisers usually have to *"…consider qualitative characteristics, such as structural quality, architectural attractiveness and location convenience"* and "*…the lack of precise information on properties often poses a problem"* (Guo, 2010). The lack of precise information as a problem for the judgment of appraisers is also supported by Myers et al. (2007), who states that the appraiser *"analyses and interprets current sales and lease transactions and the characteristics of comparable buildings involved against the subject buildings to make accurate assumptions of the current market climate and it's impact upon the value of the subject building".* The lack of these current sales and lease transactions of comparable buildings is therefore indicated as an important problem for the judgement of the appraiser by Myers et al. (2007).

French and Gabrielli (2005) state that all valuations are uncertain. Only in cases where there is a predetermined fixed cash flow (rent) can a valuation be considered to be "correct" , according to French and Gabrielli (2005). But the risk of non-payment of rent; the impact of the reversion or unforeseen

expenses incurred limits these "correct" valuations to a "best estimate" (French & Gabrielli, 2005). In cases where the cash flow is subject to variation (growth), this "best estimate" becomes even less certain according to French and Gabrielli (2005). This leads French and Gabrielli (2005) to the conclusion *"Thus, valuations are uncertain"*.

For any valuation or appraisal method to have validity it must produce an accurate estimate of the market value or price of the property investment (French & Gabrielli, 2005). The more accurate the appraiser is in its future expectations the more robust the valuations. French and Gabrielli (2005) highlight the importance of dealing with future expectations in the valuation process and suggest that the *"…adoption of multiple scenarios…"* will greatly facilitate the appraiser in *"providing sound competent professional advice"* (French & Gabrielli, 2005).

Uncertainty is a universal fact of property valuation. All valuations by their nature are uncertain, according to French and Gabrielli (2005). The Uncertainty impacts the valuation process in two ways; firstly the cash flows from investment are, to varying degrees, uncertain and secondly the resultant valuation figure is therefore open to uncertainty (French & Gabrielli, 2005). French and Gabrielli (2005) state that the sources of uncertainty *"…are rational and can be identified"*. The appraiser will use the assumption figure that is believed to be most appropriate (or most probable) but, as French and Gabrielli (2005) state, *"…there will not be, in any market, a 100% confidence in each of the input assumption used"*. There will always be a degree of uncertainty pertaining to each of the inputs of the appraiser. The future is uncertain and each input assumption done by the appraiser, captures the appraisers expectations about the future (French & Gabrielli, 2005).

Acceptance of the fact that *"…the valuation is uncertain is not an abdication of professional judgement"* but instead, *"a useful addition to the process as it allows the valuation user to place the valuation figure in context"* (French & Gabrielli, 2005). Valuation of the market price, *"…need to use market information and any projections used will reflect market expectations of future changes to the income cash flow and/or expected movements in the exit yield over time"* (French & Gabrielli, 2005). French and Gabrielli (2005) indicate the lack of knowledge and poor or imperfect information about all the inputs as the main causes of the uncertainty in valuations. *"Unless the input variables are certain then the resulting outcome (value) is also uncertain"* (French & Gabrielli, 2005).

With regard to the methods used for the valuation of real estate objects, French and Gabrielli (2005) state that *"…implicit valuation (or capitalisation) models can be valid models as they, in most markets, produce accurate estimates of price",* however, *"…the advantage of an explicit model is that it forces the valuer to question all inputs in the model"*. Boyd (2003) suggests however, that the use of explicit model is also subject to a high degree of variability and inconsistency. Boyd (2003) his research on valuation variations identify data accuracy, model consistency and bias as major concerns. According to Boyd (2003), "in cash flow studies there are practical problems with the input data and the consistency of the models".

Boyd (2003) addresses two main problems in his research regarding the discounted cash flow approach and the variations in valuation:

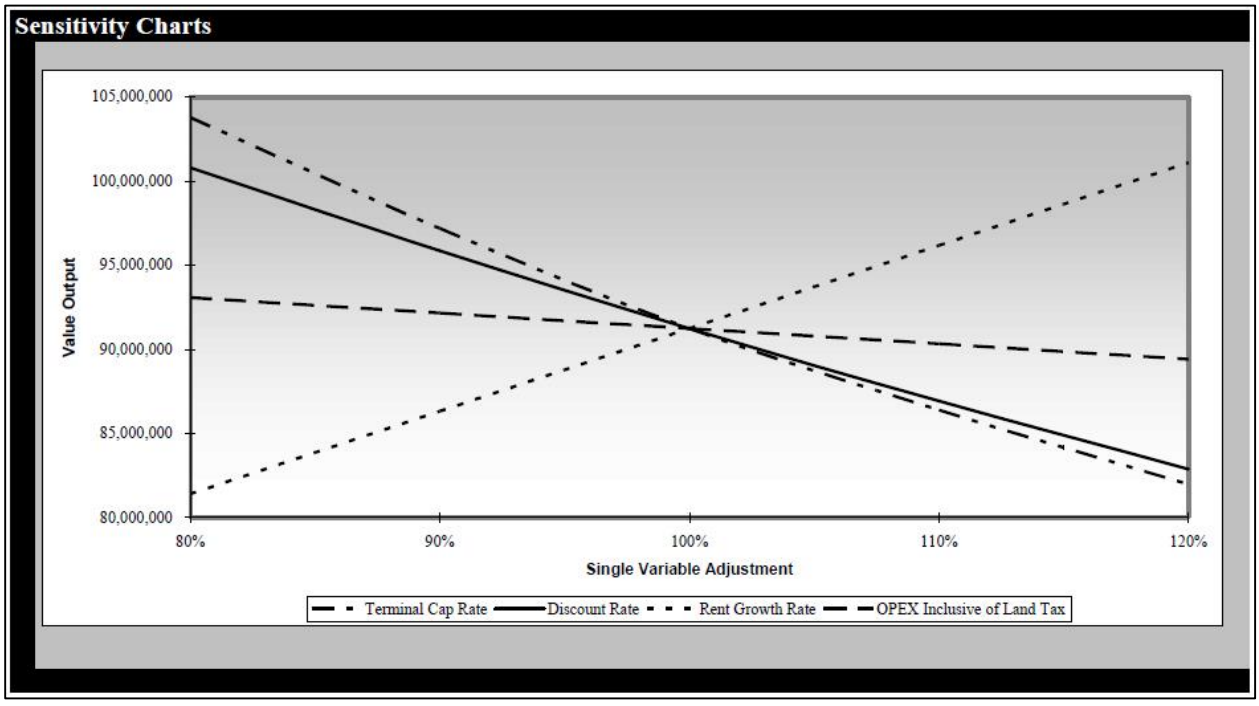
- valuation model consistency (the removal of incorrect processes or formulae)
- Data accuracy (in particular the specification of uncertain input data)

In the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV, the valuation model consistency cannot be argued as a cause for variance in valuations. Due to the fact that all the external appraisers are obligated by the means of a valuation contract and valuation manual, to use the discounted cash flow model as developed by Bouwinvest REIM. However, as Boyd (2003) argues, appraisers *"…may benefit from the use of proprietary models but they are acting irresponsibly if they are unaware of the model structure and the inherent assumptions used in the underlying model".* For the purpose of this research however assumed that any variance in valuation is not caused by valuation model inconsistency.

The data accuracy, and the uncertainty in the input data could also be argued as a cause for variance in valuations. Boyd (2003) suggest that in in order to *"…improve the accuracy of the output it is necessary to identify those uncertain inputs that have a substantial effect on the resultant output".* Typical variables that are suggested by Boyd (2003) as uncertain inputs are variables related to:

- The cost of the asset (including transfer costs)
- Current and market rent levels
- Rental growth over time
- Incentives and vacancy allowances
- Current operating expenses
- Operating expense growth over time
- Expected capital expenditure over time
- Terminal value components (eg. exit yield, costs)
- The discount rate
- And others, if external finance and/or taxation issues are considered.

Boyd (2003) has tested the sensitivity of several key variables on the resultant output, the real estate value. The sensitivity of the key variables is measured by Boyd (2003) using a sensitivity (spider) diagram which measures the output change for a realistic change in that variable only. The drawback of this analysis which is indicated by Boyd (2003), is *"…that only one variable can be changed while the others are held static"*. Boyd (2003) states that this *"…is not a realistic situation as some correlation exists between many of the variables, but it is acceptable for identifying the more sensitive variables".* Therefore the outcome of the research by Boyd (2003) is assumed to be acceptable for the purpose of this research. A graphical representation of the sensitivity analysis performed by Boyd (2003) is presented below in Graph 1.



Graph 1 Sensivity analysis by Boyd (2003)

Based on the performed sensitivity analysis, Boyd (2003) notes that *"…the gradient of the discount rate, terminal capitalisation rate and the rental growth rates are steep, demonstrating their substantial impact on the resultant figure".*
Another measure of the sensitivity of individual variables is the examination of the output change for a realistic change in an input variable, which is also researched by Boyd (2003). The outcome of this research, is the rank correlation as presented below in Table 1.

	Rank Correlation
Discount rate	-0.66
Terminal capital rate	-0.71
Rent growth rate	0.30
Open growth rate	-0.07

Table 1 Sensitivity analysis by Boyd (2003)

Both researches by Boyd (2003) demonstrate that the terminal capitalization rate (Exit Yield) and the discount rate are the most sensitive variables and, as Boyd (2003) suggests, these variables *"…should be very carefully selected"*. The appraiser should source as much relevant secondary data as possible and thereafter make a reasoned subjective judgement on these key variables (Boyd, 2003).

However the discounted cash flow model used by Boyd (2003) could not be the same as the discounted cash flow model used by Bouwinvest REIM for the valuation of the real estate objects of the Dutch Institutional Residential Fund NV, the outcomes of the research conducted by Boyd (2003) are in line with the described discounted cash flow model in the previous section. Based on the described calculations in the Bouwinvest REIM discounted cash flow model, the Discount Rate and the Exit Yield could be indicated as the most sensitive variables in the discounted cash flow model.

Following the argumentation of Boyd (2003), French and Gabrielli (2005), and Guo (2010) on the uncertainty in valuations, is assumed for the purpose of this research, that variance in valuations could be caused by the variance in estimations by appraisers on uncertain, sensitive variables in the discounted cash flow model. Due to this uncertainty in the variable estimation/determination by appraisers, it is therefore also assumed that different appraisers would estimate/determine the same variables differently, given that the rest of the circumstances are the same.

Based on that assumption, the variance in valuations of real estate objects could be caused by switching appraiser, due to the uncertainty in valuations, caused by uncertainty in sensitive variable estimation/determination by the appraisers.

2.4 RESEARCH HYPOTHESIS AND ASSUMPTIONS

Throughout the establishment of the theoretical framework, several assumptions were made. Some of the assumptions are considered to define the scope of the research and the presumptions of the research, while other assumptions, about casual relationships, are the basis of the hypothesis formulation of this research. In order to research what the effect is of an appraiser switch on the valuation of Dutch Real Estate, and what the effect is of an appraiser switch on the underlying parameters in Dutch Real Estate valuation, the following research assumptions and hypothesis were formulated:

Research Scoping / Presumptions:

- The value of real estate objects, as determined by Bouwinvest REIM for the Dutch Institutional Residential Fund NV, is based on the Market Value base as defined by the International Valuation Standards Counsil (2011) and the Royal Institution of Chartered Surveyors (2012).
- The underlying concept of real estate valuation, the definition of Market value, as well as the underlying principles and the interpretation of these principles as defined by the IVSC, the ASB and the RICS, are considered not to be influential on the variance in real estate valuations, and not to be the cause of any variance in real estate valuations, at Bouwinvest REIM.
- The valuations of real estate objects, and the variance in the valuations at Bouwinvest REIM and the Dutch Institutional Residential Fund NV, are not influenced or caused by the existence of the different valuation approaches as described in the theoretical framework.
- All the real estate objects of the Dutch Institutional Residential Fund NV are valued through the income approach, by using the Discounted Cash Flow model. Therefore the different valuation approaches, and the difference between the different valuation approaches, are considered not to have an influence, or could not be indicated as a cause, of any variance in real estate valuations.
- All valuations are done by the use of the, in the theoretical framework described, discounted cash flow model, which is obligated by Bouwinvest REIM to be used by the external appraisers for the valuation of real estate objects in the portfolio of the Dutch Institutional Residential Fund NV.
- The three main timing elements, as described in the theoretical framework, are held constant throughout all the valuations in the case of Bouwinvest REIM and the Dutch Institutional Residential Fund NV. Any variance in valuation is therefore not to be caused or influenced by the three described main timing elements.

Research Hypothesis:

- When a real estate object is valued by a different appraiser, e.g. an appraiser switch, there will be variance in the valuation.

Possible theoretical explanations for the variance in valuation:

- The variance in the valuation, due to an appraiser switch, could be caused by variance in the Discounted Cash Flow Value and variance in the Discounted Terminal Value
- The variance in the Discounted Terminal value, when a real estate object is valued by a different appraiser, could be caused by a variance in the Exit Yield.
- The variance in the Discounted Cash Flow Value and the Discounted Terminal value, when a real estate object is valued by a different appraiser, could be caused by a variance in the Discount Rate.

In the next section the research methodology that will be used to research this hypothesis is explained, as well as the methodology for the data collection.

3.0 METHODOLOGY AND DATA

The aim of this section is to outline the research methodology and the methods used for data collection, in order to research the formulated hypothesis in the previous section. This is done in order to research what the effect is of an appraiser switch on the valuation of Dutch Real Estate, and what the effect is of an appraiser switch on the underlying parameters in Dutch Real Estate valuation

3.1 METHODOLOGY

The research focusses on the effect of an appraiser switch on the valuation of Dutch Real Estate.

3.1.1 Event Study

In order to research the effect of an appraiser switch on the valuation of Dutch Real Estate, the research is structured as an event study. The choice for an event study is based on a similar research methodology used by Kabir and Roosenboom (2003). The main advantage of research methodology is that it allows to exclude and control for any time-specific factors. Investments in Real Estate Objects have a certain volatility, and the event study methodology allows for controlling this time-specific volatility of real estate objects. Besides this advantage of the event study, this methodology allows for a comparison between two or more groups.

Therefore the design of the event study will be as such, to investigate whether the appraiser switch has an effect on real estate valuation, compared to a group of real estate objects that have not been switched from appraiser at the same time. A graphical representation of the event study design is presented below in Figure 7.

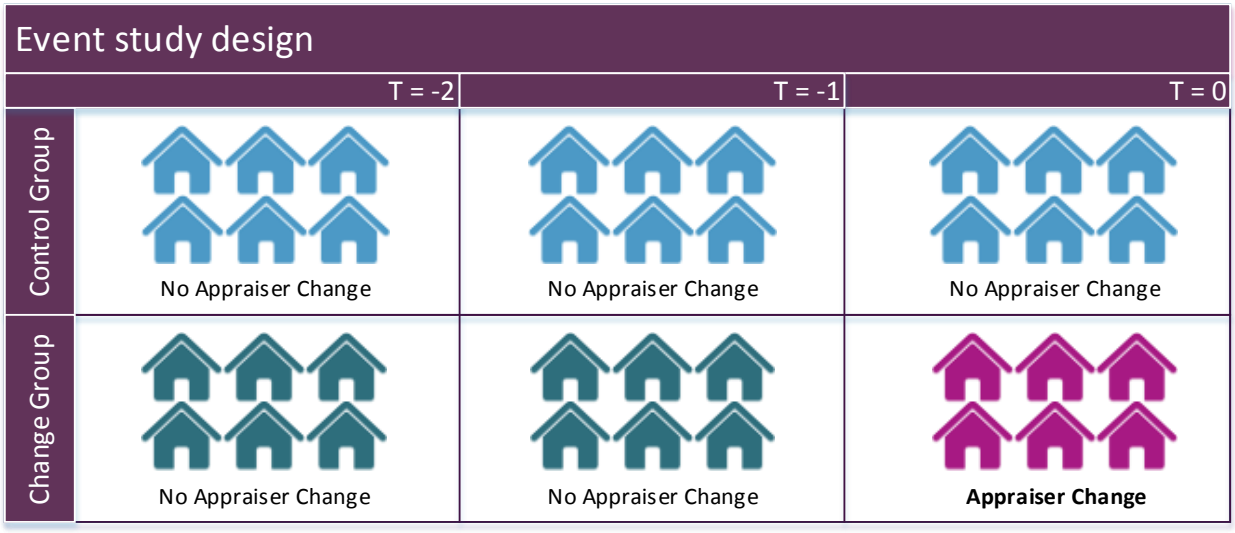


Figure 7 Event study design

In the design of the event study, the main event is defined as the switching of appraiser. In order to research the effect of an appraiser switch on real estate valuation, two groups will be composed, a change group and a control group. This will be done in order to compare the effect of an appraiser switch on real estate valuation with a control group of real estate objects that have not switched from appraiser. This control group will serve as a benchmark of the real estate market. By making use of a control group, any volatility in real estate valuation is controlled for.

In order to control for the fact that two groups will be constructed, and any differences between these groups could influence the outcome of the research, two pre-tests will be conducted in order to investigate if the valuations in the control group differ significantly from the change group, even before the appraisers are switched. These pre-tests are done in the two quartiles before the actual appraiser switching occurs. Therefore the time window of the event study will be set at 3 quartiles, were the 2 first quartiles, T=-1 and T=-2, serve as a pre-test in order to control for group differences and to establish a benchmark for the actual quartile in which the appraisers are switched. For the validity of these pre-tests and the actual moment that the appraisers are switched, an additional condition is formulated. The real estate objects from both the change group, and the control group, should not have been subject to any appraiser switching during the event window, other than the actual switching moment at T=0.

In order to research if the real estate valuations of the change group differ significantly from the benchmark, the control group, statistical test will be applied, as well as a qualitative analysis of the descriptive statistics. Both independent T-Tests, as well as Non-Parametric Tests will be conducted in order to research the difference between the control group and the change group. These statistical tests are the common statistical methods to investigate the differences between two groups, according to previous similar event study methodologies as defined in the research by Kabir and Roosenboom (2003).

The hypothesis, as formulated in the previous section, that will be tested by the means of the event study is:

- When a real estate object is valued by a different appraiser, e.g. an appraiser switch, there will be variance in the valuation.

3.2 DATA COLLECTION

The aim of this section is to outline how the data for the research is collected, how the samples for the event study are constructed, if the sample data is representative for the population and how the variables are defined. Also how any possible outliers in the data sets are handled is discussed in this section.

3.2.1 Data Collection

The data required for analysis is data on the real estate valuations of Dutch Real Estate. As in the scoping of the research is defined, the research will only focus on the real estate valuations of the Dutch Institutional Residential Fund NV. Therefore only data from the Dutch Institutional Residential Fund NV is used in the analysis. This data is available in pdf and excel files at Bouwinvest REIM and is for the purpose of this research combined in one main excel file. This excel file served as the input file for the different analysis, both quantitative and qualitative.

The time period of the data that was collected is from 2009 until 2013.

3.2.2 Research Variables

The event study is focused on the effect is of an appraiser switch on the valuation of Dutch Real Estate. The effect of an appraiser switch is therefore measured as the effect (change) in the real estate object value. To examine the change in real estate value (per real estate object), the following formula is used:

$$Change\ in\ Real\ Estate\ Value\ (in\ \%) = \frac{(Real\ Estate\ Value\ \text{at}\ \mathrm{T} = 0) - (Real\ Estate\ Value\ \text{at}\ \mathrm{T} = -1)}{(Real\ Estate\ Value\ \text{at}\ \mathrm{T} = 0)}$$

This formula calculates the percentage change of a real estate object, compared to the previous value of the real estate object. This formula enables the comparison of the relative value changes between the multiple real estate objects in the Dutch Institutional Residential Fund NV portfolio, which all have a different size and value.

The switching of appraiser is measured by a the allocation of a dummy variable to the datasets. The dummy variable “Appraiser Switch” has a value of 1 for the cases were the appraiser has switched in that quartile, and the dummy variable has a value of 0 for the cases were the appraiser has not been switched in that quartile.

3.2.3 Research Samples

Based on the real estate valuation data of the Dutch Institutional Residential Fund NV, seven moments could be indicated as a moment where real estate objects switched from appraiser. Therefore, for the event study, seven samples were constructed. Each of those samples contained three measurement moments, as can be derived from the event study design. The research sample construction is presented in 8.4 Appendix IV: Research Sample Construction, in Table 20.

For the validity of the research, the consistency of the samples is analysed. The consistency analysis of the samples was focussed on two elements:

- The internal validity of the samples:
    - Do all measurement moments within the sample contain data of the same real estate objects?
    - Is the restraint of no appraiser switch in the previous measurement moments to the actual appraiser switch, met for all the real estate objects that are in the change groups?
    - Is the restraint of no appraiser switch in all the measurement moments, met for all the real estate objects that are in the control group?

- The external validity of the samples:
    - Are the samples representative for the portfolio of the Dutch Institutional Residential Fund NV?

To check for the internal validity of the samples a consistency check is executed. This consistency check compared all the real estate object numbers within the measurement moments in the samples. The executed consistency check is presented in 8.5 Appendix V: Sample Consistency Checks. Also the restraints related to the appraiser switching are checked for all the samples, control- and change groups. The main conclusion concerning the internal validity is that the data that will be used for the analysis show no threat to the internal validity, the samples are consistent and the restraints regarding the appraiser switching are met within all the samples.

To check for the external validity, an analysis is executed in which the main characteristics of the sample portfolios, are compared with the main characteristics of the total portfolio of the Dutch Institutional Residential Fund NV. To enhance to internal validity as well, the main characteristics are also compared within the samples, between the control group and the change group. The main characteristics in this analysis are the characteristics that are used by Bouwinvest REIM for their internal portfolio management and external reporting about their portfolio management. The four main portfolio/sample characteristics that are distinguished are:

- The portfolio/sample distribution to the region of the real estate objects
- The portfolio/sample distribution to the type of the real estate objects
- The portfolio/sample distribution to the risk profile of the real estate objects
- The portfolio/sample distribution to the hurdle rate of the real estate objects

The characteristic comparison of the samples in relation to the total portfolio of the Dutch Institutional Residential Fund NV, as well as the comparison within the samples, are presented in 8.6 Appendix VI: Characteristics comparison within samples and 8.7 Appendix VII: Characteristics comparison Samples to Portfolio.

From the analysis of the comparisons, based on the portfolio characteristics, can be concluded that there are no threats to the internal validity within the samples, as well as that there are no threats to the external validity. The samples give a valid representation of the portfolio of Dutch Institutional Residential Fund NV, based on the described characteristics.

3.2.4 Outlier Handling

To control for any abnormalities in the data set, an analysis in conducted to identify any possible abnormalities. This analysis is focussed on the identification of any outliers in the data sets that will be used for the research. The analysis identified, per data set, the most extreme values in the positive changes in real estate value, as well as the most extreme values in the negative changes in real estate value.

The identification of the outliers is done by conducting an explorative analysis in SPSS for each data set. The outliers are than identified by researching the constructed histograms, the extreme values table and the normality plots of the explorative SPSS analysis. An observed value is considered an outlier when the value deviates more than 2 standard deviations from the normal distribution.

The identification of the outliers is graphically represented by the Detrended Normal Q-Q Plots and the Histograms for each sample, and is presented in 8.8 Appendix VIII: Outlier identification. Then a qualitative analysis in then performed for each outliers to investigate whether the extreme value could be the result from any abnormality such as the separation of real estate objects, a partial sale of the real estate object or any other abnormality. The results of the outlier identification and how the outliers are handled is presented below in Table 2.

Outlier Identification						
Sample	Case nr	Object nr	MS Moment	Year / Quarter	Abnormality	Deleted?
1	152	1337710	3	2010 Q1 - 2010 Q2	no abnormalities	**no**
	158	1353710	3	2010 Q1 - 2010 Q2	no abnormalities	**no**
	195	1375710	3	2010 Q1 - 2010 Q2	no abnormalities	**no**
	254	1337710	1	2009 Q3 - 2009 Q4	no abnormalities	**no**
2	43	1375810	4	2010 Q2 - 2010 Q3	no abnormalities	**no**
	413	1360110	2	2009 Q4 - 2010 Q1	no abnormalities	**no**
3	-	-	-	-	-	-
4	7	1337810	7	2011 Q1 - 2011 Q2	no abnormalities	**no**
	245	1370511	7	2011 Q1 - 2011 Q2	data inconsistency	**yes**
5	26	1357110	14	2012 Q4 - 2013 Q1	no abnormalities	**no**
	398	1361810	13	2012 Q3 - 2012 Q4	partial sale	**yes**
	537	1359410	12	2012 Q2 - 2012 Q3	partial sale	**yes**
	544	1360511	12	2012 Q2 - 2012 Q3	partial sale	**yes**
6	36	1361117	15	2013 Q1 - 2013 Q2	no abnormalities	**no**
	432	1361810	13	2012 Q3 - 2012 Q4	partial sale	**yes**
7	6	1329410	16	2013 Q2 - 2013 Q3	no abnormalities	**no**
	19	1346810	16	2013 Q2 - 2013 Q3	no abnormalities	**no**
	28	1350810	16	2013 Q2 - 2013 Q3	no abnormalities	**no**

Table 2 Outlier Identification

4.0 EMPIRICAL RESULTS

4.1 DESCRIPTIVE STATISTICS

The aim of this section is to provide the results of the descriptive statistics analysis for each sample. An overview of the complete descriptive statistics per sample, per measurement moment, can be found in 8.9 Appendix IX: Descriptive Statistics. The analysis of the descriptive statistics, which are explained below using the leading book on statistics by Field (2013), is based on several elements:

- Mean
- Median
- Standard Deviation
- Range and Interquartile Range

The Mean and the Median are analysed in order to determine the centre of the distributions in the samples, per measurement moment and per group (Control group and Change group). The Median is described by Field (2013) as the middle score in a distribution, when scores are ranked in order of magnitude. The main advantage of an analysis of the Median, as centre of a distribution, is that the Median is relatively unaffected by extreme scores at either ends of the distribution, according to Field (2013). The Median is also the basic input for the statistical Non-Parametric tests, the Independent-Samples Mann-Whitney U Tests.

The Mean is described by Field (2013) as the centre of a distribution, based on the average score. The main disadvantage of the Mean as measurement for the centre of a distribution is that it can be influenced by extreme scores, according to Field (2013). However, the more observations that are included in the analysis, the less sensitive the Mean analysis will be for extreme scores. The Mean is also the basis input for the Independent-Sample T-Tests.

In order to quantify the spread and dispersion in the distribution, the Standard Deviation, the Range and the Interquartile Range are analysed per sample, per measurement moment and per group (Control group and Change group). The Range is described by Field (2013) as a measurement for the dispersion within a sample, calculated by subtracting the lowest score in the sample from the highest score in the sample. The main disadvantage of the Range as measurement for dispersion, is that the Range is highly influenced by any extreme values, according to Field (2013).

One way to work around this extreme values that influence the Range, is by looking at the Interquartile Range. The Interquartile Range is the Range within a sample, when the values at the extremes of the distribution are excluded, according to Field (2013). The Interquartile Range is calculated by cutting of the top and bottom 25% of the scores in the sample and calculate the range of the middle 50% scores in the sample. The main advantage of the Interquartile Range as measurement for the dispersion in the distribution is that is not affected by the extreme scores (Field, 2013). The disadvantage is that the Interquartile Range only measures half of the data, the middle 50% of the distribution (Field, 2013).

Another way of analysing the spread in a distribution is by looking at how different each score is from the centre of the distribution. The Standard Deviation is a measurement of the average variability (spread) of a set of data, measured in the same units as the original data, according to Field (2013). A small Standard Deviation indicates that the observations in the sample are close to the centre (Mean) of the sample, were a large Standard Deviation indicates that the observations are more distant from the centre (Mean) of the sample (Field, 2013).

In this section the results of the descriptive statistics analysis will be presented, per sample, per measurement moment and per group (Control group and Change group).

4.1.1 Sample 1

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 1 is presented on the next page in Table 3 and Table 4. The total number of units in sample 1 is 100, were there are 49 units in the control group and 51 units in the change group.

The Mean (Median) change in total value at T=-2 (Q4 2009 compared to Q3 2009) is -1.4859647% (-1.227795%) for the control group, and -1.6086958% (-0.769643%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q3 2009. There is a Mean difference of -0.1227311%, and a Median difference of 0.4581520% between the change- and the control group. This indicates that the negative value change in the Mean is greater in the change group than in the control group, and that the negative value change in the Median is greater in the control group than in the change group.

The Mean (Median) change in total value at T=-1 (Q1 2010 compared to Q4 2009) is -0.6706244% (-0.440377%) for the control group, and -0.5300623% (-0.502290%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q4 2009. There is a Mean difference of 0,1405621%, and a Median difference of -0.0619130%) between the change- and the control group. This indicates the negative value change in the Mean is greater in the control group than in the change group, and that the negative value change in the Median is greater in the change group than in the control group.

The Mean (Median) change in total value at T=0 (Q2 2010 compared to Q1 2010), the moment that the real estate objects in the change group are actually switched from appraiser, is 0.2435202% (0.041728%) for the control group, and -0.8436887% (-0.633413%) for the change group. This indicates that on average, there is a positive change in total value, compared to the Q1 2010, in the control group, and that there is a negative change in total value for the real estate objects that switched from appraiser, the change group. The difference in the value change in the Mean between the change- and control group is -1,0872089%, and the difference in the value change in the Median between the change- and the control group is -0.6751410%, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 and at T=-1. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, there is a considerable difference in dispersion and spread between the two groups. The difference between the two groups at T=0 in the Range is 23,065892%, the difference in the Interquartile Range is 4,6941380% and the difference in the Standard Deviation between the groups is 4.1002830%. This indicates that there is not only a difference in the Mean and Median average value change between the two groups at T=0, but that there is also a considerable difference between the groups in the dispersion and spread of the total value changes.

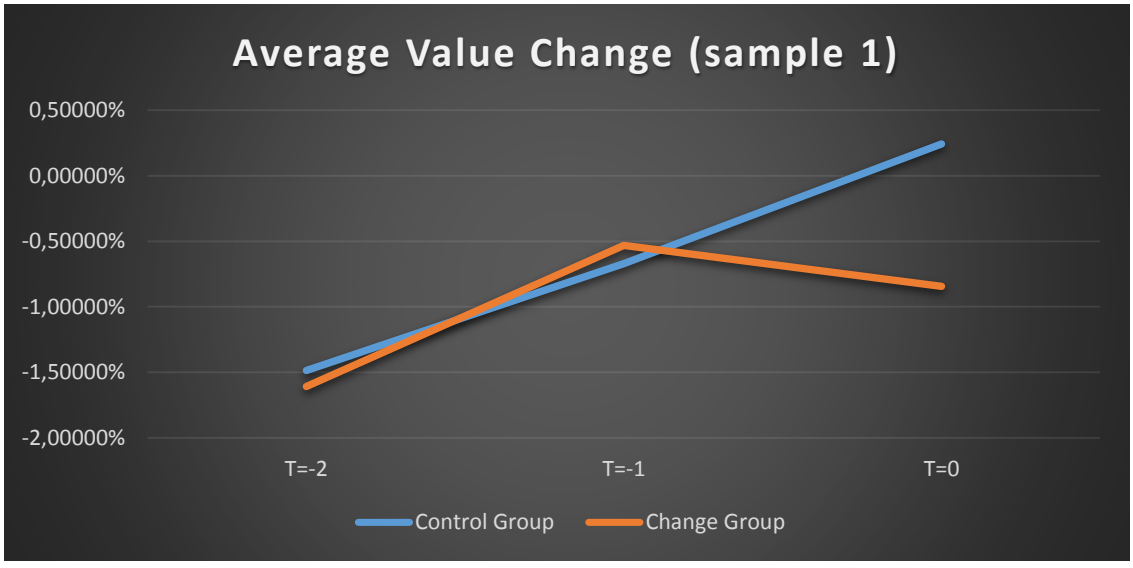
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 59. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 1 is presented on the next page, in Graph 2.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
1	N	Control	49	49	49
		Change	51	51	51
	Mean	Control	-1,4859647%	-0,6706244%	0,2435202%
		Change	-1,6086958%	-0,5300623%	-0,8436887%
	Median	Control	-1,227795%	-0,440377%	0,041728%
		Change	-0,769643%	-0,502290%	-0,633413%
	Std. Dev.	Control	2,0220153%	1,0836422%	1,0987983%
		Change	3,0370663%	0,8247822%	5,1990813%
	Range	Control	13,853178%	6,098699%	6,872742%
		Change	18,6377160%	4,7920880%	29,9386340%
	Interquartile Range	Control	1,570127%	1,147758%	0,647145%
		Change	1,326792%	1,068942%	5,341283%

Table 3 Descriptive Statistics summary sample 1

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
1	Mean difference	-0,1227311%	0,1405621%	-1,0872089%
	Median difference	0,4581520%	-0,0619130%	-0,6751410%
	Std. Dev. difference	1,0150510%	-0,2588600%	4,1002830%
	Range difference	4,7845380%	-1,3066110%	23,0658920%
	I.Q. Range difference	-0,2433350%	-0,0788160%	4,6941380%

Table 4 Group Differences summary sample 1



Graph 2 Mean Total Value Change development sample 1

4.1.2 Sample 2

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 2 is presented on the next page in Table 5 and Table 6. The total number of units in sample 2 is 153, were there are 104 units in the control group and 49 units in the change group.

The Mean (Median) change in total value at T=-2 (Q1 2010 compared to Q4 2009) is -0.6892771% (-0.2680115%) for the control group, and -0.6706244% (-0.4403770%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q4 2009. There is a Mean difference of 0.0186527%, and a Median difference of -0.1723655% between the change- and the control group. This indicates that the negative value change in the Mean is slightly smaller in the change group than in the control group, and that the negative value change in the Median is slightly smaller in the control group than in the change group.

The Mean (Median) change in total value at T=-1 (Q2 2010 compared to Q1 2010) is 0.3077951% (0.1639445%) for the control group, and 0.2435202% (0.0417280%) for the change group. This indicates that on average, there is in both groups a positive change in total value, compared to Q1 2010. There is a Mean difference of -0.0642749%, and a Median difference of -0.1222165% between the change- and the control group. This indicates the positive value change in the Mean and the Median is slightly greater in the control group than in the change group.

The Mean (Median) change in total value at T=0 (Q3 2010 compared to Q2 2010), the moment that the real estate objects in the change group are actually switched from appraiser, is 0.2692982% (0.2466625%) for the control group, and -1.6247223% (-0.9842150%) for the change group. This indicates that on average, there is a positive change in total value, compared to the Q2 2010, in the control group, and that there is a negative change in total value for the real estate objects that switched from appraiser, the change group. The difference in the value change in the Mean between the change- and control group is -1.8940205%, and the difference in the value change in the Median between the change- and the control group is -1.2308775%, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1. Only the Range for the control group at T=-2 is considerably different than for the change group. This is caused by some extreme values in the control group. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, there is a considerable difference in dispersion and spread between the two groups. The difference between the two groups at T=0 in the Range is 24,6450130%, the difference in the Interquartile Range is 4.6674340% and the difference in the Standard Deviation between the groups is 4.1435185%. This indicates that there is not only a difference in the Mean and Median average value change between the two groups at T=0, but that there is also a considerable difference between the groups in the dispersion and spread of the total value changes.

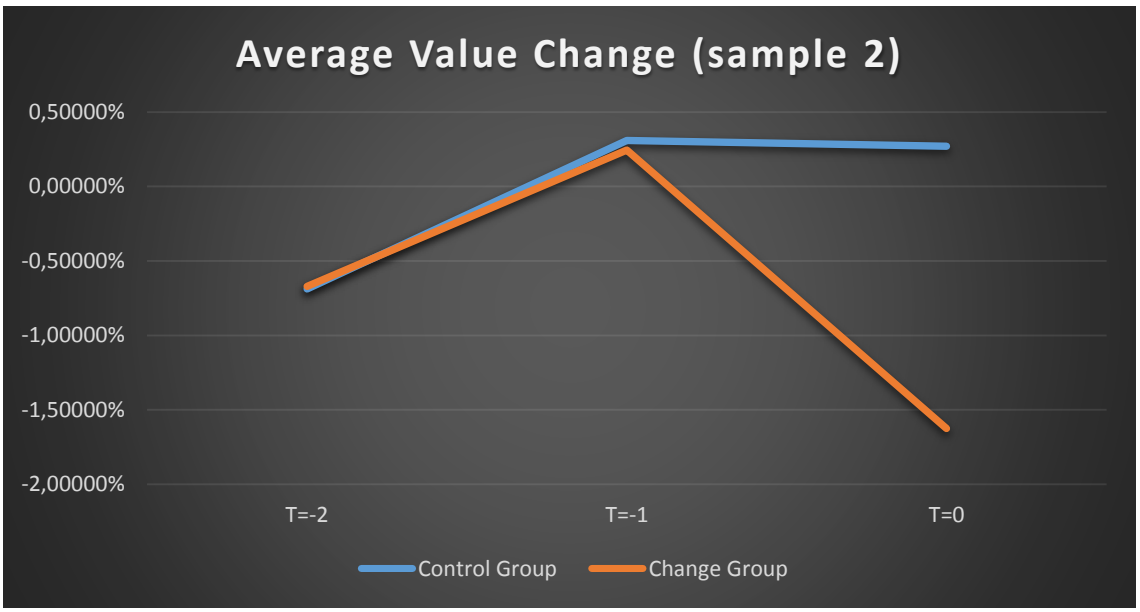
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 60. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 2 is presented on the next page, in Graph 3.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
2	N	Control	104	104	104
		Change	49	49	49
	Mean	Control	-0,6892771%	0,3077951%	0,2692982%
		Change	-0,6706244%	0,2435202%	-1,6247223%
	Median	Control	-0,2680115%	0,1639445%	0,2466625%
		Change	-0,4403770%	0,0417280%	-0,9842150%
	Std. Dev.	Control	4,1779394%	0,8184431%	0,8469243%
		Change	1,0836422%	1,0987983%	4,9904427%
	Range	Control	31,307600%	6,421738%	5,289472%
		Change	6,098699%	6,872742%	29,934485%
	Interquartile Range	Control	1,822356%	0,652268%	0,900569%
		Change	1,147758%	0,647145%	5,568003%

Table 5 Descriptive Statistics summary sample 2

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
2	Mean difference	0,0186527%	-0,0642749%	-1,8940205%
	Median difference	-0,1723655%	-0,1222165%	-1,2308775%
	Std. Dev. difference	-3,0942972%	0,2803552%	4,1435185%
	Range difference	-25,2089010%	0,4510040%	24,6450130%
	I.Q. Range difference	-0,6745980%	-0,0051230%	4,6674340%

Table 6 Group Differences summary sample 2



Graph 3 Mean Total Value Change development sample 2

4.1.3 Sample 3

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 3 is presented on the next page in Table 7 and Table 8. The total number of units in sample 3 is 155, were there are 101 units in the control group and 54 units in the change group.

The Mean (Median) change in total value at T=-2 (Q3 2010 compared to Q2 2010) is 0.57605567% (0.2768400%) for the control group, and -0.04189976% (0.1109335%) for the change group. This indicates that on average, there is in both groups a positive change in total value, compared to Q2 2010. There is a Mean difference of 0.-0.5341559%, and a Median difference of -0.1659065% between the change- and the control group. This indicates that the positive value change in the Mean and Median is slightly smaller in the change group than in the control group.

The Mean (Median) change in total value at T=-1 (Q4 2010 compared to Q3 2010) is 0.25720594% (0.2350500%) for the control group, and -0.90797360% (-0.4744620%) for the change group. This indicates that on average, there is a positive change in total value, compared to Q3 2010, in the control group, and a negative change in total value in the change group. There is a Mean difference of -1.1651795%, and a Median difference of -0.7095120% between the change- and the control group. This indicated that there is a considerable difference in total value change between the two groups at T=-1.

The Mean (Median) change in total value at T=0 (Q1 2011 compared to Q4 2010), the moment that the real estate objects in the change group are actually switched from appraiser, is 0.36334880% (0.0946750%) for the control group, and -0.36224790% (-0.0170095%) for the change group. This indicates that on average, there is a positive change in total value, compared to the Q4 2010, in the control group, and that there is a negative change in total value for the real estate objects that switched from appraiser, the change group. The difference in the value change in the Mean between the change- and control group is -0.7255967%, and the difference in the value change in the Median between the change- and the control group is -0.1116845%, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1 and T=0. Only the Range for the control group at T=0 is somewhat different than the Range for the change group. This indicates that there is a considerable difference in the Mean and Median average value change between the two groups at T=-1 and T=0, but that there is no considerable difference between the groups in the dispersion and spread of the total value changes throughout the sample measurement moments.

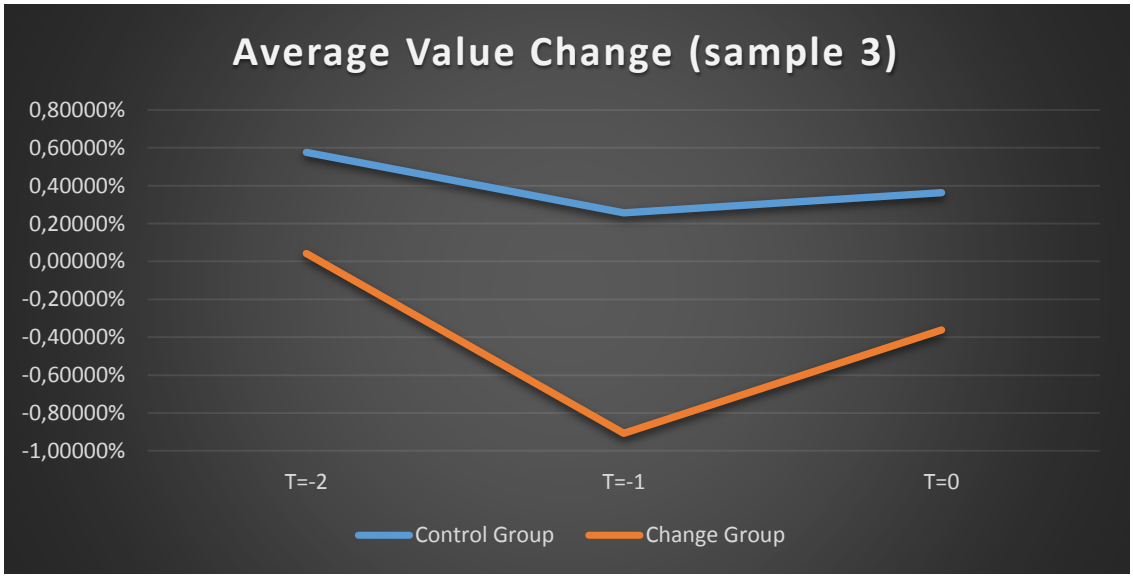
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 61. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 3 is presented on the next page, in Graph 4.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
3	N	Control	101	101	101
		Change	54	54	54
	Mean	Control	0,57605567%	0,25720594%	0,36334880%
		Change	0,04189976%	-0,90797360%	-0,36224790%
	Median	Control	0,2768400%	0,2350500%	0,0946750%
		Change	0,1109335%	-0,4744620%	-0,0170095%
	Std. Dev.	Control	0,58984495%	0,82235308%	1,30828053%
		Change	1,01408898%	1,31206523%	1,02787114%
	Range	Control	2,9376850%	7,0656720%	8,4115640%
		Change	5,1312590%	4,6968190%	4,8607570%
	Interquartile Range	Control	0,924711%	0,333287%	1,137333%
		Change	1,504606%	1,297109%	0,642437%

Table 7 Descriptive Statistics summary sample 3

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
3	Mean difference	-0,5341559%	-1,1651795%	-0,7255967%
	Median difference	-0,1659065%	-0,7095120%	-0,1116845%
	Std. Dev. difference	0,4242440%	0,4897122%	-0,2804094%
	Range difference	2,1935740%	-2,3688530%	-3,5508070%
	I.Q. Range difference	0,5798950%	0,9638220%	-0,4948960%

Table 8 Group Differences summary sample 3



Graph 4 Mean Total Value Change development sample 3

4.1.4 Sample 4

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 4 is presented on the next page in Table 9 and Table 10. The total number of units in sample 4 is 132, were there are 68 units in the control group and 64 units in the change group.

The Mean (Median) change in total value at T=-2 (Q4 2010 compared to Q3 2010) is 0.1262590% (0.0249255%) for the control group, and 0.2769254 % (0.2729445%) for the change group. This indicates that on average, there is in both groups a positive change in total value, compared to Q3 2010. There is a Mean difference of 0.1506664%, and a Median difference of 0.2480190% between the change- and the control group. This indicates that the positive value change in the Mean and Median is slightly greater in the change group than in the control group.

The Mean (Median) change in total value at T=-1 (Q1 2011 compared to Q4 2010) is 0.5693476% (0.4333920%) for the control group, and 0.3699379% (0.0720320%) for the change group. This indicates that on average, there is in both groups a positive change in total value, compared to Q4 2010. There is a Mean difference of -0.1994097%, and a Median difference of -0.3613600% between the change- and the control group. This indicates the positive value change in the Mean and the Median is slightly smaller in the control group than in the change group.

The Mean (Median) change in total value at T=0 (Q2 2011 compared to Q1 2011), the moment that the real estate objects in the change group are actually switched from appraiser, is -0.6869264% (-0.6952970%) for the control group, and -0.2130958% (-0.0610925%) for the change group. This indicates that on average, in both groups there is a negative change in total value, compared to the Q1 2011. The difference in the value change in the Mean between the change- and control group is 0.4738306%, and the difference in the value change in the Median between the change- and the control group is 0.6342045%. This indicates the negative value change in the Mean and the Median is slightly greater in the control group than in the change group at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1 and T=0. Only the Range for the control group at T=-2 and T=-1 is considerably different than for the change group. This is caused by some extreme values in the control group. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, the Range for the change group is considerably different than for the control group.

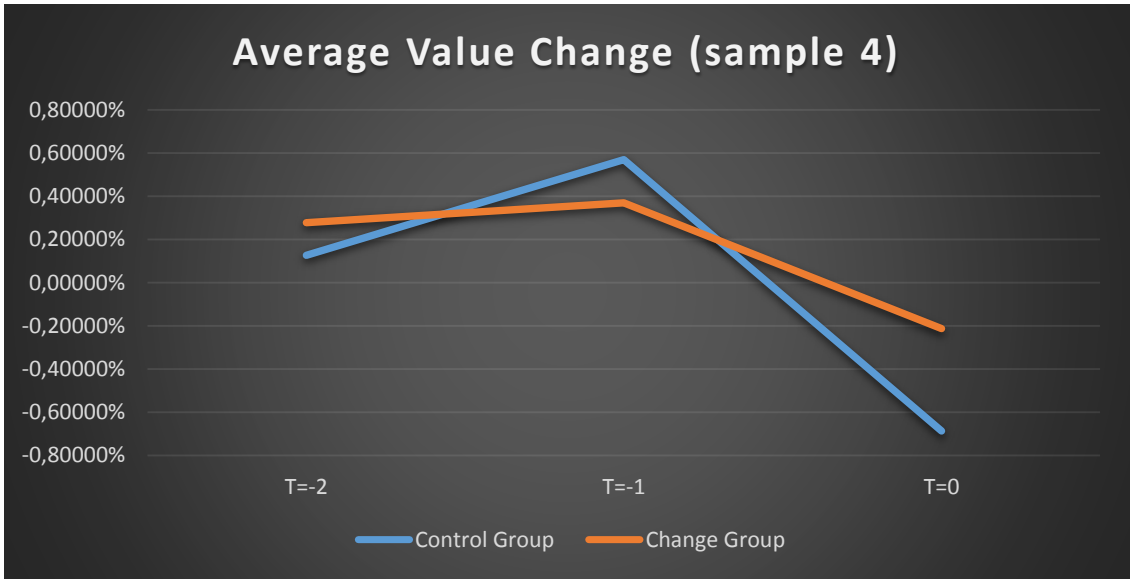
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 62. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 4 is presented on the next page, in Graph 5.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
4	N	Control	68	68	68
		Change	64	64	64
	Mean	Control	0,1262590%	0,5693476%	-0,6869264%
		Change	0,2769254%	0,3699379%	-0,2130958%
	Median	Control	0,0249255%	0,4333920%	-0,6952970%
		Change	0,2729445%	0,0720320%	-0,0610925%
	Std. Dev.	Control	0,9654962%	1,6376515%	0,7050847%
		Change	0,4038422%	0,6458630%	1,2298291%
	Range	Control	7,065672%	8,411564%	4,840071%
		Change	3,661877%	2,676264%	9,482892%
	Interquartile Range	Control	0,403899%	2,390287%	0,887916%
		Change	0,129316%	1,012880%	0,279528%

Table 9 Descriptive Statistics summary sample 4

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
4	Mean difference	0,1506664%	-0,1994097%	0,4738306%
	Median difference	0,2480190%	-0,3613600%	0,6342045%
	Std. Dev. difference	-0,5616540%	-0,9917885%	0,5247443%
	Range difference	-3,4037950%	-5,7353000%	4,6428210%
	I.Q. Range difference	-0,2745830%	-1,3774070%	-0,6083880%

Table 10 Group Differences summary sample 4



Graph 5 Mean Total Value Change development sample 4

4.1.5 Sample 5

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 5 is presented on the next page in Table 11 and Table 12. The total number of units in sample 5 is 201, were there are 155 units in the control group and 46 units in the change group.

The Mean (Median) change in total value at T=-2 (Q3 2012 compared to Q2 2012) is -0.6304174% (-0.4097860%) for the control group, and -0.5835140% (-0.5382740%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q2 2012. There is a Mean difference of 0.0469034%, and a Median difference of -0.1284880% between the change- and the control group. This indicates that the negative value change in the Mean is slightly smaller in the change group than in the control group, and that the negative value change in the Median is slightly smaller in the control group than in the change group.

The Mean (Median) change in total value at T=-1 (Q4 2012 compared to Q3 2012) is -0.7970412% (-0.7620370%) for the control group, and -1.1482925% (-0.9549665%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q3 2012. There is a Mean difference of -0.3512513%, and a Median difference of -0.1929295% between the change- and the control group. This indicates the negative value change in the Mean and the Median is slightly greater in the change group than in the control group.

The Mean (Median) change in total value at T=0 (Q1 2013 compared to Q4 2012), the moment that the real estate objects in the change group are actually switched from appraiser, is -0.8091992% (-0.6402630%) for the control group, and -1.9845181% (-0.5668920%) for the change group. This indicates that on average, in both groups there is a negative change in total value, compared to the Q4 2012. The difference in the value change in the Mean between the change- and control group is -1.1753189%, and the difference in the value change in the Median between the change- and the control group is 0.0733710 %. This indicates the negative value change in the Mean is considerably greater in the change group than in the change group at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The negative value change in the Median however, is slightly smaller in the change group than in the control group at T=0.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1. Only the Range for the control group at T=-1 is considerably different than for the change group. This is caused by some extreme values in the control group. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, there is a considerable difference in dispersion and spread between the two groups. The difference between the two groups at T=0 in the Range is 11,2676490%, the difference in the Interquartile Range is 4.9178800% and the difference in the Standard Deviation between the groups is 2.8626805%. This indicates that there is not only a difference in the Mean and Median average value change between the two groups at T=0, but that there is also a considerable difference between the groups in the dispersion and spread of the total value changes at T=0.

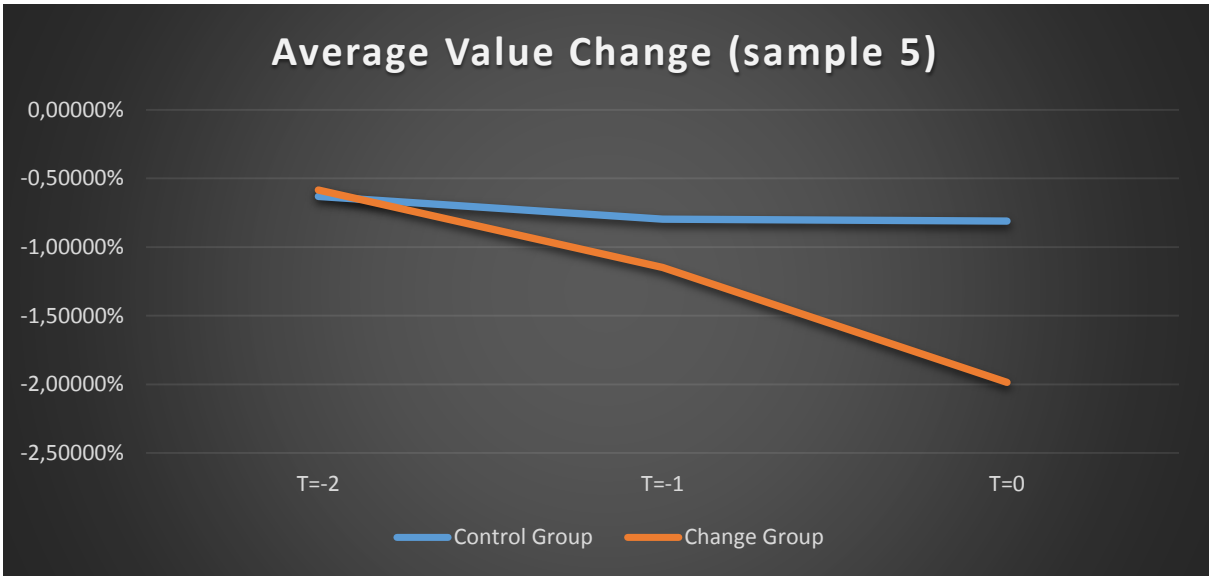
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 63. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 5 is presented on the next page, in Graph 6.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
5	N	Control	155	155	155
		Change	46	46	46
	Mean	Control	-0,6304174%	-0,7970412%	-0,8091992%
		Change	-0,5835140%	-1,1482925%	-1,9845181%
	Median	Control	-0,4097860%	-0,7620370%	-0,6402630%
		Change	-0,5382740%	-0,9549665%	-0,5668920%
	Std. Dev.	Control	1,1264438%	1,6120582%	1,1087186%
		Change	1,3740272%	1,0361652%	3,9713991%
	Range	Control	9,064105%	15,420495%	7,383889%
		Change	9,411771%	5,174121%	18,651538%
	Interquartile Range	Control	1,240556%	0,991553%	0,995161%
		Change	1,218573%	1,029495%	5,913041%

Table 11 Descriptive Statistics summary sample 5

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
5	Mean difference	0,0469034%	-0,3512513%	-1,1753189%
	Median difference	-0,1284880%	-0,1929295%	0,0733710%
	Std. Dev. difference	0,2475834%	-0,5758931%	2,8626805%
	Range difference	0,3476660%	-10,2463740%	11,2676490%
	I.Q. Range difference	-0,0219830%	0,0379420%	4,9178800%

Table 12 Group Differences summary sample 5



Graph 6 Mean Total Value Change development sample 5

4.1.6 Sample 6

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 6 is presented on the next page in Table 13 and Table 14Table 6. The total number of units in sample 6 is 157, were there are 106 units in the control group and 51 units in the change group.

The Mean (Median) change in total value at T=-2 (Q4 2012 compared to Q3 2012) is -0.89345160% (-0.7890355%) for the control group, and -0.61110720% (-0.7113110%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q3 2012. There is a Mean difference of 0.2823444%, and a Median difference of 0.0777245% between the change- and the control group. This indicates that the negative value change in the Mean is slightly smaller in the change group than in the control group, and that the negative value change in the Median is slightly smaller in the change group than in the control group.

The Mean (Median) change in total value at T=-1 (Q1 2013 compared to Q4 2012) is -0.78194960% (-0.6325905%) for the control group, and -0.88760930% (-0.7150720%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q4 2012. There is a Mean difference of -0.1056597%, and a Median difference of -0.0824815% between the change- and the control group. This indicates the negative value change in the Mean and the Median is slightly greater in the change group than in the control group.

The Mean (Median) change in total value at T=0 (Q2 2013 compared to Q1 2013), the moment that the real estate objects in the change group are actually switched from appraiser, is -0.98464590% (-0.7557025%) for the control group, and -1.79619240% (-1.9121200%) for the change group. This indicates that on average, in both groups there is a negative change in total value, compared to the Q1 2013. The difference in the value change in the Mean between the change- and control group is -0.8115465%, and the difference in the value change in the Median between the change- and the control group is -1.1564175%, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. This indicates the negative value change in the Mean and the Median is considerably greater in the change group than in the control group at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1. Only the Range for the control group at T=-2 is considerably different than for the change group. This is caused by some extreme values in the control group. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, there is a considerable difference in dispersion and spread between the two groups. The difference between the two groups at T=0 in the Range is 18.3753490%, the difference in the Interquartile Range is 1.9555910% and the difference in the Standard Deviation between the groups is 2.5526903%. This indicates that there is not only a difference in the Mean and Median average value change between the two groups at T=0, but that there is also a considerable difference between the groups in the dispersion and spread of the total value changes at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

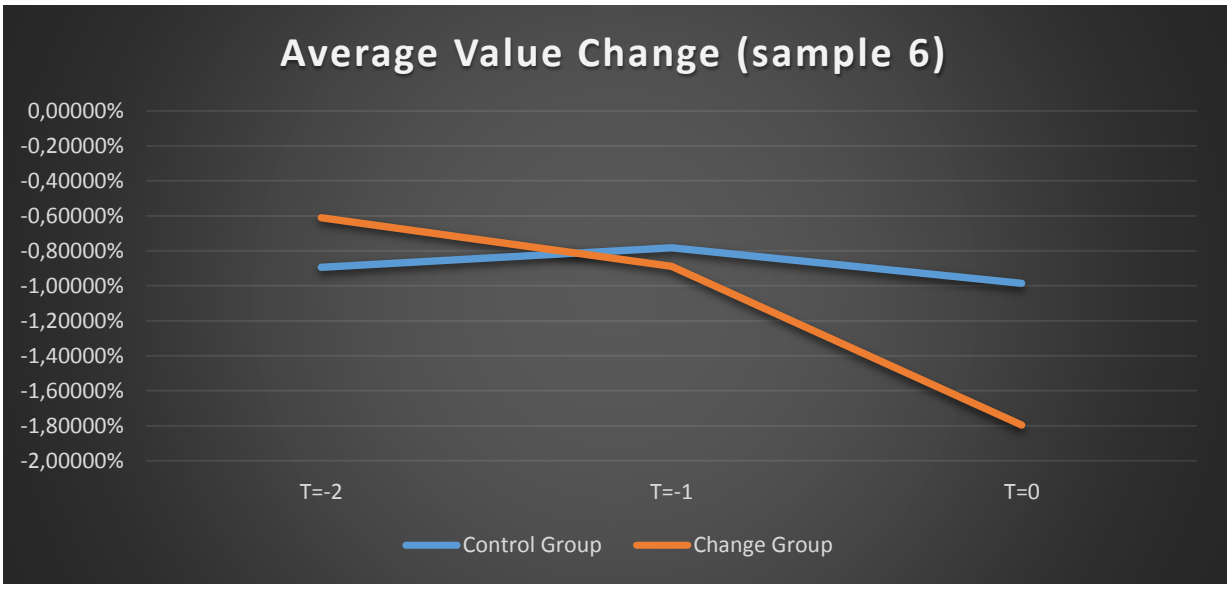
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 64. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 6 is presented on the next page, in Graph 7.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
6	N	Control	106	106	106
		Change	51	51	51
	Mean	Control	-0,89345160%	-0,78194960%	-0,98464590%
		Change	-0,61110720%	-0,88760930%	-1,79619240%
	Median	Control	-0,7890355%	-0,6325905%	-0,7557025%
		Change	-0,7113110%	-0,7150720%	-1,9121200%
	Std. Dev.	Control	1,62628552%	1,11110657%	1,25291768%
		Change	1,54973297%	1,09465183%	3,80560797%
	Range	Control	15,4204950%	6,8280560%	7,9550680%
		Change	9,3949040%	6,4496150%	26,3304170%
	Interquartile Range	Control	1,043043%	0,953357%	1,385537%
		Change	1,070489%	1,079470%	3,341128%

Table 13 Descriptive Statistics summary sample 6

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
6	Mean difference	0,2823444%	-0,1056597%	-0,8115465%
	Median difference	0,0777245%	-0,0824815%	-1,1564175%
	Std. Dev. difference	-0,0765525%	-0,0164547%	2,5526903%
	Range difference	-6,0255910%	-0,3784410%	18,3753490%
	I.Q. Range difference	0,0274460%	0,1261130%	1,9555910%

Table 14 Group Differences summary sample 6



Graph 7 Mean Total Value Change development sample 6

4.1.7 Sample 7

A summary of the descriptive statistics, as well as a summary of the group differences (the Change group measurements compared to the Control group measurements), for sample 7 is presented on the next page in Table 15 and Table 16. The total number of units in sample 7 is 106, were there are 58 units in the control group and 48 units in the change group.

The Mean (Median) change in total value at T=-2 (Q1 2013 compared to Q4 2012) is -0.5239076% (-0.4098460%) for the control group, and -1.0192602 % (-0.8012830%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q4 2013. There is a Mean difference of -0.4953526 %, and a Median difference of -0.3914370% between the change- and the control group. This indicates that the negative value change in the Mean and the Median is smaller in the change group than in the control group.

The Mean (Median) change in total value at T=-1 (Q2 2013 compared to Q1 2013) is -0.8206334% (-0.5963650%) for the control group, and -1.1373302% (-0.9223995%) for the change group. This indicates that on average, there is in both groups a negative change in total value, compared to Q1 2013. There is a Mean difference of -0-3166968 %, and a Median difference of -0.3260345% between the change- and the control group. This indicates the negative value change in the Mean and the Median is slightly greater in the change group than in the control group.

The Mean (Median) change in total value at T=0 (Q3 2013 compared to Q2 2013), the moment that the real estate objects in the change group are actually switched from appraiser, is -1.0696223% (-1.0872253%) for the control group, and -2.1568476% (-2.4051520%) for the change group. This indicates that on average, in both groups there is a negative change in total value, compared to the Q2 2013. The difference in the value change in the Mean between the change- and control group is -1.0872253%, and the difference in the value change in the Median between the change- and the control group is -1.4294465% at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. This indicates the negative value change in the Mean and the Median is considerably greater in the change group than in the control group at T=0, the moment that the real estate objects in the change group are actually switched from appraiser.

The dispersion and spread of the total value changes, measured by the Range, the Interquartile Range and the Standard Deviation, are almost equal for the control- and change group at T=-2 at T=-1. At T=0, however, the moment that the real estate objects in the change group are actually switched from appraiser, there is a considerable difference in dispersion and spread between the two groups. The difference between the two groups at T=0 in the Range is 12.3644760%, the difference in the Interquartile Range is 3.2970090% and the difference in the Standard Deviation between the groups is 2.5284634%. This indicates that there is not only a difference in the Mean and Median average value change between the two groups at T=0, but that there is also a considerable difference between the groups in the dispersion and spread of the total value changes.

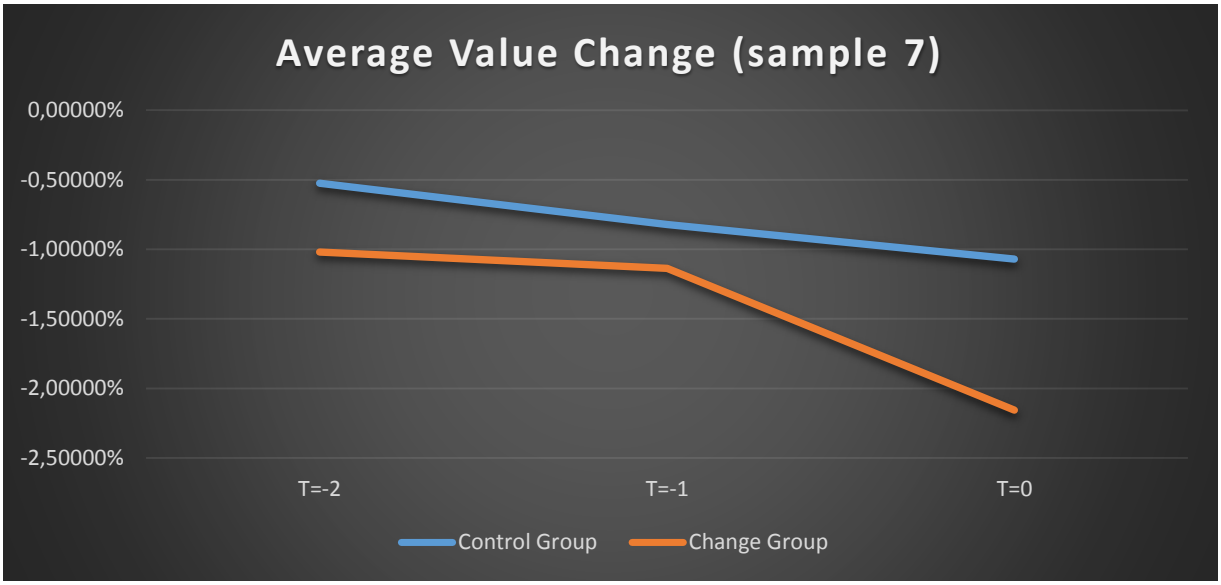
A graphical representation of the differences in the dispersion and spread between the two groups, throughout all the measurement moments in the sample, is presented in 8.10 Appendix X: Boxplots of % change in Total Value per sample, Figure 65. A graphical representation of the Mean Total Value Change development throughout the measurement moments in sample 7 is presented on the next page, in Graph 8.

Descriptive Statistics summary					
Sample	Description	Group	T = -2	T = -1	T = 0
7	N	Control	58	58	58
		Change	48	48	48
	Mean	Control	-0,5239076%	-0,8206334%	-1,0696223%
		Change	-1,0192602%	-1,1373302%	-2,1568476%
	Median	Control	-0,4098460%	-0,5963650%	-0,9757055%
		Change	-0,8012830%	-0,9223995%	-2,4051520%
	Std. Dev.	Control	1,0065093%	1,0508208%	0,8506405%
		Change	1,0394272%	1,4486758%	3,3791039%
	Range	Control	6,081662%	6,102052%	4,734643%
		Change	5,949916%	6,777201%	17,099119%
	Interquartile Range	Control	0,809334%	1,121646%	0,713683%
		Change	0,865221%	1,817661%	4,010692%

Table 15 Descriptive Statistics summary sample 7

Group Differences summary				
Sample	Description	T = -2	T = -1	T = 0
7	Mean difference	-0,4953526%	-0,3166968%	-1,0872253%
	Median difference	-0,3914370%	-0,3260345%	-1,4294465%
	Std. Dev. difference	0,0329179%	0,3978550%	2,5284634%
	Range difference	-0,1317460%	0,6751490%	12,3644760%
	I.Q. Range difference	0,0558870%	0,6960150%	3,2970090%

Table 16 Group Differences summary sample 7



Graph 8 Mean Total Value Change development sample 7

4.2 EVENT STUDY RESULTS

The aim of this section is to provide the results of the event study for each sample. The event study was done in order to research the hypothesis that when a real estate object is valued by a different appraiser, e.g. an appraiser switch, there will be variance in the valuation. To test the hypothesis there were statistical tests (T-Tests and Non-Parametric Tests) conducted in order to test whether the observed differences between the control group and the change group, as presented in the previous section, are significant. A summary of the event study results is presented below, in Table 17. The complete results of the performed statistical tests can be found in 8.11 Appendix XI: Event Study Statistical Test results.

In this section the results of the performed statistical tests will be presented, per sample and per measurement moment, in order to determine whether the observed differences between the control group and the change group, as presented in the previous section, are significant.

Event Study Results summary					
Sample	Test	Description	T = -2	T = -1	T = 0
1	T-Test	Mean difference	0,12273113%	-0,14056220%	1,08720897%
		Sig. (2-tailed)	0,812	0,469	0,155
	Non-Parametric	Decision	Retain	Retain	Retain
		Sig.	0,248	0,416	0,182
2	T-Test	Mean difference	-0,01865260%	0,06427484%	1,89402054%
		Sig. (2-tailed)	0,976	0,716	0,000
	Non-Parametric	Decision	Retain	Retain	Reject
		Sig.	0,757	0,184	0,001
3	T-Test	Mean difference	0,53415591%	1,16517953%	0,72559635%
		Sig. (2-tailed)	0,000	0,000	0,001
	Non-Parametric	Decision	Reject	Reject	Reject
		Sig.	0,001	0,000	0,000
4	T-Test	Mean difference	-0,15066640%	0,19940970%	-0,47383050%
		Sig. (2-tailed)	0,250	0,365	0,007
	Non-Parametric	Decision	Reject	Reject	Reject
		Sig.	0,000	0,358	0,000
5	T-Test	Mean difference	-0,04690340%	0,35125130%	1,17531887%
		Sig. (2-tailed)	0,833	0,082	0,001
	Non-Parametric	Decision	Retain	Reject	Retain
		Sig.	0,906	0,040	0,920
6	T-Test	Mean difference	-0,28234440%	0,10565971%	0,81154649%
		Sig. (2-tailed)	0,295	0,574	0,049
	Non-Parametric	Decision	Retain	Retain	Reject
		Sig.	0,358	0,546	0,010
7	T-Test	Mean difference	0,49535261%	0,31669679%	1,08722539%
		Sig. (2-tailed)	0,015	0,196	0,020
	Non-Parametric	Decision	Reject	Retain	Reject
		Sig.	0,003	0,213	0,006

Table 17 Event Study Results summary

4.2.1 Sample 1

On average at T=-2, the negative value change is greater in the change group (M=-1.6086958%, SE=2.02201532%) than in the control group (M=-1.4859647%, SE=3.03706628%). The difference between the change group and the control group (0.12273113%) was **not significant** t(87.4)=0.239, p(0.248) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test indicate that there is also **no significant difference**, p(0.248) > 0.05, in the distributions of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-2.

On average at T=-1, the negative value change is less in the change group (M=-0.5300623%, SE=0.82478220%) than in the control group (M=-0.6706244%, SE=1.08364223%). The difference between the change group and the control group (-0.01405622%) was **not significant** t(87.4)=-0.728, p(0.416) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.416) > 0.05 in the distributions of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the value change is negative in the change group (M=-0.8436887%, SE=5.19908126%) and positive in the control group (M=0.24352022%, SE=1.09879826%). The difference between the change group and the control group (1.08720897%) was **not significant** t(98)=1.433, p(0.182) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate there is also **no significant difference**, p(0.182) > 0.05 in the distributions of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.2 Sample 2

On average at T=-2, the positive value change is less in the change group (M=-0.6706244%, SE=1.08364223%) than in the control group (M=-0.6892771%, SE=4.17793943%). The difference between the change group and the control group (-0.0186526%) was **not significant** t(151)=-0.031, p(0.976) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.757) > 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the positive value change is less in the change group (M=0.24352022%, SE=1.09879826%) than in the control group (M=0.30779507, SE=0.81844308%). The difference between the change group and the control group (0.06427484%) was **not significant** t(74.017)=-0.365, p(0.716) > 0.05 This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.184) > 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the value change is negative in the change group (M=-1.6247223%, SE=4.99044273%) and positive in the control group (M=0.26929819, SE=0.84692428%). The difference between the change group and the control group (1.89402054%) was **significant** t(151)=3.770, p(0.000) < 0.05. This indicates that

there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.001) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.3 Sample 3

On average at T=-2, the positive value change is less in the change group (M=0.04189976%, SE=1.01408898%) than in the control group (M=-0.57605567%, SE=0.58984495%). The difference between the change group and the control group (0.053415591%) was **significant** t(153)=4.148, p(0.000) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.001) < 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the value change is negative in the change group (M=-0.9079736%, SE=1.31206523%) and positive in the control group (M=0.25720594, SE=0.82235308%). The difference between the change group and the control group (1.16517953%) was **significant** t(153)=-6.783, p(0.000) < 0.05 This indicates that there is a significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.00) > 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the value change is negative in the change group (M=-0.3622476%, SE=1.02787114%) and positive in the control group (M=0.36334880, SE=1.30828053%). The difference between the change group and the control group (0.72559636%) was **significant** t(153)=3.532, p(0.001) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.000) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.4 Sample 4

On average at T=-2, the positive value change is greater in the change group (M=0.27692538%, SE=0.40384222%) than in the control group (M=0.12625897%, SE=0.96549616%). The difference between the change group and the control group (-0.1506664%) was **not significant** t(130)=-1.157, p(0.250) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test however, indicate that there is **a significant difference**, p(0.000) < 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the positive value change is less in the change group (M=0.36993786%, SE=0.08073288%) than in the control group (M=0.56934756, SE=1.63765148%). The difference between the change group and the control group (0.19940970%) was **not significant** t(130)=0.910, p(0.365) > 0.05 This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.358) > 0.05 in the distribution of the value changes

between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the negative value change is less in the change group (M=-0.2130958%, SE=1.22982905%) than in the control group (M=-0.6869264, SE=0.70508474%). The difference between the change group and the control group (-0.4738305%) was **significant** t(99.091)=-2.694, p(0.008) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.000) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.5 Sample 5

On average at T=-2, the negative value change is less in the change group (M=-0.5835140%, SE=1.37402718%) than in the control group (M=-0.6304174%, SE=1.12644378%). The difference between the change group and the control group (-0.0469034%) was **not significant** t(63.998)=-0.211, p(0.833) > 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.906) > 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the negative value change is greater in the change group (M=-1.1482925%, SE=1.03616518 %) than in the control group (M=-0.7970412, SE=1.61205823%). The difference between the change group and the control group (0.35125130%) was **not significant** t(115.461)=1.754, p(0.082) > 0.05 This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test however, indicate that there is also **a significant difference**, p(0.0.40) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the negative value change is greater in the change group (M=-1.9845181%, SE=3.9139906%) than in the control group (M=-0.8091992, SE=1.10871859%). The difference between the change group and the control group (1.17531887%) was **significant** t(199)=3.293, p(0.001) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.920) > 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.6 Sample 6

On average at T=-2, the negative value change is less in the change group (M=-0.6111072%, SE=1.54973297%) than in the control group (M=-0.8934516%, SE=1.62628552 %). The difference between the change group and the control group (-0.2823444%) was **not significant** t(103.222)=-1.052, p(0.295)> 0.05. This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.358) > 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the negative value change is greater in the change group (M=-0.8876093%, SE=1.09465183%) than in the control group (M=-0.7819496, SE=1.11110657%). The difference between the change group and the control group (0.10565971%) was **not significant** t(100.139)=-0.564, p(0.564) > 0.05 This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.546) > 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the negative value change is greater in the change group (M=-1.7961924%, SE=3.80560797%) than in the control group (M=0-0.9846459, SE=0.84692428%). The difference between the change group and the control group (0.81154649%) was **significant** t(155)=1.989, p(0.049) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.010) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

4.2.7 Sample 7

On average at T=-2, the negative value change is greater in the change group (M=-1.0192602%, SE=1.03942718%) than in the control group (M=-0.5239076%, SE=1.00650925%). The difference between the change group and the control group (0.49535261%) was **significant** t(99.060)=2.478, p(0.015) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.003) > 0.05, in the distributions of the value changes between the real estate objects in change group and the real estate objects in the control group at T=-2.

On average at T=-1, the negative value change is greater in the change group (M=-1.1373302%, SE=1.44867584%) than in the control group (M=-0.8206334, SE=1.05082083%). The difference between the change group and the control group (0.31669679%) was **not significant** t(104)=1.302, p(0.196) > 0.05 This indicates that there is no significant difference in the average value change between the change group and the control group. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **no significant difference**, p(0.213) > 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=-1.

On average at T=0, the moment that the real estate objects in the change group are actually switched from appraiser, the negative value change is greater in the change group (M=-2.1568476%, SE=3.37910392%) than in the control group (M=-1.0696223, SE=0.8506054%). The difference between the change group and the control group (1.08722539%) was **significant** t(104)=2.364, p(0.020) < 0.05. This indicates that there is a significant difference in the average value change between the change group and the control group, at T=0, the moment that the real estate objects in the change group are actually switched from appraiser. The results of the Non-Parametric, Independent-Samples Mann-Whitney U Test, indicate that there is also **a significant difference**, p(0.006) < 0.05 in the distribution of the value changes between the real estate objects in the change group and the real estate objects in the control group at T=0.

5.0 CONCLUSION

This research examined the effect of an appraiser switch on the valuation of Dutch real estate by investigating the valuation outcomes of real estate objects, and in particular the changes in the outcomes of the valuations. The real estate objects used in for the analysis are a part of the real estate portfolio of the Bouwinvest Dutch Institutional Residential Fund, which is managed by Bouwinvest REIM. The Business- and Corporate Controllers at Bouwinvest REIM, as well as the management of Bouwinvest REIM, have the presumption that the circulation of appraisers is related with a significant depreciation of the real estate objects. Therefore the main research question for this research was formulated as:

"What is the effect of an appraiser switch on the valuation of Dutch Real Estate?"

To answer this research question, quantitative data and research methods were used. This chapter aims to formulate an answer to the main research question by presenting the conclusions of the quantitative analysis that were conducted on the effect of an appraiser switch on the valuation of Dutch Real Estate.

In order to determine if there is any effect of an appraiser switch on the valuation of Dutch real estate, the research was set up as an event study. The main advantage of this research methodology is that it allowed the exclusion and controlling for any time-specific factors. Besides this advantage of the event study, this methodology made is possible to compare two groups, a Change group and a Control group. This was done in order to investigate whether the appraiser switch has an effect on real estate valuation, compared to a group of real estate objects that have not been switched from appraiser at the same time.

An analysis of the descriptive statistics was conducted at first. The analysis was based on the percentage of change in the valuation of real estate objects throughout the measurement moments. The analysis was conducted per sample, per measurement moment and per group (Control group and Change group). The analysis of the descriptive statistics was focussed on the Mean, the Median, the Standard Deviation, Range and Interquartile Range.

In order to research if the real estate valuations of the change group differ significantly from the benchmark, the control group, statistical test were applied, as well as a qualitative analysis of the descriptive statistics. Both independent T-Tests, as well as Non-Parametric Tests were conducted in order to research the difference between the control group and the change group.

The outcomes of the performed analysis and research could be divided into two different aggregation levels:

1. The effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level

2. The effect of an appraiser switch on the valuation of Dutch Real Estate on real estate object level

In the next section the conclusions of the research and analysis will be presented at both levels, section 5.1 will focus on the effect on real estate portfolio level and section 5.2 will focus on the effect on real estate object level.

5.1 THE EFFECT ON REAL ESTATE PORTFOLIO LEVEL

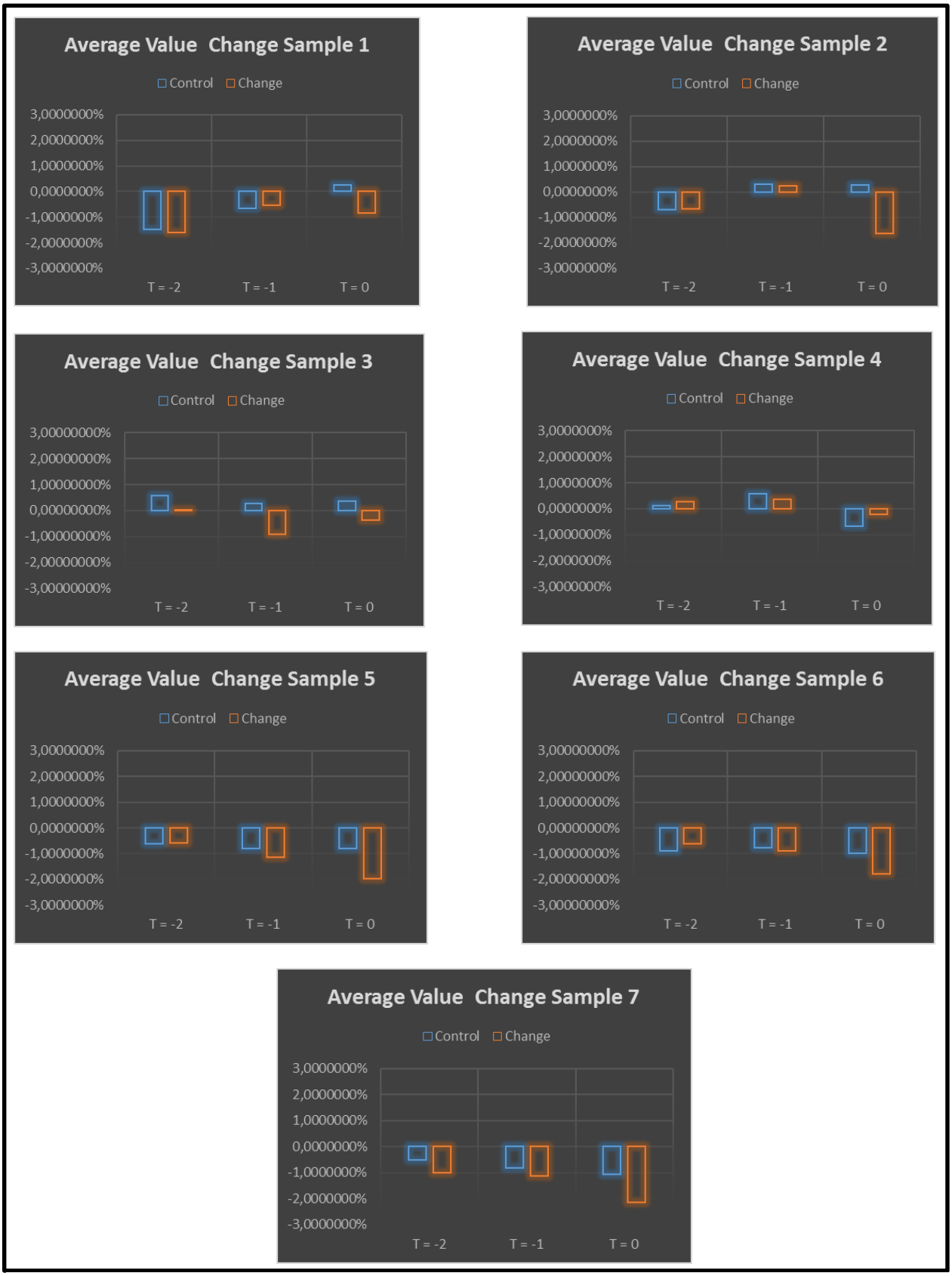
The results of the descriptive statistics indicate that there are differences in the average value change between the Change group and the Control group. The first remarkable outcome of the analysis of the descriptive statistics is that not in all the samples these differences in average value change, are only at the moment that there is an appraiser switch. The differences in average value change between the control group and the change group are also presented in several samples at t=-2 and t=-1. This indicates that a difference in average value change can also be presented when there is no appraiser switched.

The average value change, per sample, per group and per measurement moment are presented in Table 18. A graphical representation of the average value change is presented on the next page in Graph 9.

Descriptive Statistics summary

Sample	Description	Group	T = -2	T = -1	T = 0
1	Mean	Control	-1,4859647%	-0,6706244%	0,2435202%
		Change	-1,6086958%	-0,5300623%	-0,8436887%
2	Mean	Control	-0,6892771%	0,3077951%	0,2692982%
		Change	-0,6706244%	0,2435202%	-1,6247223%
3	Mean	Control	0,57605567%	0,25720594%	0,36334880%
		Change	0,04189976%	-0,90797360%	-0,36224790%
4	Mean	Control	0,1262590%	0,5693476%	-0,6869264%
		Change	0,2769254%	0,3699379%	-0,2130958%
5	Mean	Control	-0,6304174%	-0,7970412%	-0,8091992%
		Change	-0,5835140%	-1,1482925%	-1,9845181%
6	Mean	Control	-0,89345160%	-0,78194960%	-0,98464590%
		Change	-0,61110720%	-0,88760930%	-1,79619240%
7	Mean	Control	-0,5239076%	-0,8206334%	-1,0696223%
		Change	-1,0192602%	-1,1373302%	-2,1568476%

Table 18 Descriptive Statistics summary

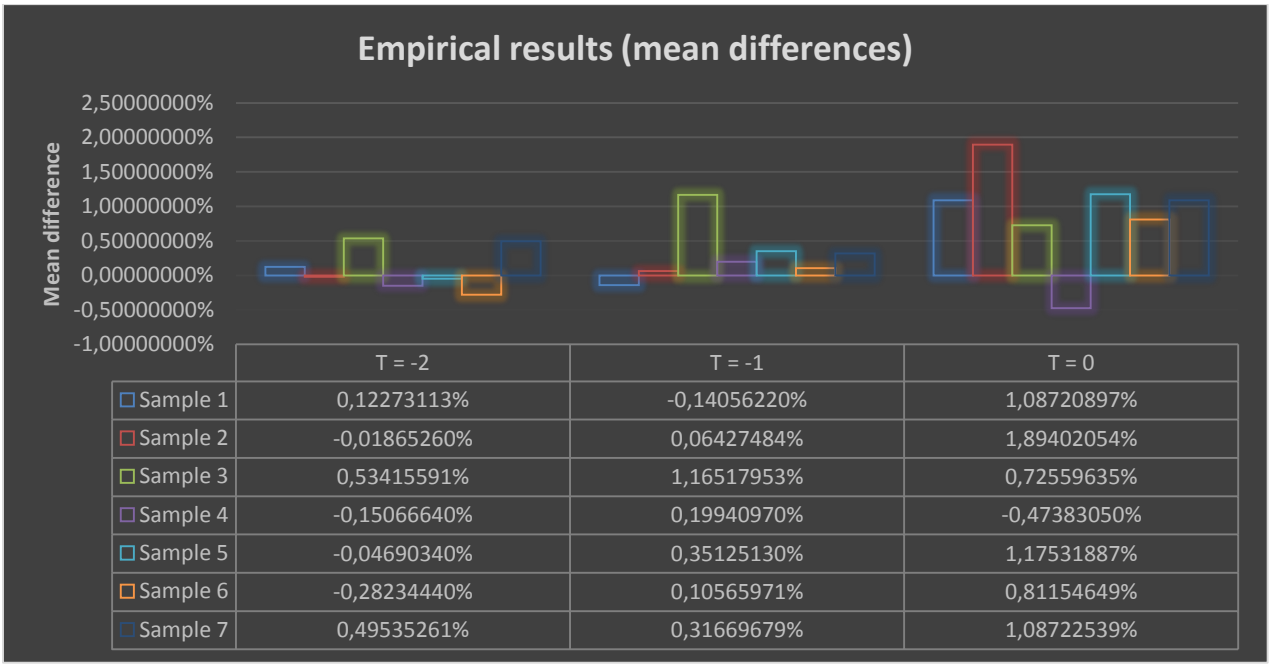


Graph 9 Average Value Changes (Per sample)

The results of the T-tests indicate that not all differences in average value change are significant. An overview of the average value change differences and their significance is presented below in Table 19. A graphical representation of the difference in average value change is presented below in Graph 10.

Research Results summary					
Sample	Test	Description	T = -2	T = -1	T = 0
1	T-Test	Mean difference	0,12273113%	-0,14056220%	1,08720897%
		Sig. Difference	No	No	No
2	T-Test	Mean difference	-0,01865260%	0,06427484%	1,89402054%
		Sig. (2-tailed)	No	No	Yes
3	T-Test	Mean difference	0,53415591%	1,16517953%	0,72559635%
		Sig. (2-tailed)	Yes	Yes	Yes
4	T-Test	Mean difference	-0,15066640%	0,19940970%	-0,47383050%
		Sig. (2-tailed)	No	No	Yes
5	T-Test	Mean difference	-0,04690340%	0,35125130%	1,17531887%
		Sig. (2-tailed)	No	No	Yes
6	T-Test	Mean difference	-0,28234440%	0,10565971%	0,81154649%
		Sig. (2-tailed)	No	No	Yes
7	T-Test	Mean difference	0,49535261%	0,31669679%	1,08722539%
		Sig. (2-tailed)	Yes	No	Yes

Table 19 Research Results summary



Graph 10 Empirical Results

From the performed research, analysis and results as presented in thesis, several conclusions can be drawn in relation to the effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level. The research results indicate that there are differrences in average value change between the control group and the change group. In two of the seven samples these difference are significant at moments that there is not an actual appraiser switch. However, in six of the seven samples these differences in average value change are significant at the moment that there is an actual appraiser switch.

This leads therefore to conclude that there is an significant effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level.

When looking at the direction of the average value changes, and the differences in average value changes between the control and the change group, the results indicate that these differences are not always in the same direction. At first the direction of the average value changes will be discussed at the moment that there was no actual appraiser change.

From the fourtheen measurement moments when there is no actual appraiser switch, at five measurement moment the negative average value change is bigger in the change group than in the control group is. This indicates that at these measurement moments, on average, the real estate objects in the change group are more depreciated than the real estate objects in the control group. However, only at one of these meausurement moments the difference apperaered to be significant.

From the fourtheen measurement moments when there is no actual appraiser switch, at four measurement moment the negative average value change is bigger in the control group than in the change group is. This indicates that at these measurement moments, on average, the real estate objects in the control group are more depreciated than the real estate objects in the change group. However, at none of these meausurement moments the difference apperaered to be significant.

From the fourtheen measurement moments when there is no actual appraiser switch, at three measurement moment the positve average value change is less in the change group than in the control group is. This indicates that at these measurement moments, on average, the real estate objects in the change group are less appriciatied than the real estate objects in the control group. However, only at one of these meausurement moments the difference apperaered to be significant.

From the fourtheen measurement moments when there is no actual appraiser switch, at one measurement moment the positive average value change is bigger in the change group than in the control group is. This indicates that at this measurement moment, on average, the real estate objects in the change group are more appriciated than the real estate objects in the change group. However, at this meausurement moment the difference apperaered not to be significant.

From the fourtheen measurement moments when there is no actual appraiser switch, at one measurement moment there was a positve average value change in the control group, and a negative average value change in the change group is. This indicates that at this measurement moment, on average, the real estate objects in the change group were depreciatied, and the real estate objects in the control group were appriciated. However, at this meausurement moment the difference apperaered not to be significant.

This leads therefore to conclude that there is no significant difference in the direction of the average value change, between the control group and the change group, at the moments that there was no actual appraiser switch.

When looking at the direction of the average value changes, and the differences in average value changes between the control and the change group, at the moment when there was an actual appraiser switch, the results indicate that these differences are not always in the same direction.

From the seven measurement moments when there is an actual appraiser switch, at three measurement moment the negative average value change is bigger in the change group than in the control group is. This indicates that at these measurement moments, on average, the real estate objects in the change group are more depreciated than the real estate objects in the control group. At all three of these meausurement moments the difference apperaered to be significant.

From the seven measurement moments when there is an actual appraiser switch, at one measurement moment the negative average value change is bigger in the control group than in the change group is. This indicates that at this measurement moment, on average, the real estate objects in the control group are more depreciated than the real estate objects in the change group. The difference at this meausurement moment apperaered to be significant.

From the fourtheen measurement moments when there is no actual appraiser switch, at three measurement moments there was a positve average value change in the control group, and a negative average value change in the change group is. This indicates that at these measurement moments, on average, the real estate objects in the change group were depreciatied, and the real estate objects in the control group were appriciated. At all three of these meausurement moments the difference apperaered to be significant.

This leads therefore to conclude that there is a significant, negative difference in the direction of the average value change, between the change group and the control group, at the moments that there was an actual appraiser switch.

The results of the research, and the conclusions drawn from this results, lead therefore to conclude on the effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level that:

There is an significant, negative effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level.

5.2 THE EFFECT ON REAL ESTATE OBJECT LEVEL

The effect of an appraiser switch on the valuation of Dutch Real Estate does not only have an impact on portfolio level, but also on individual real estate object levels. The average value changes on portfolio level appeared not that big, due to the fact that these were based on the mean value change on portfolio level.

An analysis of the descriptive statistics, and in particular the range and the interquartile range data, provided an insight on the effect of an appraiser switch on real estate object level. A boxplot, which displays the range differences in value change between the control group and the change group, at the moment that an appraiser is switched, is presented below in Figure 8.

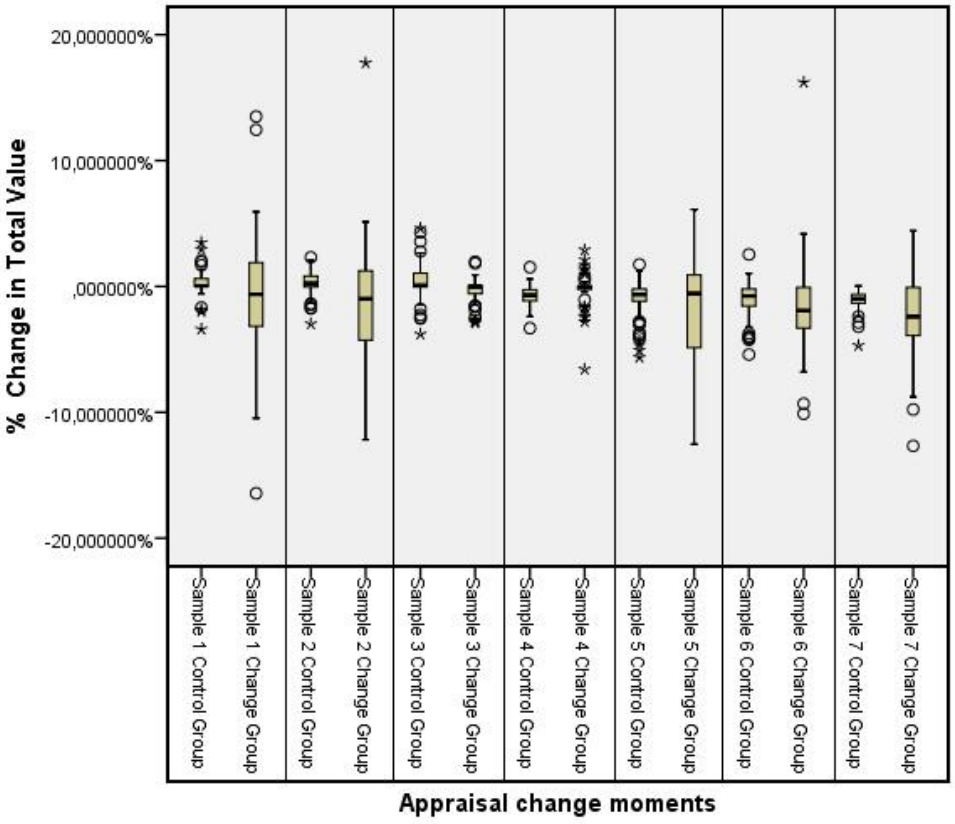


Figure 8 Boxplot of the Value Change Range at the moment an appraiser is switched

The boxplot presented above in Figure 8 shows that in five of the seven samples, there is an evident difference in the range of value change, between the control group and the change group. This indicates that on portfolio level the average value change in the change group could differ just a bit from the control group, but on real estate object level there can be influential differences in value change.

The results of the research, and the conclusions drawn from this results, lead therefore to conclude on the effect of an appraiser switch on the valuation of Dutch Real Estate on real estate object level that:

The relative small effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level, could have a relative big effect on real estate object level.

6.0 DISCUSSION

The aim of this section is to discuss the research results and conclusion. Also the managerial implications for Bouwinvest REIM will be addressed and recommendations for further research will be made.

6.1 RESEARCH CONCLUSION DISCUSSION

The main conclusion of the performed research is that there is an significant, negative effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level. Also the relative small effect of an appraiser switch on the valuation of Dutch Real Estate on real estate portfolio level, could have a relative big effect on real estate object level.

Due to the fact that the appraisal of real estate object is done by humans, and not by machines, it is not really that strange that if someone else is appraising a real estate object, the outcome/value will slightly differ from the previous taxation. This is also highlighted in the literature on real estate valuation by French and Gabrielli (2005). According to French and Gabrielli (2005) this is inherent to the method that is used by appraisers for the valuation of real estate objects, the Discounted Cash Flow Method. *"By allowing for a range in the inputs, in either the All Risks Yield approach or the Discounted Cash Flow method, the valuer is openly acknowledging that there will always be a degree of uncertainty in the choice of input variables that must mean that the output figure, the valuation, is not a single figure"* (French & Gabrielli, 2005).

In relation to reliability and variance in the input variables of the Discounted Cashflow Model, French and Gabrielli (2005) state *that "…valuers tend not to conceptualise uncertainty in the form of standard deviations around a mean. Instead, they think in terms of "most likely" figure, the "best" and the "worst". This is a triangular (3–point) distribution. In other words, once the valuer has determined the most likely input, as used in both of the static models above, it would be possible for them to quantify their uncertainty on each variable by asking them what they believed that the corresponding best and worst figures could be".* (French & Gabrielli, 2005)

On the outcome side of a real estate object valuation there also seems to be some room for discussion. Appraisers are currently asked by their clients to provide one single figure for the value of a real estate object. According to French and Gabrielli (2005) , *"the acknowledgement of the fact that the value of a property is not a single point is not a new concept. In other professions, most obviously the valuations of chattels and fine arts, the valuation is never given as a single figure but as a range (and often a very large range). Until an item is sold, the price is not determined. And as a valuation is simply an estimate of price (in advance of, or in the absence) of a sale, then the number provided can only ever be a best estimate".*

However, a range of values on a real estate object would not serve the purpose of the owner of the real estate object. But what French and Gabrielli (2005) suggest, is that *"…the valuation figure should be placed in context and that the user would be better informed if the single point estimate provided was placed in context. By accepting that uncertainty exists, then a wise client may prefer to be informed about it, provided that it is reported in an organised and helpful way"*.

Therefore, according to Boyd (2003), the emphasis should be placed on the selection and quantification of the key input variables in the studies. These variables include the discount rate, the terminal capital rate and the rental growth rate. Both the description of the discounted cash flow model, as well as the research performed by Boyd (2003), show that these are the most influential variables in the discounted cash flow model. In order to assess the certainty of the output it is necessary, according to Boyd (2003), to determine a range or profile for these key variables. Profiling the probability distribution of these variables is the more accurate way of defining these variables, and thereby reducing the variance in the outcome of the valuations, due to an appraiser switch.

6.2 MANAGERIAL IMPLICATIONS

The main conclusion of this research is in line with the presumption of the Business- and Corporate Controllers at Bouwinvest REIM, as well as the management of Bouwinvest REIM. According to their opinion *"….when a real estate object is switched from appraiser, it will be depreciated".* The results of this research support that presumption. Based on the outcomes of the research, and the discussion of the research conclusion, several managerial implications for Bouwinvest REIM could be derived.

At first the effect of an appraiser switch on portfolio level seems not very big. However, on real estate object level the effect of an appraiser switch can be influential. Therefore it would be recommended for Bouwinvest REIM to look at the absolute value of the real estate objects that are switched from appraiser. If in one quartile all the high value assets are switched from appraiser, it is to be expected that the impact on the portfolio value will be significant. Already not all real estate objects are switched at the same time, but a focus on an (relative) equal group of real estate objects, in term of absolute value, would be recommended.

The second important managerial implication for Bouwinvest REIM would be to focus more on the input parameters of the Discounted Cash Flow model. The theory on variance in real estate appraisal highlights the importance of these input variables, and in particular the Discount Rate, Exit Yield and Rental Growth Rate. Also, due to the two scenarios (Uitponden vs Exploitatie) that are currently used in the Discounted Cash Flow model, the underlying input parameters of the Discounted Cashflow Model, are not comparable between the two scenarios. If a real estate object "switches" from scenario, the previous input parameters could not be used as a benchmark for the other scenario.

The last managerial implication for Bouwinvest REIM would be to monitor the development of the input parameters, as well as the outcome of the valuations, more closely and more into detail. This research showed that there is a significant, negative effect of an appraiser switch on the valuation of Dutch Real Estate on portfolio level, but maybe even more important, that there have been influential negative effects on the value of individual real estate objects.

6.3 RECOMMENDATIONS FOR FURTHER RESEARCH

The recommendations for further research are in line with the discussion of the conclusion and the managerial implications for Bouwinvest REIM.

The first are area that should be a topic for further research is the influence of the input parameters in the Discounted Cash Flow model. In particular how the variance in valuation outcomes could be explained by variance in the input parameters. Variance in valuation can only be caused by variance in the underlying parameters of the valuation model.

The second recommendation for further research would be research on the effect of an appraisal switch on individual real estate during a certain timeframe. As this research has shown, the effects of an appraisal switch on individual real estate objects could be influential. A cross-sectional time series research, focussed on the value development of several individual real estate objects could provide more insight in the effects of an appraisal switch in absolute value and developments during the time.

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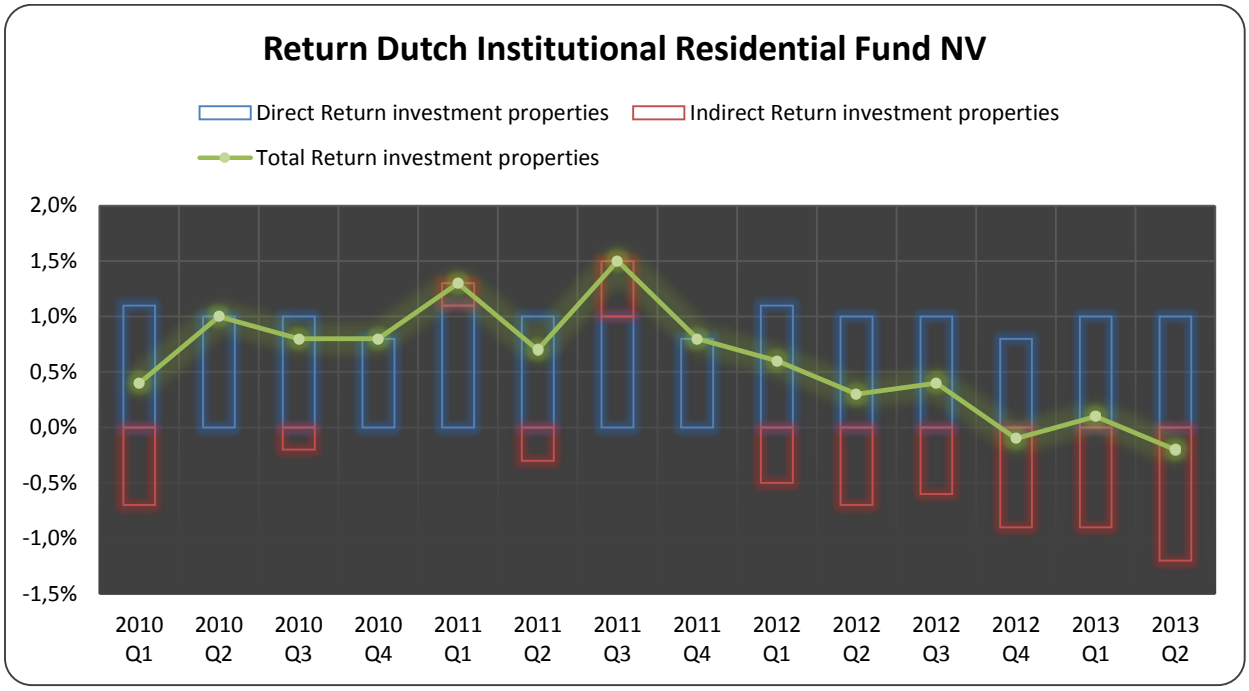
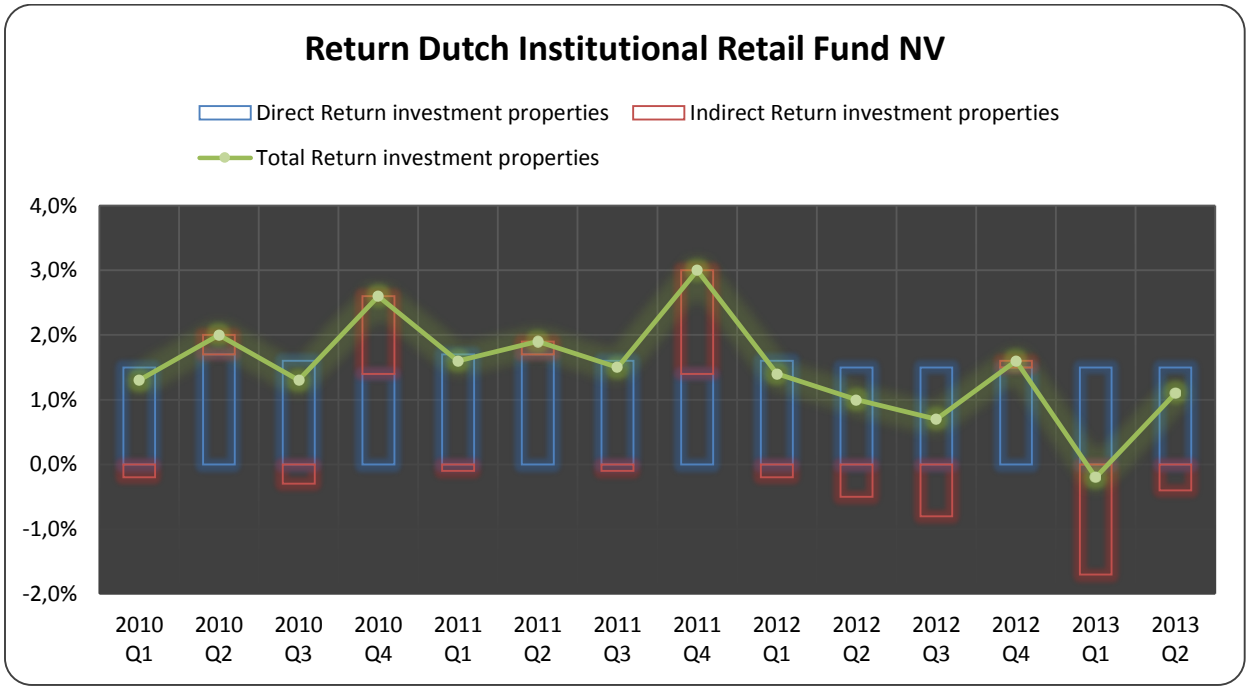
8.0 APPENDIX

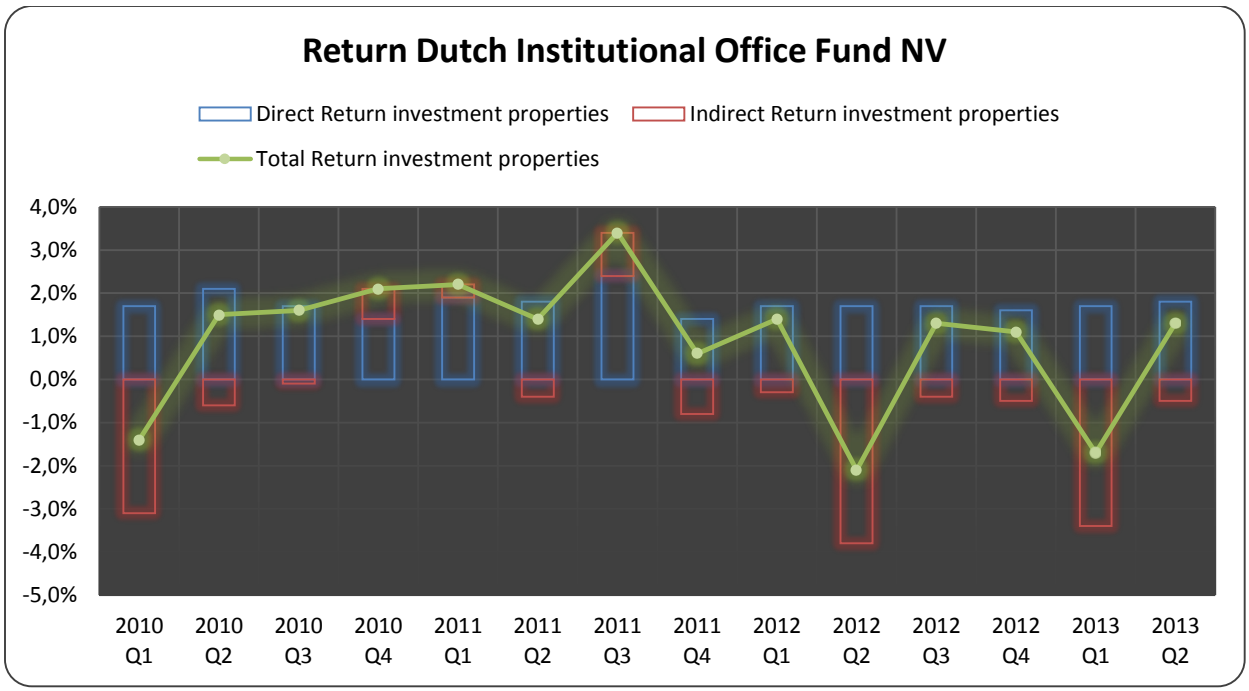
8.1 APPENDIX I: RETURNS OF THE REAL ESTATE INVESTMENT FUNDS



Graph 11 Return Dutch Institutional Residential Fund NV



Graph 12 Return Dutch Institutional Retail Fund NV



Graph 13 Return Dutch Institutional Office Fund NV

8.2 APPENDIX II: CONCEPTUAL FRAMEWORK ON MARKET VALUE

The definition of *market value* shall be applied in accordance with the following conceptual framework (International Valuation Standards Counsil, 2011):

a) "the estimated amount" refers to a price expressed in terms of money payable for the asset in an arm's length market transaction. *Market value* is the most probable price reasonably obtainable in the market on the *valuation date* in keeping with the *market value* definition. It is the best price reasonably obtainable by the seller and the most advantageous price reasonably obtainable by the buyer. This estimate specifically excludes an estimated price inflated or deflated by special terms or circumstances such as atypical financing, sale and leaseback arrangements, special considerations or concessions granted by anyone associated with the sale, or any element of *special value*;
b) "an asset should exchange" refers to the fact that the value of an asset is an estimated amount rather than a predetermined amount or actual sale price. It is the price in a transaction that meets all the elements of the market value definition at the *valuation date*;
c) "on the *valuation date*" requires that the value is time-specific as of a given date. Because markets and market conditions may change, the estimated value may be incorrect or inappropriate at another time. The valuation amount will reflect the actual market state and circumstances as of the effective *valuation date*, not as of either a past or future date. The definition also assumes simultaneous exchange and completion of the contract for sale without any variation in price that might otherwise be made;
d) "between a willing buyer" refers to one who is motivated, but not compelled to buy. This buyer is neither over eager nor determined to buy at any price. This buyer is also one who purchases in accordance with the realities of the current market and with current market expectations, rather than in relation to an imaginary or hypothetical market that cannot be demonstrated or anticipated to exist. The assumed buyer would not pay a higher price than the market requires. The present owner is included among those who constitute "the market";
e) "and a willing seller" is neither an over eager nor a forced seller prepared to sell at any price, nor one prepared to hold out for a price not considered reasonable in the current market. The willing seller is motivated to sell the asset at market terms for the best price attainable in the open market after proper marketing, whatever that price may be. The factual circumstances of the actual owner are not a part of this consideration because the willing seller is a hypothetical owner;
f) "in an arm's length transaction" is one between parties who do not have a particular or special relationship, eg parent and subsidiary companies or landlord and tenant, that may make the price level uncharacteristic of the market or inflated because of an element of s*pecial value*. The *market value* transaction is presumed to be between unrelated parties, each acting independently;
g) "after proper marketing" means that the asset would be exposed to the market in the most appropriate manner to effect its disposal at the best price reasonably obtainable in accordance with the *market value* definition. The method of sale is deemed to be that most appropriate to obtain the best price in the market to which the seller has access. The length of exposure time is not a fixed period but will vary according to the type of asset and market conditions. The only criterion is that there must have been sufficient time to allow the asset to be brought to the attention of an adequate number of market participants. The exposure period occurs prior to the *valuation date*;
h) "where the parties had each acted knowledgeably, prudently" presumes that both the willing buyer and the willing seller are reasonably informed about the nature and characteristics of the asset, its actual and potential uses and the state of the market as of the *valuation date*. Each is further presumed to use that knowledge prudently to seek the price that is most favourable for their respective positions in the transaction. Prudence is assessed by referring to the state of the market at the *valuation date*, not with benefit of hindsight at some later date. For example, it is not necessarily imprudent for a seller to sell assets in a market with falling prices at a price that is lower than previous market levels. In such cases, as is true for other exchanges in markets with

changing prices, the prudent buyer or seller will act in accordance with the best market information available at the time;

i) “and without compulsion” establishes that each party is motivated to undertake the transaction, but neither is forced or unduly coerced to complete it.

8.3 APPENDIX III: DISCOUNTED CASH FLOW MODEL SCENARIOS

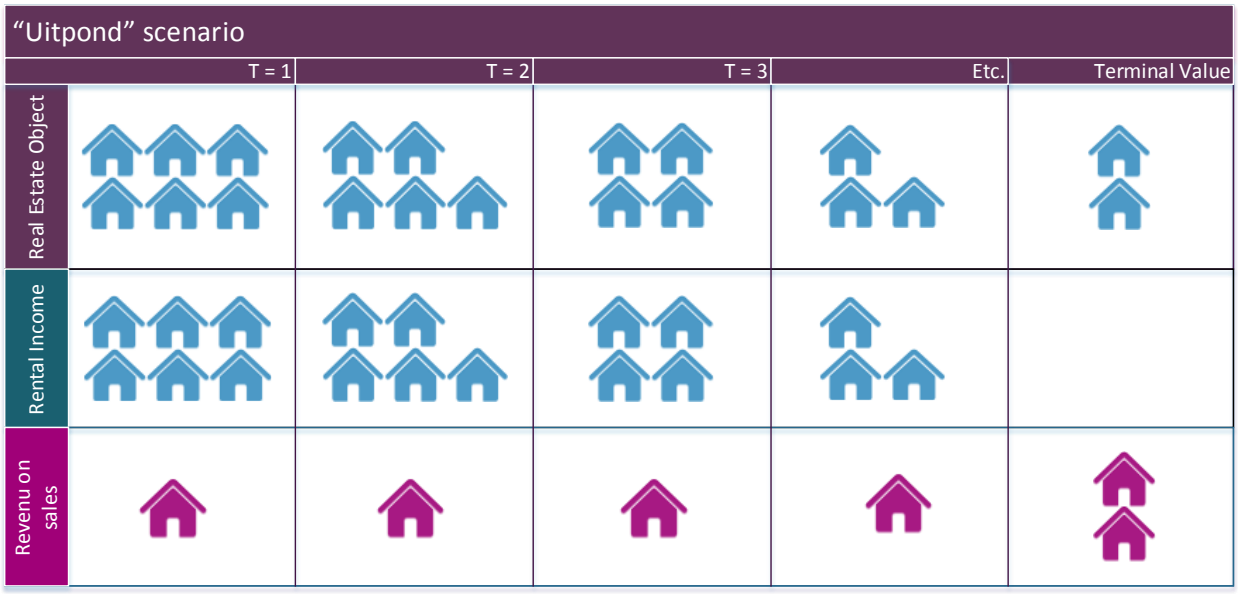


Figure 9 Graphical representation of the "Uitpond" scenario

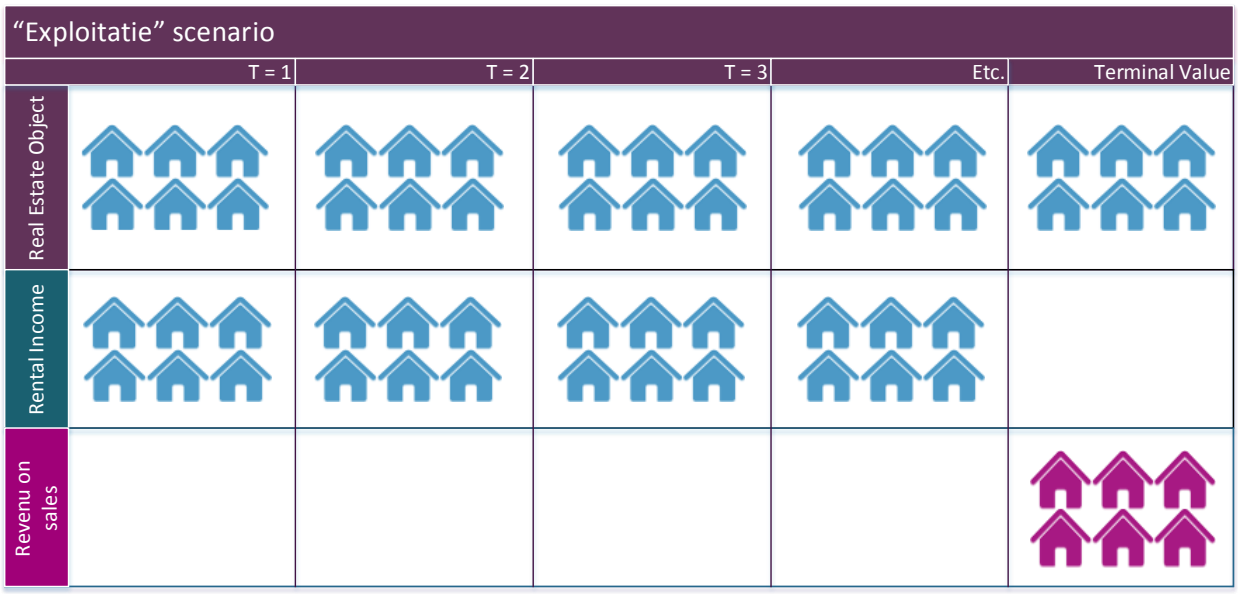


Figure 10 Graphical representation of the "Exploitatie" scenario

8.4 APPENDIX IV: RESEARCH SAMPLE CONSTRUCTION

Research Sample Construction				
Sample	Group	T=-2	T=-1	T=0
1	Control Group	**2009 Q4** No appraiser change	**2010 Q1** No appraiser change	**2010 Q2** No appraiser change
	Change Group	**2009 Q4** No appraiser change	**2010 Q1** No appraiser change	**2010 Q2** Appraiser Change
2	Control Group	**2010 Q1** No appraiser change	**2010 Q2** No appraiser change	**2010 Q3** No appraiser change
	Change Group	**2010 Q1** No appraiser change	**2010 Q2** No appraiser change	**2010 Q3** Appraiser Change
3	Control Group	**2010 Q3** No appraiser change	**2010 Q4** No appraiser change	**2011 Q1** No appraiser change
	Change Group	**2010 Q3** No appraiser change	**2010 Q4** No appraiser change	**2011 Q1** Appraiser Change
4	Control Group	**2010 Q4** No appraiser change	**2011 Q1** No appraiser change	**2011 Q2** No appraiser change
	Change Group	**2010 Q4** No appraiser change	**2011 Q1** No appraiser change	**2011 Q2** Appraiser Change
5	Control Group	**2012 Q3** No appraiser change	**2012 Q4** No appraiser change	**2013 Q1** No appraiser change
	Change Group	**2012 Q3** No appraiser change	**2012 Q4** No appraiser change	**2013 Q1** Appraiser Change
6	Control Group	**2012 Q4** No appraiser change	**2013 Q1** No appraiser change	**2013 Q2** No appraiser change
	Change Group	**2012 Q4** No appraiser change	**2013 Q1** No appraiser change	**2013 Q2** Appraiser Change
7	Control Group	**2013 Q1** No appraiser change	**2013 Q2** No appraiser change	**2013 Q3** No appraiser change
	Change Group	**2013 Q1** No appraiser change	**2013 Q2** No appraiser change	**2013 Q3** Appraiser Change

Table 20 Research Sample Construction

8.5 APPENDIX V: SAMPLE CONSISTENCY CHECKS

Sample 1 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1326110	1326110	1326110	✓
1326310	1326310	1326310	✓
1327410	1327410	1327410	✓
1327610	1327610	1327610	✓
1328710	1328710	1328710	✓
1329410	1329410	1329410	✓
1330210	1330210	1330210	✓
1331410	1331410	1331410	✓
1332110	1332110	1332110	✓
1332210	1332210	1332210	✓
1332310	1332310	1332310	✓
1332410	1332410	1332410	✓
1337810	1337810	1337810	✓
1340510	1340510	1340510	✓
1340511	1340511	1340511	✓
1340512	1340512	1340512	✓
1345110	1345110	1345110	✓
1345410	1345410	1345410	✓
1346810	1346810	1346810	✓
1347410	1347410	1347410	✓
1347510	1347510	1347510	✓
1349310	1349310	1349310	✓
1349710	1349710	1349710	✓
1349810	1349810	1349810	✓
1349910	1349910	1349910	✓
1350110	1350110	1350110	✓
1350310	1350310	1350310	✓
1350810	1350810	1350810	✓
1350910	1350910	1350910	✓
1351110	1351110	1351110	✓
1351210	1351210	1351210	✓
1352010	1352010	1352010	✓
1352710	1352710	1352710	✓
1355710	1355710	1355710	✓
1355910	1355910	1355910	✓
1358010	1358010	1358010	✓
1358011	1358011	1358011	✓
1358810	1358810	1358810	✓
1362910	1362910	1362910	✓
1369710	1369710	1369710	✓
1374210	1374210	1374210	✓
1375410	1375410	1375410	✓
1375810	1375810	1375810	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376510	1376510	1376510	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	
1326010	1326010	1326010	✓
1326210	1326210	1326210	✓
1328510	1328510	1328510	✓
1336210	1336210	1336210	✓
1337710	1337710	1337710	✓
1339110	1339110	1339110	✓
1344610	1344610	1344610	✓
1349210	1349210	1349210	✓
1350210	1350210	1350210	✓
1353210	1353210	1353210	✓
1353710	1353710	1353710	✓
1354510	1354510	1354510	✓
1355810	1355810	1355810	✓
1356011	1356011	1356011	✓
1356711	1356711	1356711	✓
1357910	1357910	1357910	✓
1357911	1357911	1357911	✓
1358410	1358410	1358410	✓
1358510	1358510	1358510	✓
1358610	1358610	1358610	✓
1359810	1359810	1359810	✓
1360210	1360210	1360210	✓
1360211	1360211	1360211	✓
1360410	1360410	1360410	✓
1360411	1360411	1360411	✓
1360510	1360510	1360510	✓
1360511	1360511	1360511	✓
1361010	1361010	1361010	✓
1361110	1361110	1361110	✓
1361111	1361111	1361111	✓
1361112	1361112	1361112	✓
1361113	1361113	1361113	✓
1361114	1361114	1361114	✓
1361115	1361115	1361115	✓
1361116	1361116	1361116	✓
1361117	1361117	1361117	✓
1361610	1361610	1361610	✓
1362911	1362911	1362911	✓
1366910	1366910	1366910	✓
1366911	1366911	1366911	✓
1370710	1370710	1370710	✓
1371110	1371110	1371110	✓
1371210	1371210	1371210	✓
1371310	1371310	1371310	✓
1371311	1371311	1371311	✓
1374910	1374910	1374910	✓
1374911	1374911	1374911	✓
1375710	1375710	1375710	✓
1376410	1376410	1376410	✓
1376610	1376610	1376610	✓
1379910	1379910	1379910	✓

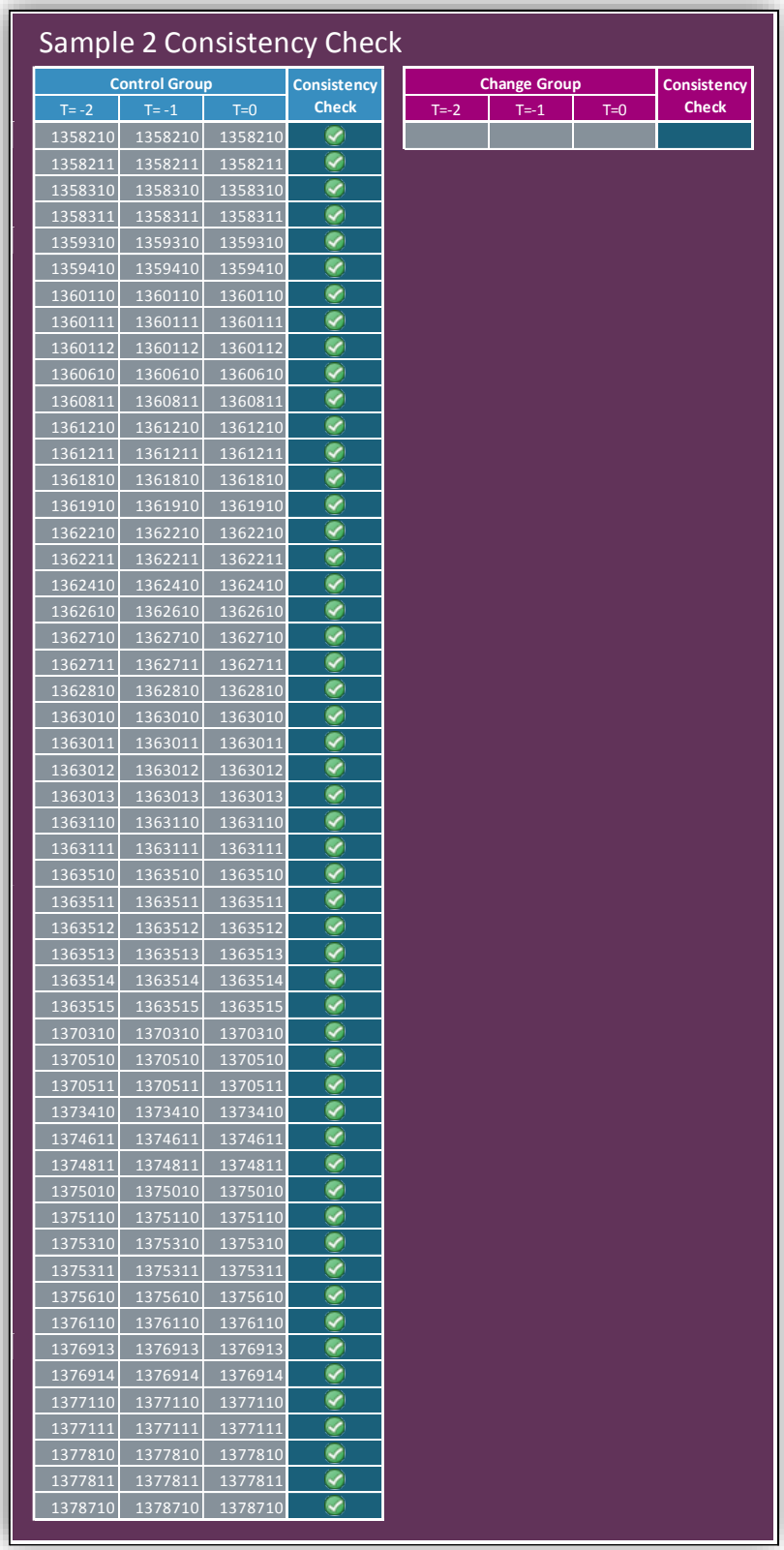
Table 21 Sample 1 Consistency Check

Sample 2 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1325810	1325810	1325810	✓
1325812	1325812	1325812	✓
1325813	1325813	1325813	✓
1325814	1325814	1325814	✓
1326710	1326710	1326710	✓
1327810	1327810	1327810	✓
1328110	1328110	1328110	✓
1328111	1328111	1328111	✓
1328610	1328610	1328610	✓
1329010	1329010	1329010	✓
1329110	1329110	1329110	✓
1330310	1330310	1330310	✓
1330410	1330410	1330410	✓
1331210	1331210	1331210	✓
1332910	1332910	1332910	✓
1333410	1333410	1333410	✓
1333411	1333411	1333411	✓
1333910	1333910	1333910	✓
1334010	1334010	1334010	✓
1334310	1334310	1334310	✓
1338210	1338210	1338210	✓
1338410	1338410	1338410	✓
1338810	1338810	1338810	✓
1340810	1340810	1340810	✓
1342010	1342010	1342010	✓
1342410	1342410	1342410	✓
1342610	1342610	1342610	✓
1343510	1343510	1343510	✓
1344410	1344410	1344410	✓
1346910	1346910	1346910	✓
1347110	1347110	1347110	✓
1348310	1348310	1348310	✓
1350010	1350010	1350010	✓
1352410	1352410	1352410	✓
1353410	1353410	1353410	✓
1353810	1353810	1353810	✓
1354010	1354010	1354010	✓
1354110	1354110	1354110	✓
1354710	1354710	1354710	✓
1355010	1355010	1355010	✓
1355210	1355210	1355210	✓
1355310	1355310	1355310	✓
1355410	1355410	1355410	✓
1355411	1355411	1355411	✓
1355610	1355610	1355610	✓
1356810	1356810	1356810	✓
1357110	1357110	1357110	✓
1357210	1357210	1357210	✓
1357211	1357211	1357211	✓
1358110	1358110	1358110	✓
1358111	1358111	1358111	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	
1326110	1326110	1326110	✓
1326310	1326310	1326310	✓
1327410	1327410	1327410	✓
1327610	1327610	1327610	✓
1328710	1328710	1328710	✓
1329410	1329410	1329410	✓
1330210	1330210	1330210	✓
1331410	1331410	1331410	✓
1332110	1332110	1332110	✓
1332210	1332210	1332210	✓
1332310	1332310	1332310	✓
1332410	1332410	1332410	✓
1337810	1337810	1337810	✓
1340510	1340510	1340510	✓
1340511	1340511	1340511	✓
1340512	1340512	1340512	✓
1345110	1345110	1345110	✓
1345410	1345410	1345410	✓
1346810	1346810	1346810	✓
1347410	1347410	1347410	✓
1347510	1347510	1347510	✓
1349310	1349310	1349310	✓
1349710	1349710	1349710	✓
1349810	1349810	1349810	✓
1349910	1349910	1349910	✓
1350110	1350110	1350110	✓
1350310	1350310	1350310	✓
1350810	1350810	1350810	✓
1350910	1350910	1350910	✓
1351110	1351110	1351110	✓
1351210	1351210	1351210	✓
1352010	1352010	1352010	✓
1352710	1352710	1352710	✓
1355710	1355710	1355710	✓
1355910	1355910	1355910	✓
1358010	1358010	1358010	✓
1358011	1358011	1358011	✓
1358810	1358810	1358810	✓
1362910	1362910	1362910	✓
1369710	1369710	1369710	✓
1374210	1374210	1374210	✓
1375410	1375410	1375410	✓
1375810	1375810	1375810	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376510	1376510	1376510	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓

Table 22 Sample 2 Consistency Check (part 1)



Sample 2 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1358210	1358210	1358210	✓
1358211	1358211	1358211	✓
1358310	1358310	1358310	✓
1358311	1358311	1358311	✓
1359310	1359310	1359310	✓
1359410	1359410	1359410	✓
1360110	1360110	1360110	✓
1360111	1360111	1360111	✓
1360112	1360112	1360112	✓
1360610	1360610	1360610	✓
1360811	1360811	1360811	✓
1361210	1361210	1361210	✓
1361211	1361211	1361211	✓
1361810	1361810	1361810	✓
1361910	1361910	1361910	✓
1362210	1362210	1362210	✓
1362211	1362211	1362211	✓
1362410	1362410	1362410	✓
1362610	1362610	1362610	✓
1362710	1362710	1362710	✓
1362711	1362711	1362711	✓
1362810	1362810	1362810	✓
1363010	1363010	1363010	✓
1363011	1363011	1363011	✓
1363012	1363012	1363012	✓
1363013	1363013	1363013	✓
1363110	1363110	1363110	✓
1363111	1363111	1363111	✓
1363510	1363510	1363510	✓
1363511	1363511	1363511	✓
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1370310	1370310	1370310	✓
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1373410	1373410	1373410	✓
1374611	1374611	1374611	✓
1374811	1374811	1374811	✓
1375010	1375010	1375010	✓
1375110	1375110	1375110	✓
1375310	1375310	1375310	✓
1375311	1375311	1375311	✓
1375610	1375610	1375610	✓
1376110	1376110	1376110	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1377810	1377810	1377810	✓
1377811	1377811	1377811	✓
1378710	1378710	1378710	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	

Table 23 Sample 2 Consistency Check (part 2)

Sample 3 Consistency Check

Control Group			Consistency Check	Change Group			Consistency Check
T= -2	T= -1	T=0		T=-2	T=-1	T=0	
1325810	1325810	1325810	✓	1326710	1326710	1326710	✓
1325812	1325812	1325812	✓	1328110	1328110	1328110	✓
1325813	1325813	1325813	✓	1328111	1328111	1328111	✓
1325814	1325814	1325814	✓	1328510	1328510	1328510	✓
1326010	1326010	1326010	✓	1328610	1328610	1328610	✓
1326210	1326210	1326210	✓	1332910	1332910	1332910	✓
1327810	1327810	1327810	✓	1333910	1333910	1333910	✓
1329010	1329010	1329010	✓	1336210	1336210	1336210	✓
1329110	1329110	1329110	✓	1337710	1337710	1337710	✓
1330310	1330310	1330310	✓	1338410	1338410	1338410	✓
1330410	1330410	1330410	✓	1340810	1340810	1340810	✓
1331210	1331210	1331210	✓	1342010	1342010	1342010	✓
1333410	1333410	1333410	✓	1343510	1343510	1343510	✓
1333411	1333411	1333411	✓	1344610	1344610	1344610	✓
1334010	1334010	1334010	✓	1348310	1348310	1348310	✓
1334310	1334310	1334310	✓	1353810	1353810	1353810	✓
1338210	1338210	1338210	✓	1354710	1354710	1354710	✓
1338810	1338810	1338810	✓	1355210	1355210	1355210	✓
1339110	1339110	1339110	✓	1355410	1355410	1355410	✓
1342410	1342410	1342410	✓	1355411	1355411	1355411	✓
1342610	1342610	1342610	✓	1356011	1356011	1356011	✓
1344410	1344410	1344410	✓	1357910	1357910	1357910	✓
1346910	1346910	1346910	✓	1357911	1357911	1357911	✓
1347110	1347110	1347110	✓	1358310	1358310	1358310	✓
1349210	1349210	1349210	✓	1358311	1358311	1358311	✓
1350010	1350010	1350010	✓	1360110	1360110	1360110	✓
1350210	1350210	1350210	✓	1360111	1360111	1360111	✓
1352410	1352410	1352410	✓	1360112	1360112	1360112	✓
1353210	1353210	1353210	✓	1360210	1360210	1360210	✓
1353410	1353410	1353410	✓	1360211	1360211	1360211	✓
1353710	1353710	1353710	✓	1360811	1360811	1360811	✓
1354010	1354010	1354010	✓	1361210	1361210	1361210	✓
1354110	1354110	1354110	✓	1361211	1361211	1361211	✓
1354510	1354510	1354510	✓	1361610	1361610	1361610	✓
1355010	1355010	1355010	✓	1361910	1361910	1361910	✓
1355310	1355310	1355310	✓	1362410	1362410	1362410	✓
1355610	1355610	1355610	✓	1362610	1362610	1362610	✓
1355810	1355810	1355810	✓	1362710	1362710	1362710	✓
1356711	1356711	1356711	✓	1362711	1362711	1362711	✓
1356810	1356810	1356810	✓	1363110	1363110	1363110	✓
1357110	1357110	1357110	✓	1363111	1363111	1363111	✓
1357210	1357210	1357210	✓	1366910	1366910	1366910	✓
1357211	1357211	1357211	✓	1366911	1366911	1366911	✓
1358110	1358110	1358110	✓	1370310	1370310	1370310	✓
1358111	1358111	1358111	✓	1374811	1374811	1374811	✓
1358210	1358210	1358210	✓	1375010	1375010	1375010	✓
1358211	1358211	1358211	✓	1375310	1375310	1375310	✓
1358410	1358410	1358410	✓	1375311	1375311	1375311	✓
1358510	1358510	1358510	✓	1375610	1375610	1375610	✓
1358610	1358610	1358610	✓	1375710	1375710	1375710	✓
1359310	1359310	1359310	✓	1376610	1376610	1376610	✓

Table 24 Sample 3 Consistency Check (part 1)

Sample 3 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1359410	1359410	1359410	✓
1359810	1359810	1359810	✓
1360410	1360410	1360410	✓
1360411	1360411	1360411	✓
1360510	1360510	1360510	✓
1360511	1360511	1360511	✓
1360610	1360610	1360610	✓
1361010	1361010	1361010	✓
1361110	1361110	1361110	✓
1361111	1361111	1361111	✓
1361112	1361112	1361112	✓
1361113	1361113	1361113	✓
1361114	1361114	1361114	✓
1361115	1361115	1361115	✓
1361116	1361116	1361116	✓
1361117	1361117	1361117	✓
1361810	1361810	1361810	✓
1362210	1362210	1362210	✓
1362211	1362211	1362211	✓
1362810	1362810	1362810	✓
1362911	1362911	1362911	✓
1363010	1363010	1363010	✓
1363011	1363011	1363011	✓
1363012	1363012	1363012	✓
1363013	1363013	1363013	✓
1363510	1363510	1363510	✓
1363511	1363511	1363511	✓
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1370710	1370710	1370710	✓
1371110	1371110	1371110	✓
1371210	1371210	1371210	✓
1371310	1371310	1371310	✓
1371311	1371311	1371311	✓
1373410	1373410	1373410	✓
1374611	1374611	1374611	✓
1374910	1374910	1374910	✓
1374911	1374911	1374911	✓
1375110	1375110	1375110	✓
1376110	1376110	1376110	✓
1376410	1376410	1376410	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1379910	1379910	1379910	✓

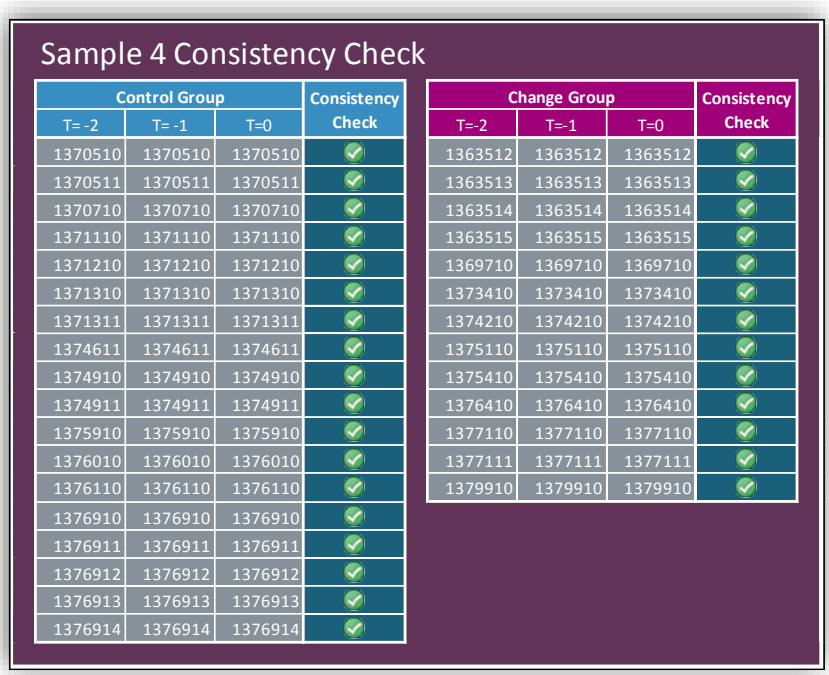
Change Group			Consistency Check
T=-2	T=-1	T=0	
1377810	1377810	1377810	✓
1377811	1377811	1377811	✓
1378710	1378710	1378710	✓

Table 25 Sample 3 Consistency Check (part 2)

Sample 4 Consistency Check

Control Group			Consistency Check	Change Group			Consistency Check
T= -2	T= -1	T=0		T=-2	T=-1	T=0	
1325810	1325810	1325810	✓	1326210	1326210	1326210	✓
1325812	1325812	1325812	✓	1326310	1326310	1326310	✓
1325813	1325813	1325813	✓	1330310	1330310	1330310	✓
1325814	1325814	1325814	✓	1330410	1330410	1330410	✓
1326010	1326010	1326010	✓	1332410	1332410	1332410	✓
1326110	1326110	1326110	✓	1334010	1334010	1334010	✓
1327810	1327810	1327810	✓	1337810	1337810	1337810	✓
1329010	1329010	1329010	✓	1338210	1338210	1338210	✓
1329110	1329110	1329110	✓	1339110	1339110	1339110	✓
1331210	1331210	1331210	✓	1342410	1342410	1342410	✓
1331410	1331410	1331410	✓	1344410	1344410	1344410	✓
1332210	1332210	1332210	✓	1346810	1346810	1346810	✓
1333410	1333410	1333410	✓	1346910	1346910	1346910	✓
1333411	1333411	1333411	✓	1347110	1347110	1347110	✓
1334310	1334310	1334310	✓	1350110	1350110	1350110	✓
1338810	1338810	1338810	✓	1350810	1350810	1350810	✓
1340510	1340510	1340510	✓	1351110	1351110	1351110	✓
1340511	1340511	1340511	✓	1353210	1353210	1353210	✓
1340512	1340512	1340512	✓	1353410	1353410	1353410	✓
1342610	1342610	1342610	✓	1355010	1355010	1355010	✓
1345110	1345110	1345110	✓	1355310	1355310	1355310	✓
1347510	1347510	1347510	✓	1355710	1355710	1355710	✓
1349210	1349210	1349210	✓	1357210	1357210	1357210	✓
1349310	1349310	1349310	✓	1357211	1357211	1357211	✓
1349710	1349710	1349710	✓	1358110	1358110	1358110	✓
1350010	1350010	1350010	✓	1358111	1358111	1358111	✓
1350210	1350210	1350210	✓	1358210	1358210	1358210	✓
1350310	1350310	1350310	✓	1358211	1358211	1358211	✓
1352410	1352410	1352410	✓	1358410	1358410	1358410	✓
1353710	1353710	1353710	✓	1358510	1358510	1358510	✓
1354010	1354010	1354010	✓	1358610	1358610	1358610	✓
1354110	1354110	1354110	✓	1359310	1359310	1359310	✓
1354510	1354510	1354510	✓	1359810	1359810	1359810	✓
1355610	1355610	1355610	✓	1361010	1361010	1361010	✓
1355810	1355810	1355810	✓	1361110	1361110	1361110	✓
1355910	1355910	1355910	✓	1361111	1361111	1361111	✓
1356711	1356711	1356711	✓	1361112	1361112	1361112	✓
1356810	1356810	1356810	✓	1361113	1361113	1361113	✓
1357110	1357110	1357110	✓	1361114	1361114	1361114	✓
1358010	1358010	1358010	✓	1361115	1361115	1361115	✓
1358011	1358011	1358011	✓	1361116	1361116	1361116	✓
1358810	1358810	1358810	✓	1361117	1361117	1361117	✓
1359410	1359410	1359410	✓	1361810	1361810	1361810	✓
1360410	1360410	1360410	✓	1362910	1362910	1362910	✓
1360411	1360411	1360411	✓	1362911	1362911	1362911	✓
1360510	1360510	1360510	✓	1363010	1363010	1363010	✓
1360511	1360511	1360511	✓	1363011	1363011	1363011	✓
1360610	1360610	1360610	✓	1363012	1363012	1363012	✓
1362210	1362210	1362210	✓	1363013	1363013	1363013	✓
1362211	1362211	1362211	✓	1363510	1363510	1363510	✓
1362810	1362810	1362810	✓	1363511	1363511	1363511	✓

Table 26 Sample 4 Consistency Check (part 1)



Sample 4 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1370710	1370710	1370710	✓
1371110	1371110	1371110	✓
1371210	1371210	1371210	✓
1371310	1371310	1371310	✓
1371311	1371311	1371311	✓
1374611	1374611	1374611	✓
1374910	1374910	1374910	✓
1374911	1374911	1374911	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376110	1376110	1376110	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1369710	1369710	1369710	✓
1373410	1373410	1373410	✓
1374210	1374210	1374210	✓
1375110	1375110	1375110	✓
1375410	1375410	1375410	✓
1376410	1376410	1376410	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1379910	1379910	1379910	✓

Table 27 Sample 4 Consistency Check (part 2)

Sample 5 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1326010	1326010	1326010	✓
1326110	1326110	1326110	✓
1326210	1326210	1326210	✓
1326310	1326310	1326310	✓
1326710	1326710	1326710	✓
1327410	1327410	1327410	✓
1327610	1327610	1327610	✓
1328510	1328510	1328510	✓
1328610	1328610	1328610	✓
1328710	1328710	1328710	✓
1329410	1329410	1329410	✓
1330210	1330210	1330210	✓
1331210	1331210	1331210	✓
1331410	1331410	1331410	✓
1332110	1332110	1332110	✓
1332210	1332210	1332210	✓
1332310	1332310	1332310	✓
1332410	1332410	1332410	✓
1332910	1332910	1332910	✓
1336210	1336210	1336210	✓
1337710	1337710	1337710	✓
1337810	1337810	1337810	✓
1338810	1338810	1338810	✓
1339110	1339110	1339110	✓
1340510	1340510	1340510	✓
1340511	1340511	1340511	✓
1340512	1340512	1340512	✓
1342010	1342010	1342010	✓
1343510	1343510	1343510	✓
1344610	1344610	1344610	✓
1345110	1345110	1345110	✓
1345410	1345410	1345410	✓
1346810	1346810	1346810	✓
1347110	1347110	1347110	✓
1347410	1347410	1347410	✓
1347510	1347510	1347510	✓
1348310	1348310	1348310	✓
1349210	1349210	1349210	✓
1349310	1349310	1349310	✓
1349710	1349710	1349710	✓
1349810	1349810	1349810	✓
1349910	1349910	1349910	✓
1350110	1350110	1350110	✓
1350210	1350210	1350210	✓
1350310	1350310	1350310	✓
1350810	1350810	1350810	✓
1350910	1350910	1350910	✓
1351110	1351110	1351110	✓
1351210	1351210	1351210	✓
1352010	1352010	1352010	✓
1352710	1352710	1352710	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	
1325810	1325810	1325810	✓
1325812	1325812	1325812	✓
1325813	1325813	1325813	✓
1325814	1325814	1325814	✓
1327810	1327810	1327810	✓
1328110	1328110	1328110	✓
1328111	1328111	1328111	✓
1329010	1329010	1329010	✓
1329110	1329110	1329110	✓
1330310	1330310	1330310	✓
1330410	1330410	1330410	✓
1333410	1333410	1333410	✓
1333411	1333411	1333411	✓
1333910	1333910	1333910	✓
1334010	1334010	1334010	✓
1334310	1334310	1334310	✓
1338210	1338210	1338210	✓
1338410	1338410	1338410	✓
1340810	1340810	1340810	✓
1342410	1342410	1342410	✓
1342610	1342610	1342610	✓
1344410	1344410	1344410	✓
1346910	1346910	1346910	✓
1350010	1350010	1350010	✓
1352410	1352410	1352410	✓
1357110	1357110	1357110	✓
1358110	1358110	1358110	✓
1358111	1358111	1358111	✓
1358210	1358210	1358210	✓
1358211	1358211	1358211	✓
1358310	1358310	1358310	✓
1358311	1358311	1358311	✓
1360110	1360110	1360110	✓
1360111	1360111	1360111	✓
1360112	1360112	1360112	✓
1360811	1360811	1360811	✓
1361210	1361210	1361210	✓
1361211	1361211	1361211	✓
1362410	1362410	1362410	✓
1362610	1362610	1362610	✓
1362710	1362710	1362710	✓
1362711	1362711	1362711	✓
1370310	1370310	1370310	✓
1373410	1373410	1373410	✓
1377810	1377810	1377810	✓
1377811	1377811	1377811	✓

Table 28 Sample 5 Consistency Check (part 1)

Sample 5 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1353210	1353210	1353210	✓
1353410	1353410	1353410	✓
1353710	1353710	1353710	✓
1353810	1353810	1353810	✓
1354010	1354010	1354010	✓
1354110	1354110	1354110	✓
1354510	1354510	1354510	✓
1354710	1354710	1354710	✓
1355010	1355010	1355010	✓
1355210	1355210	1355210	✓
1355310	1355310	1355310	✓
1355410	1355410	1355410	✓
1355411	1355411	1355411	✓
1355610	1355610	1355610	✓
1355710	1355710	1355710	✓
1355810	1355810	1355810	✓
1355910	1355910	1355910	✓
1356011	1356011	1356011	✓
1356711	1356711	1356711	✓
1356810	1356810	1356810	✓
1357210	1357210	1357210	✓
1357211	1357211	1357211	✓
1357910	1357910	1357910	✓
1357911	1357911	1357911	✓
1358010	1358010	1358010	✓
1358011	1358011	1358011	✓
1358410	1358410	1358410	✓
1358510	1358510	1358510	✓
1358610	1358610	1358610	✓
1358810	1358810	1358810	✓
1359310	1359310	1359310	✓
1359410	1359410	1359410	✓
1359810	1359810	1359810	✓
1360210	1360210	1360210	✓
1360211	1360211	1360211	✓
1360410	1360410	1360410	✓
1360411	1360411	1360411	✓
1360510	1360510	1360510	✓
1360511	1360511	1360511	✓
1360610	1360610	1360610	✓
1361010	1361010	1361010	✓
1361110	1361110	1361110	✓
1361111	1361111	1361111	✓
1361112	1361112	1361112	✓
1361113	1361113	1361113	✓
1361114	1361114	1361114	✓
1361115	1361115	1361115	✓
1361116	1361116	1361116	✓
1361117	1361117	1361117	✓
1361610	1361610	1361610	✓
1361810	1361810	1361810	✓
1361910	1361910	1361910	✓
1362210	1362210	1362210	✓
1362211	1362211	1362211	✓

Control Group			Consistency Check
T= -2	T= -1	T=0	
1362810	1362810	1362810	✓
1362910	1362910	1362910	✓
1362911	1362911	1362911	✓
1363010	1363010	1363010	✓
1363011	1363011	1363011	✓
1363012	1363012	1363012	✓
1363013	1363013	1363013	✓
1363110	1363110	1363110	✓
1363111	1363111	1363111	✓
1363510	1363510	1363510	✓
1363511	1363511	1363511	✓
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1366910	1366910	1366910	✓
1366911	1366911	1366911	✓
1369710	1369710	1369710	✓
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1370710	1370710	1370710	✓
1371110	1371110	1371110	✓
1371210	1371210	1371210	✓
1371310	1371310	1371310	✓
1371311	1371311	1371311	✓
1374210	1374210	1374210	✓
1374611	1374611	1374611	✓
1374811	1374811	1374811	✓
1374910	1374910	1374910	✓
1374911	1374911	1374911	✓
1375010	1375010	1375010	✓
1375110	1375110	1375110	✓
1375310	1375310	1375310	✓
1375311	1375311	1375311	✓
1375410	1375410	1375410	✓
1375610	1375610	1375610	✓
1375710	1375710	1375710	✓
1375810	1375810	1375810	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376110	1376110	1376110	✓
1376410	1376410	1376410	✓
1376510	1376510	1376510	✓
1376610	1376610	1376610	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1378710	1378710	1378710	✓
1379910	1379910	1379910	✓

Table 29 Sample 5 Consistency Check (part 2)

Sample 6 Consistency Check

Control Group			Consistency Check	Change Group			Consistency Check
T= -2	T= -1	T=0		T=-2	T=-1	T=0	
1326110	1326110	1326110	✓	1326010	1326010	1326010	✓
1326310	1326310	1326310	✓	1326210	1326210	1326210	✓
1326710	1326710	1326710	✓	1328510	1328510	1328510	✓
1327410	1327410	1327410	✓	1336210	1336210	1336210	✓
1327610	1327610	1327610	✓	1337710	1337710	1337710	✓
1328610	1328610	1328610	✓	1339110	1339110	1339110	✓
1328710	1328710	1328710	✓	1344610	1344610	1344610	✓
1329410	1329410	1329410	✓	1349210	1349210	1349210	✓
1330210	1330210	1330210	✓	1350210	1350210	1350210	✓
1331210	1331210	1331210	✓	1353210	1353210	1353210	✓
1331410	1331410	1331410	✓	1353710	1353710	1353710	✓
1332110	1332110	1332110	✓	1354510	1354510	1354510	✓
1332210	1332210	1332210	✓	1355810	1355810	1355810	✓
1332310	1332310	1332310	✓	1356011	1356011	1356011	✓
1332410	1332410	1332410	✓	1356711	1356711	1356711	✓
1332910	1332910	1332910	✓	1357910	1357910	1357910	✓
1337810	1337810	1337810	✓	1357911	1357911	1357911	✓
1338810	1338810	1338810	✓	1358410	1358410	1358410	✓
1340510	1340510	1340510	✓	1358510	1358510	1358510	✓
1340511	1340511	1340511	✓	1358610	1358610	1358610	✓
1340512	1340512	1340512	✓	1359810	1359810	1359810	✓
1342010	1342010	1342010	✓	1360210	1360210	1360210	✓
1343510	1343510	1343510	✓	1360211	1360211	1360211	✓
1345110	1345110	1345110	✓	1360410	1360410	1360410	✓
1345410	1345410	1345410	✓	1360411	1360411	1360411	✓
1346810	1346810	1346810	✓	1360510	1360510	1360510	✓
1347110	1347110	1347110	✓	1360511	1360511	1360511	✓
1347410	1347410	1347410	✓	1361010	1361010	1361010	✓
1347510	1347510	1347510	✓	1361110	1361110	1361110	✓
1348310	1348310	1348310	✓	1361111	1361111	1361111	✓
1349310	1349310	1349310	✓	1361112	1361112	1361112	✓
1349710	1349710	1349710	✓	1361113	1361113	1361113	✓
1349810	1349810	1349810	✓	1361114	1361114	1361114	✓
1349910	1349910	1349910	✓	1361115	1361115	1361115	✓
1350110	1350110	1350110	✓	1361116	1361116	1361116	✓
1350310	1350310	1350310	✓	1361117	1361117	1361117	✓
1350810	1350810	1350810	✓	1361610	1361610	1361610	✓
1350910	1350910	1350910	✓	1362911	1362911	1362911	✓
1351110	1351110	1351110	✓	1366910	1366910	1366910	✓
1351210	1351210	1351210	✓	1366911	1366911	1366911	✓
1352010	1352010	1352010	✓	1370710	1370710	1370710	✓
1352710	1352710	1352710	✓	1371110	1371110	1371110	✓
1353410	1353410	1353410	✓	1371210	1371210	1371210	✓
1353810	1353810	1353810	✓	1371310	1371310	1371310	✓
1354010	1354010	1354010	✓	1371311	1371311	1371311	✓
1354110	1354110	1354110	✓	1374910	1374910	1374910	✓
1354710	1354710	1354710	✓	1374911	1374911	1374911	✓
1355010	1355010	1355010	✓	1375710	1375710	1375710	✓
1355210	1355210	1355210	✓	1376410	1376410	1376410	✓
1355310	1355310	1355310	✓	1376610	1376610	1376610	✓
1355410	1355410	1355410	✓	1379910	1379910	1379910	✓

Table 30 Sample 6 Consistency Check (part 1)

Sample 6 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1355411	1355411	1355411	✓
1355610	1355610	1355610	✓
1355710	1355710	1355710	✓
1355910	1355910	1355910	✓
1356810	1356810	1356810	✓
1357210	1357210	1357210	✓
1357211	1357211	1357211	✓
1358010	1358010	1358010	✓
1358011	1358011	1358011	✓
1358810	1358810	1358810	✓
1359310	1359310	1359310	✓
1359410	1359410	1359410	✓
1360610	1360610	1360610	✓
1361810	1361810	1361810	✓
1361910	1361910	1361910	✓
1362210	1362210	1362210	✓
1362211	1362211	1362211	✓
1362810	1362810	1362810	✓
1362910	1362910	1362910	✓
1363010	1363010	1363010	✓
1363011	1363011	1363011	✓
1363012	1363012	1363012	✓
1363013	1363013	1363013	✓
1363110	1363110	1363110	✓
1363111	1363111	1363111	✓
1363510	1363510	1363510	✓
1363511	1363511	1363511	✓
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1369710	1369710	1369710	✓
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1374210	1374210	1374210	✓
1374611	1374611	1374611	✓
1374811	1374811	1374811	✓
1375010	1375010	1375010	✓
1375110	1375110	1375110	✓
1375310	1375310	1375310	✓
1375311	1375311	1375311	✓
1375410	1375410	1375410	✓
1375610	1375610	1375610	✓
1375810	1375810	1375810	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376110	1376110	1376110	✓
1376510	1376510	1376510	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1378710	1378710	1378710	✓

Change Group			Consistency Check
T=-2	T=-1	T=0	

Table 31 Sample 6 Consistency Check (part 2)

Sample 7 Consistency Check

Control Group			Consistency Check
T= -2	T= -1	T=0	
1326710	1326710	1326710	✓
1328610	1328610	1328610	✓
1331210	1331210	1331210	✓
1332910	1332910	1332910	✓
1338810	1338810	1338810	✓
1342010	1342010	1342010	✓
1343510	1343510	1343510	✓
1347110	1347110	1347110	✓
1348310	1348310	1348310	✓
1353410	1353410	1353410	✓
1353810	1353810	1353810	✓
1354010	1354010	1354010	✓
1354110	1354110	1354110	✓
1354710	1354710	1354710	✓
1355010	1355010	1355010	✓
1355210	1355210	1355210	✓
1355310	1355310	1355310	✓
1355410	1355410	1355410	✓
1355411	1355411	1355411	✓
1355610	1355610	1355610	✓
1356810	1356810	1356810	✓
1357210	1357210	1357210	✓
1357211	1357211	1357211	✓
1359310	1359310	1359310	✓
1359410	1359410	1359410	✓
1360610	1360610	1360610	✓
1361810	1361810	1361810	✓
1361910	1361910	1361910	✓
1362210	1362210	1362210	✓
1362211	1362211	1362211	✓
1362810	1362810	1362810	✓
1363010	1363010	1363010	✓
1363011	1363011	1363011	✓
1363012	1363012	1363012	✓
1363013	1363013	1363013	✓
1363110	1363110	1363110	✓
1363111	1363111	1363111	✓
1363510	1363510	1363510	✓
1363511	1363511	1363511	✓
1363512	1363512	1363512	✓
1363513	1363513	1363513	✓
1363514	1363514	1363514	✓
1363515	1363515	1363515	✓
1370510	1370510	1370510	✓
1370511	1370511	1370511	✓
1374611	1374611	1374611	✓
1374811	1374811	1374811	✓
1375010	1375010	1375010	✓
1375110	1375110	1375110	✓
1375310	1375310	1375310	✓
1375311	1375311	1375311	✓
1375610	1375610	1375610	✓
1376110	1376110	1376110	✓
1376913	1376913	1376913	✓
1376914	1376914	1376914	✓
1377110	1377110	1377110	✓
1377111	1377111	1377111	✓
1378710	1378710	1378710	✓

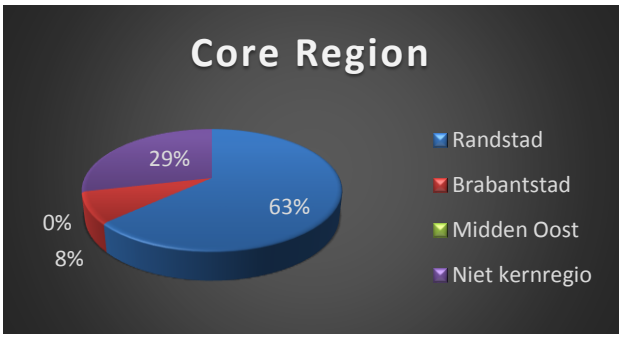
Change Group			Consistency Check
T=-2	T=-1	T=0	
1326110	1326110	1326110	✓
1326310	1326310	1326310	✓
1327410	1327410	1327410	✓
1327610	1327610	1327610	✓
1328710	1328710	1328710	✓
1329410	1329410	1329410	✓
1330210	1330210	1330210	✓
1331410	1331410	1331410	✓
1332110	1332110	1332110	✓
1332210	1332210	1332210	✓
1332310	1332310	1332310	✓
1332410	1332410	1332410	✓
1337810	1337810	1337810	✓
1340510	1340510	1340510	✓
1340511	1340511	1340511	✓
1340512	1340512	1340512	✓
1345110	1345110	1345110	✓
1345410	1345410	1345410	✓
1346810	1346810	1346810	✓
1347410	1347410	1347410	✓
1347510	1347510	1347510	✓
1349310	1349310	1349310	✓
1349710	1349710	1349710	✓
1349810	1349810	1349810	✓
1349910	1349910	1349910	✓
1350110	1350110	1350110	✓
1350310	1350310	1350310	✓
1350810	1350810	1350810	✓
1350910	1350910	1350910	✓
1351110	1351110	1351110	✓
1351210	1351210	1351210	✓
1352010	1352010	1352010	✓
1352710	1352710	1352710	✓
1355710	1355710	1355710	✓
1355910	1355910	1355910	✓
1358010	1358010	1358010	✓
1358011	1358011	1358011	✓
1358810	1358810	1358810	✓
1362910	1362910	1362910	✓
1374210	1374210	1374210	✓
1375410	1375410	1375410	✓
1375810	1375810	1375810	✓
1375910	1375910	1375910	✓
1376010	1376010	1376010	✓
1376510	1376510	1376510	✓
1376910	1376910	1376910	✓
1376911	1376911	1376911	✓
1376912	1376912	1376912	✓

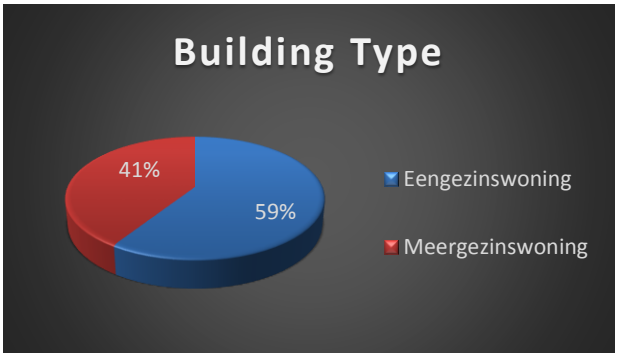
Table 32 Sample 6 Consistency Check

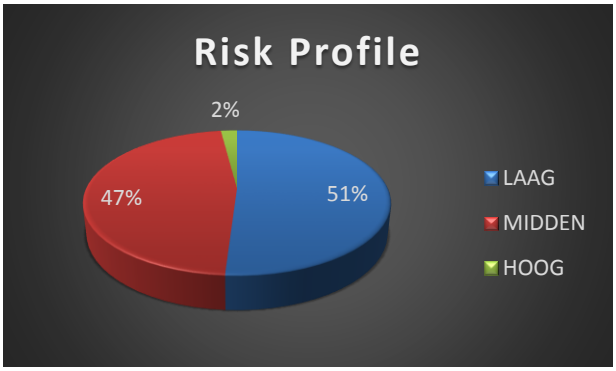
8.6 APPENDIX VI: CHARACTERISTICS COMPARISON WITHIN SAMPLES

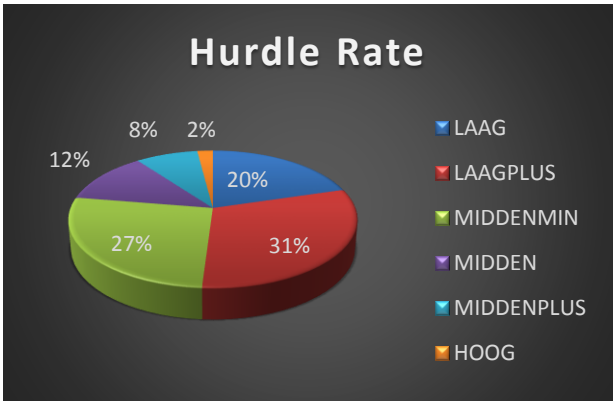
8.6.1 Sample 1

Control Group

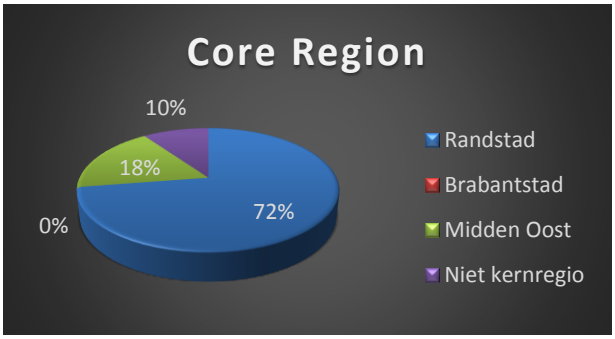


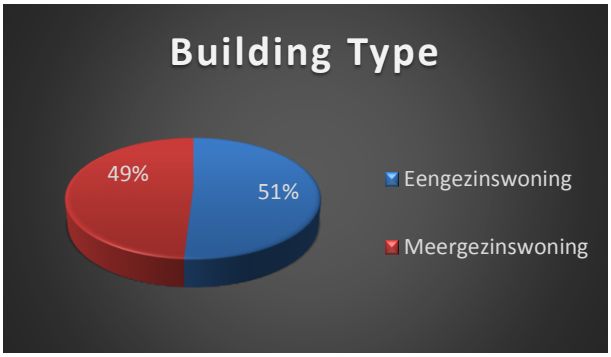


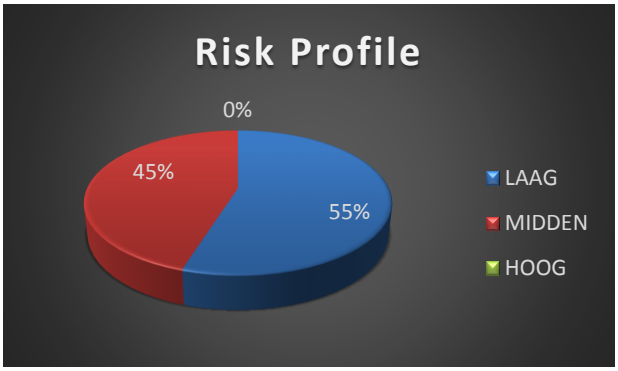


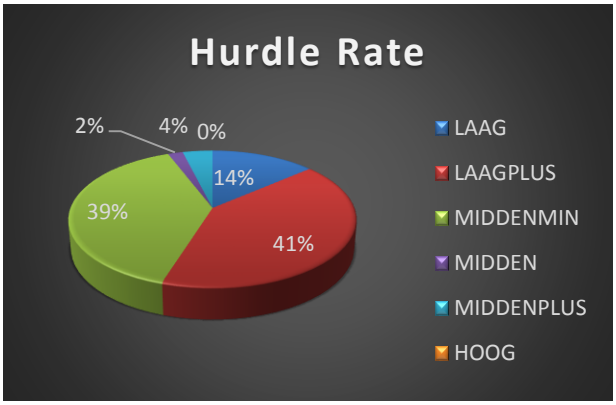


Change Group



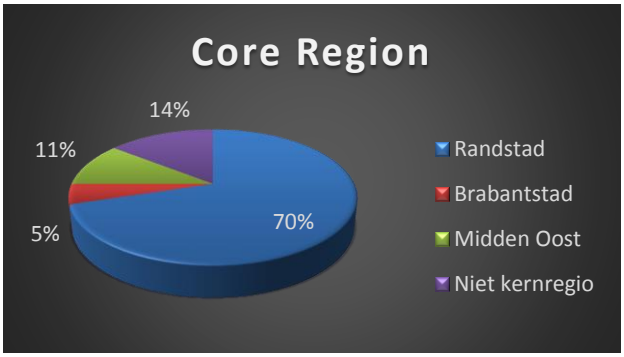


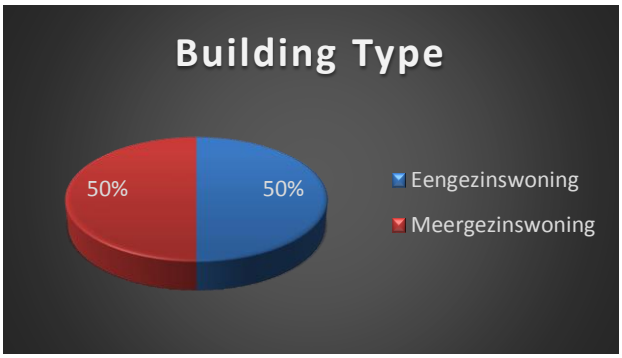


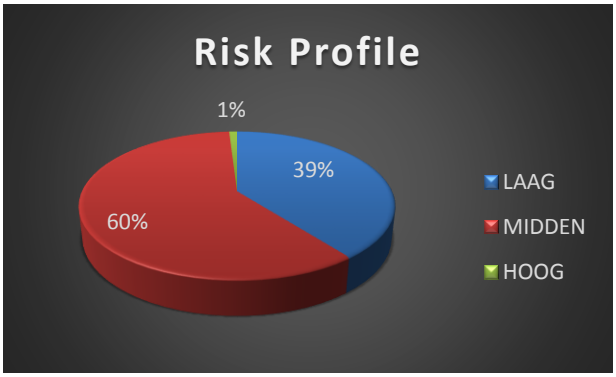


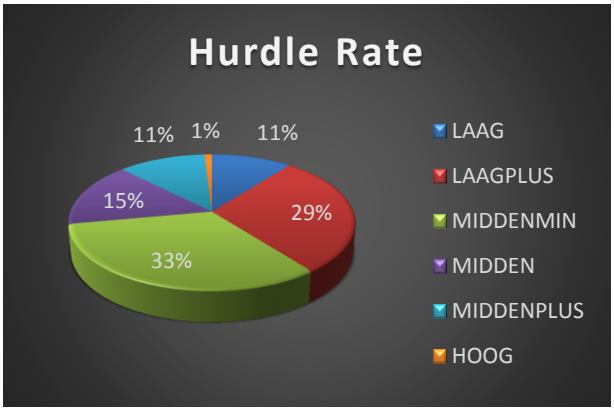
8.6.2 Sample 2

Control Group

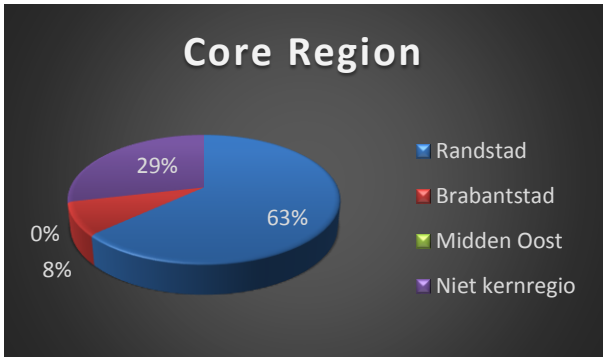


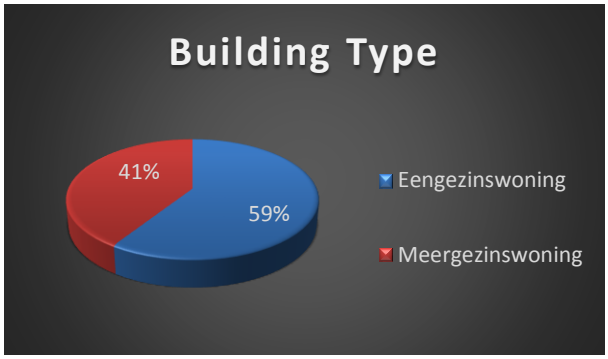


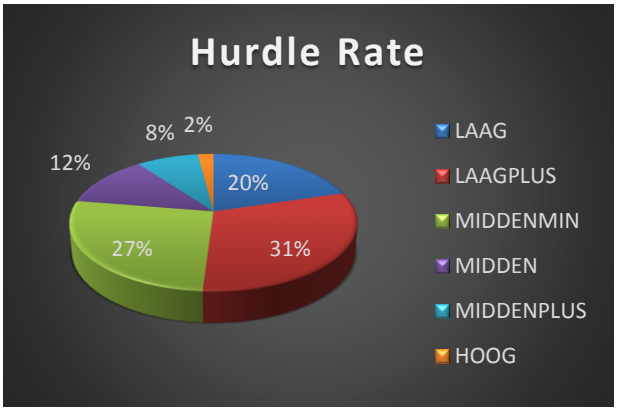




Change Group

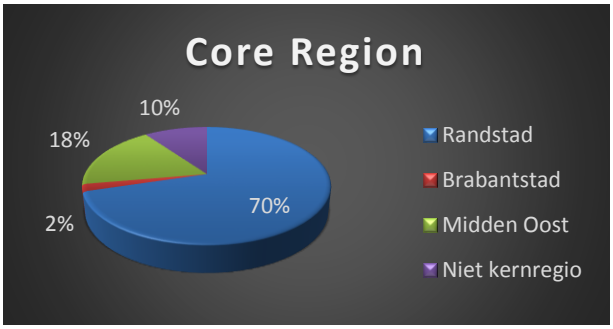


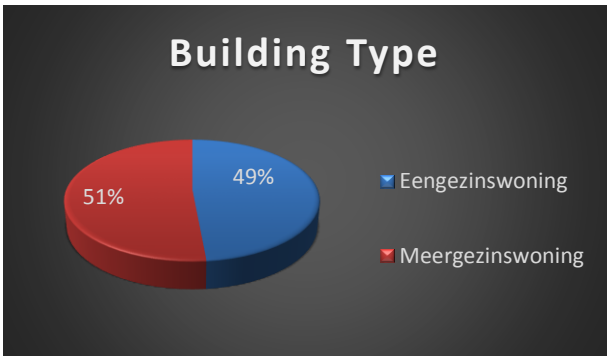


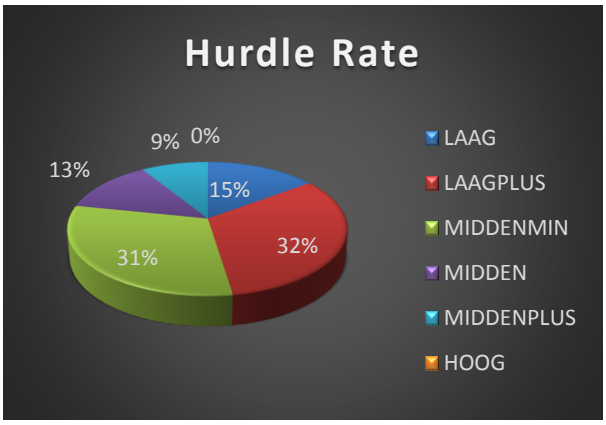


8.6.3 Sample 3

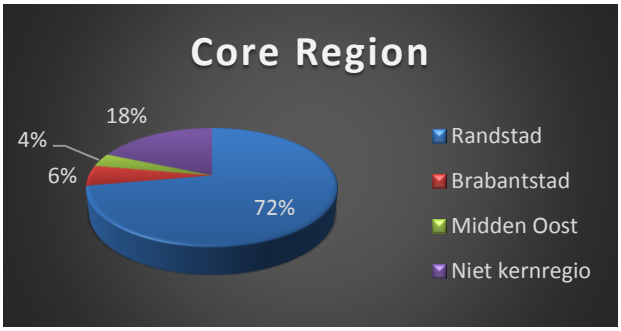
Control Group

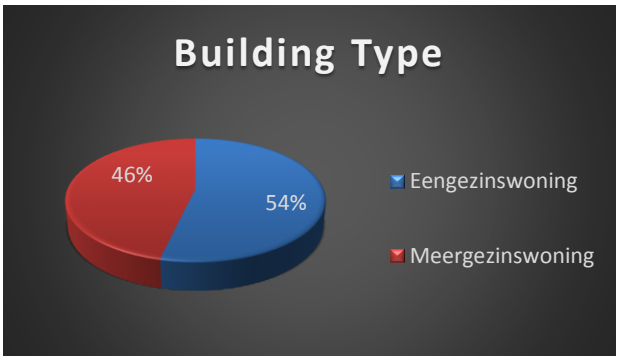


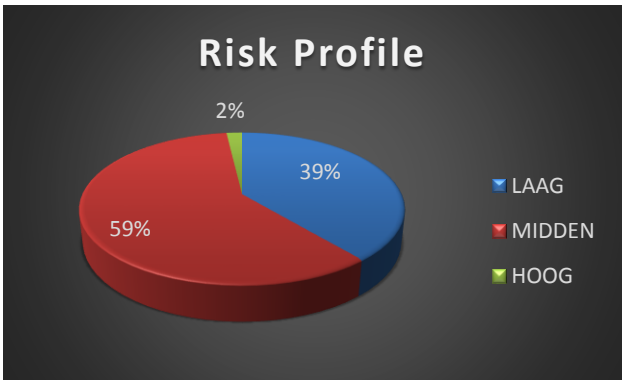


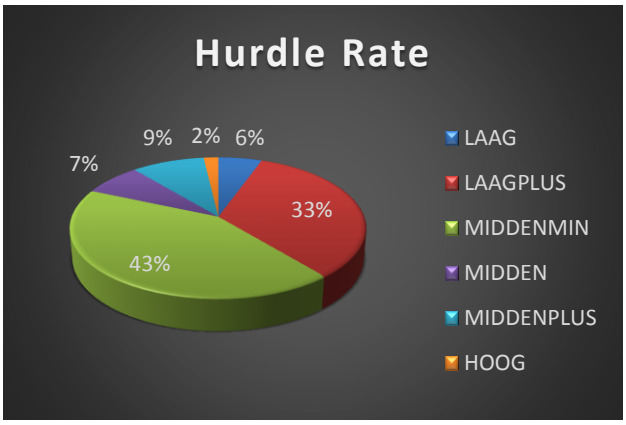


Change Group



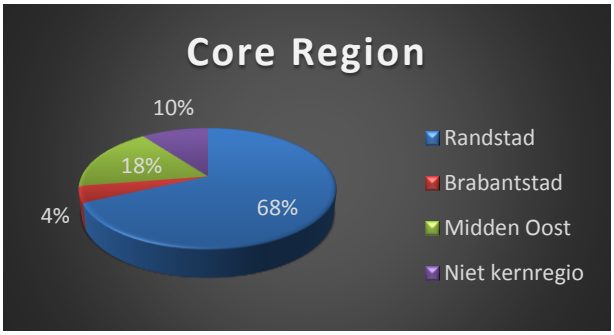


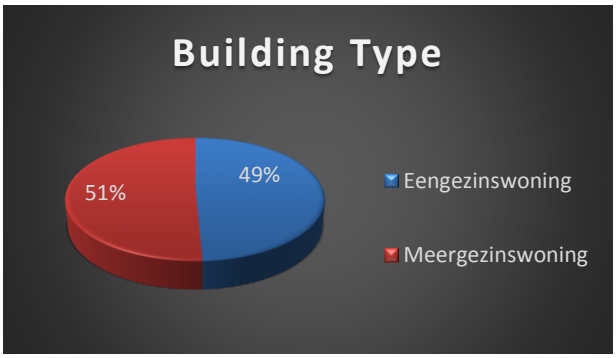


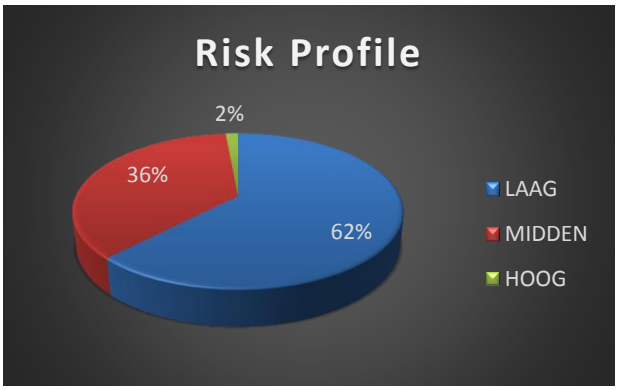


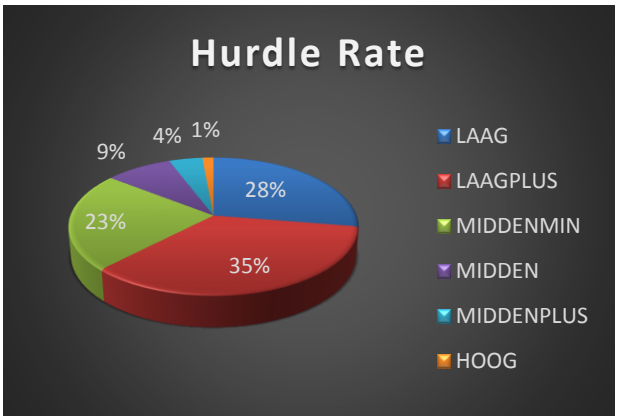
8.6.4 Sample 4

Control Group

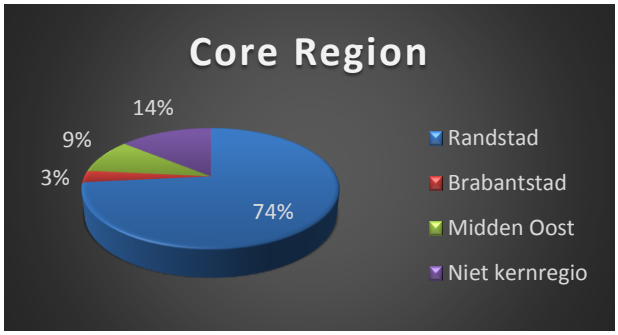


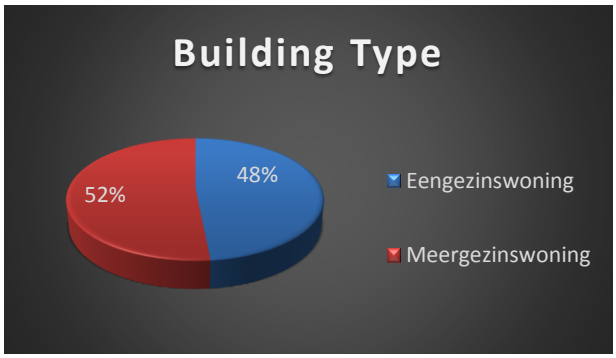


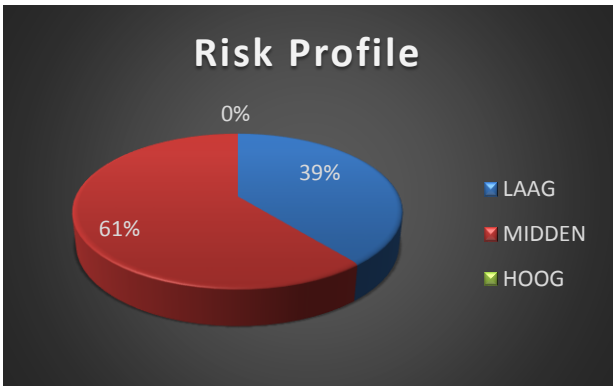


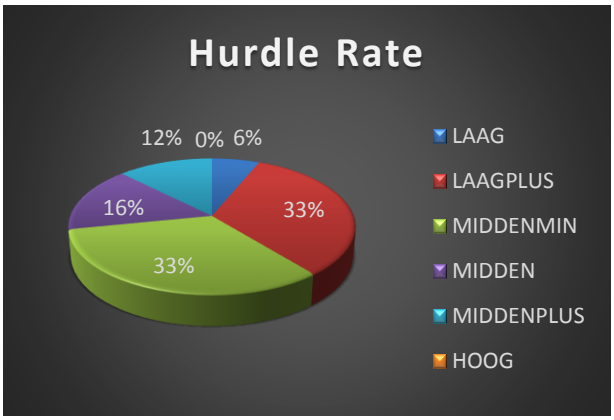


Change Group



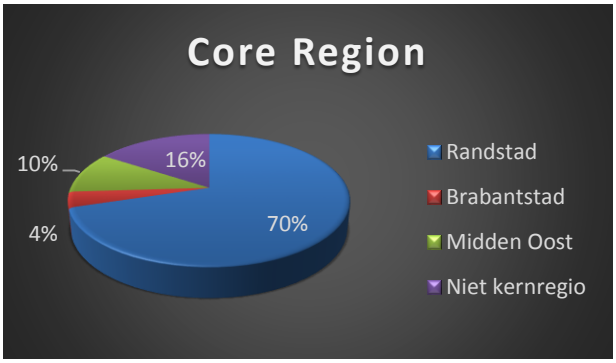


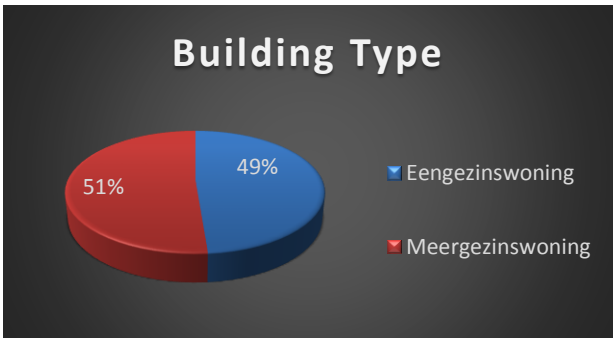


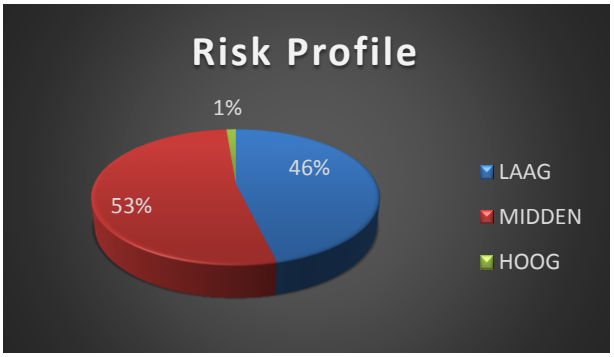


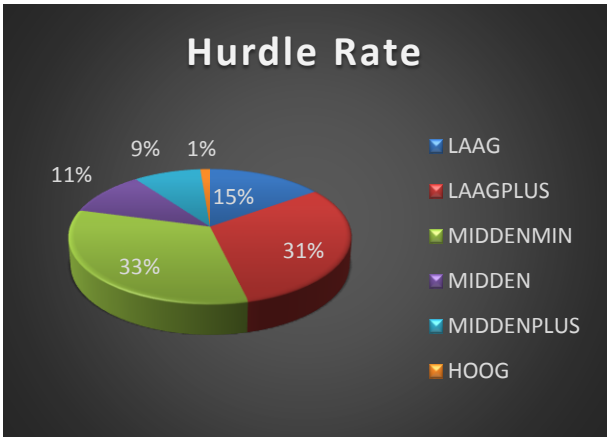
8.6.5 Sample 5

Control Group

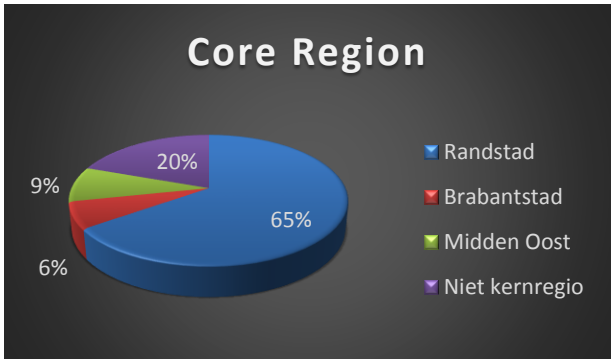


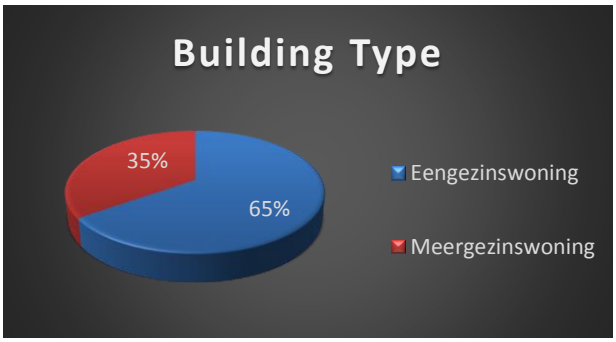


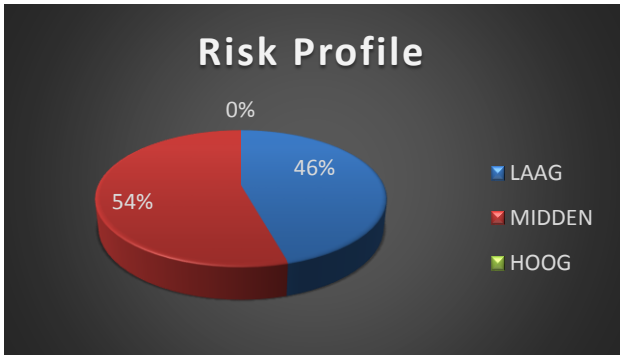


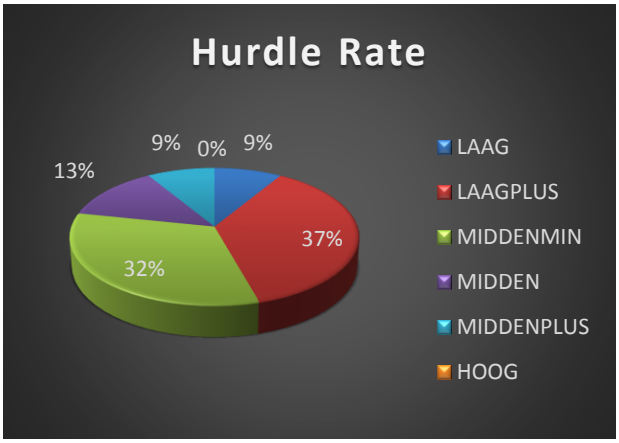


Change Group



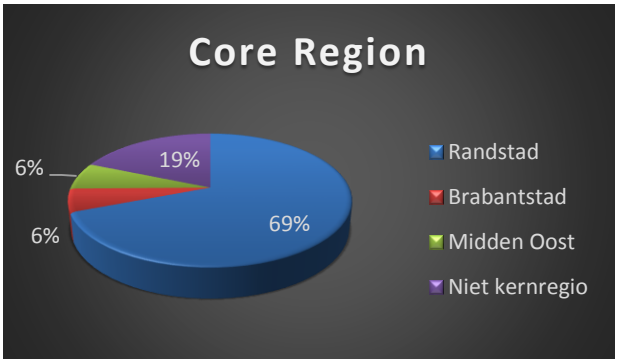


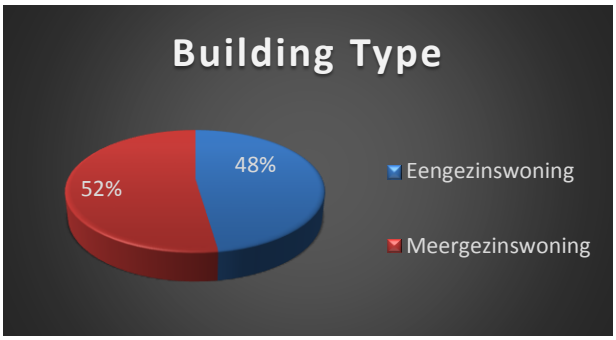


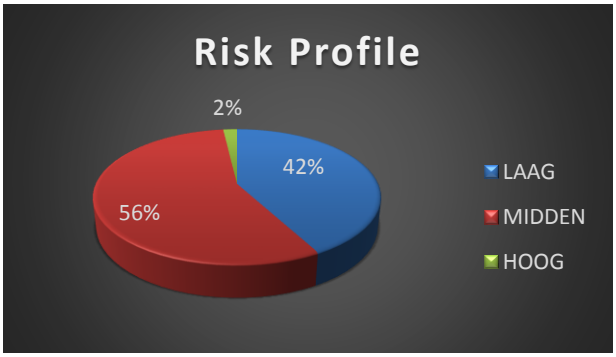


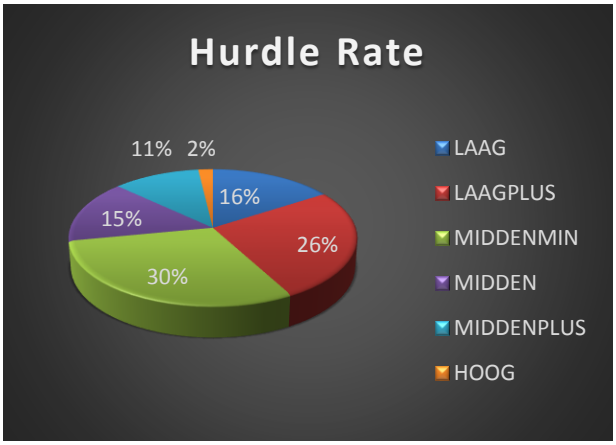
8.6.6 Sample 6

Control Group

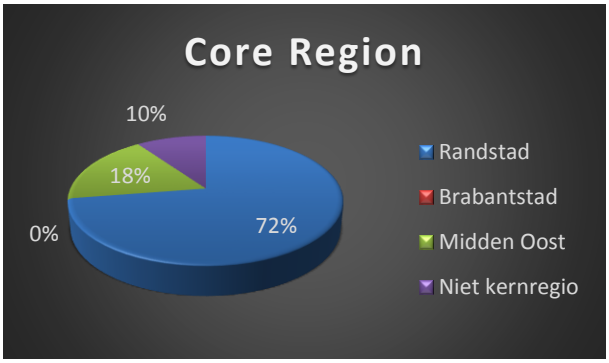


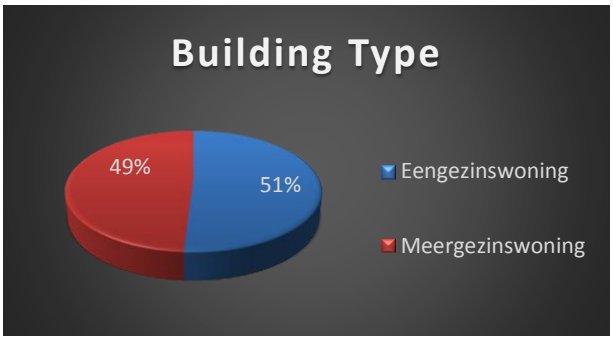


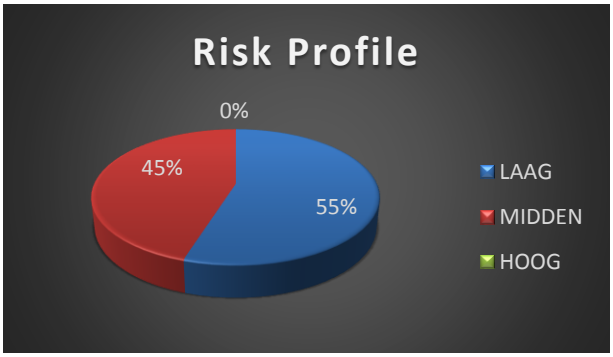


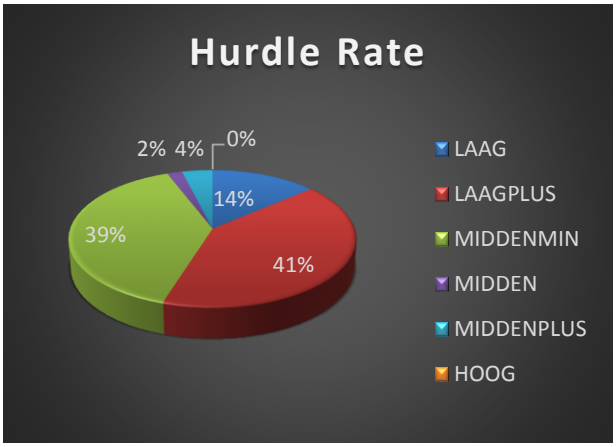


Change Group



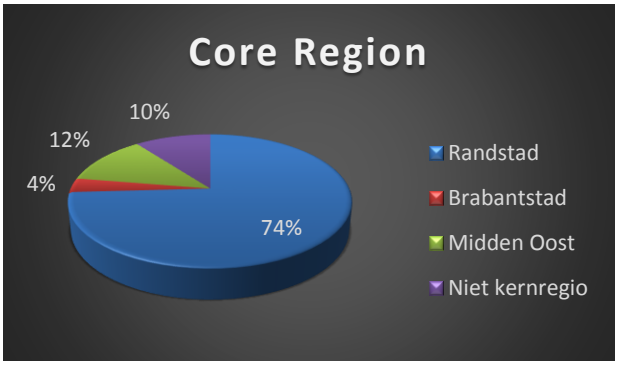


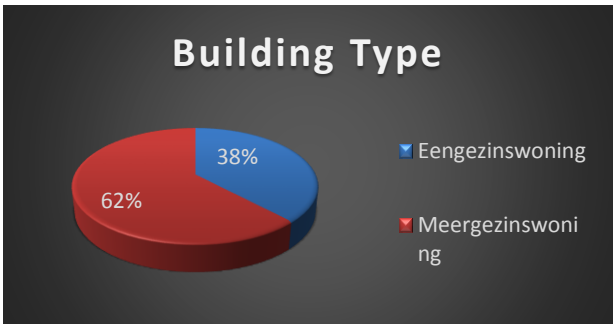


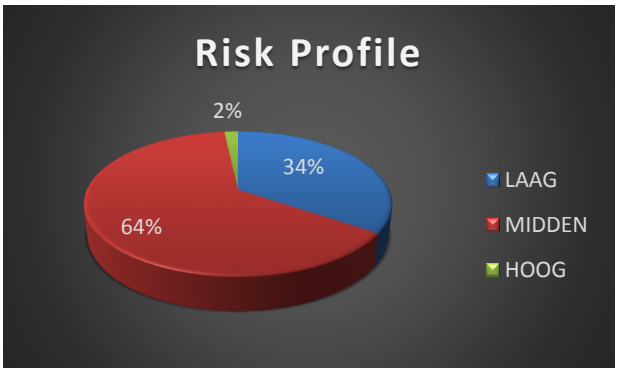


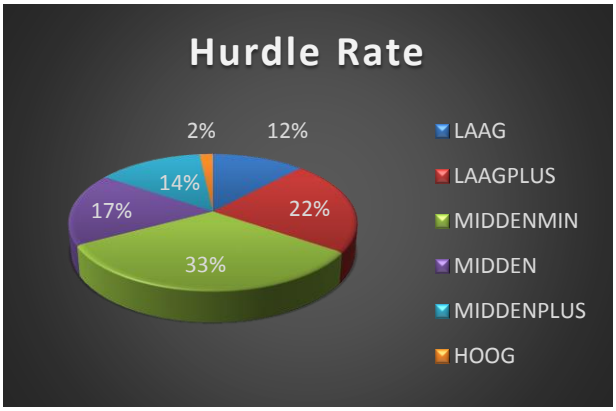
8.6.7 Sample 7

Control Group

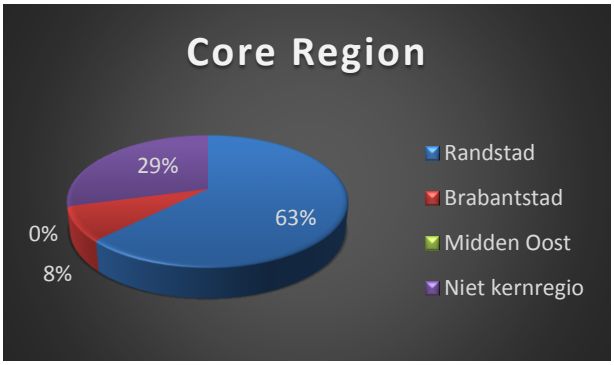


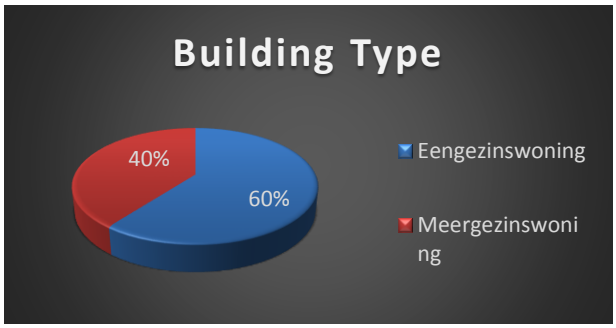


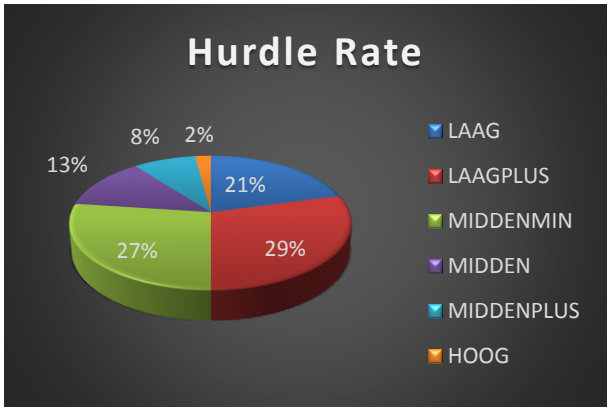




Change Group







8.7 APPENDIX VII: CHARACTERISTICS COMPARISON SAMPLES TO PORTFOLIO

Core Region Distribution															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
Randstad	69%	63%	73%	70%	63%	70%	72%	68%	73%	70%	65%	69%	73%	74%	63%
Brabantstad	4%	8%	0%	5%	8%	2%	6%	4%	3%	4%	7%	6%	0%	3%	8%
Midden Oost	10%	0%	18%	11%	0%	18%	4%	17%	9%	10%	9%	7%	18%	12%	0%
Niet kernregio	17%	29%	10%	14%	29%	10%	19%	10%	14%	16%	20%	19%	10%	10%	29%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 33 Core Region Distribution

Core Region Distribution (Differences in distribution samples compared to portfolio)															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
Randstad	69%	-6%	3%	1%	-6%	1%	3%	-1%	4%	1%	-4%	0%	3%	5%	-7%
Brabantstad	4%	4%	-4%	0%	4%	-2%	1%	0%	-1%	-1%	2%	1%	-4%	-1%	4%
Midden Oost	10%	-10%	8%	1%	-10%	8%	-6%	8%	0%	0%	-1%	-3%	8%	2%	-10%
Niet kernregio	17%	12%	-7%	-2%	12%	-7%	2%	-7%	-3%	-1%	3%	2%	-7%	-6%	13%
Total	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 34 Core Region Distribution (Differences in distribution samples compared to portfolio)

Building Type Distribution															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
Eengezinswoning	52%	59%	51%	50%	59%	49%	54%	49%	48%	49%	65%	48%	51%	38%	60%
Meergezinswoning	48%	41%	49%	50%	41%	51%	46%	51%	52%	51%	35%	52%	49%	62%	40%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 35 Building Type Distribution

Building Type Distribution (Differences in Distribution Samples compared to Portfolio)															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
Eengezinswoning	52%	7%	-1%	-2%	7%	-4%	1%	-3%	-4%	-4%	13%	-5%	-1%	-15%	8%
Meergezinswoning	48%	-7%	1%	2%	-7%	4%	-1%	3%	4%	4%	-13%	5%	1%	15%	-8%
Total	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 36 Building Type Distribution (Differences in Distribution Samples compared to Portfolio)

Risk Profile Distribution															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
LAAG	46%	51%	55%	39%	51%	48%	39%	62%	39%	46%	46%	42%	55%	34%	50%
MIDDEN	53%	47%	45%	60%	47%	52%	59%	36%	61%	53%	54%	56%	45%	64%	48%
HOOG	1%	2%	0%	1%	2%	0%	2%	1%	0%	1%	0%	2%	0%	2%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 37 Risk Profile Distribution

Risk Profile Distribution (Differences in Distribution Samples compared to Portfolio)															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
LAAG	46%	5%	9%	-7%	5%	1%	-7%	16%	-7%	0%	0%	-4%	9%	-12%	4%
MIDDEN	53%	-6%	-8%	7%	-6%	0%	6%	-17%	8%	0%	1%	3%	-8%	11%	-5%
HOOG	1%	1%	-1%	0%	1%	-1%	1%	0%	-1%	0%	-1%	1%	-1%	1%	1%
Total	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 38 Risk Profile Distribution (Differences in Distribution Samples compared to Portfolio)

Hurdle Rate Distribution															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
LAAG	14%	20%	14%	11%	20%	15%	6%	28%	6%	15%	9%	16%	14%	12%	21%
LAAGPLUS	32%	31%	41%	29%	31%	33%	33%	35%	33%	31%	37%	26%	41%	22%	29%
MIDDENMIN	33%	27%	39%	33%	27%	31%	43%	23%	33%	33%	33%	30%	39%	33%	27%
MIDDEN	11%	12%	2%	15%	12%	13%	7%	9%	16%	11%	13%	15%	2%	17%	13%
MIDDENPLUS	9%	8%	4%	12%	8%	9%	9%	4%	13%	9%	9%	11%	4%	14%	8%
HOOG	1%	2%	0%	1%	2%	0%	2%	1%	0%	1%	0%	2%	0%	2%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 39 Hurdle Rate Distribution

Hurdle Rate Distribution (Differences in Distribution Samples compared to Portfolio)															
	Portfolio	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7	
		Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change	Control	Change
LAAG	14%	7%	0%	-3%	7%	1%	-8%	14%	-7%	1%	-5%	2%	0%	-2%	7%
LAAGPLUS	32%	-2%	9%	-4%	-2%	0%	1%	2%	0%	-1%	5%	-6%	9%	-10%	-3%
MIDDENMIN	33%	-6%	6%	0%	-6%	-2%	10%	-10%	0%	0%	0%	-3%	6%	0%	-6%
MIDDEN	11%	1%	-9%	4%	1%	2%	-4%	-3%	4%	-1%	2%	4%	-9%	6%	1%
MIDDENPLUS	9%	-1%	-5%	3%	-1%	0%	0%	-4%	4%	0%	0%	2%	-5%	5%	0%
HOOG	1%	1%	-1%	0%	1%	-1%	1%	0%	-1%	0%	-1%	1%	-1%	1%	1%
Total	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 40 Hurdle Rate Distribution (Differences in Distribution Samples compared to Portfolio)

8.8 APPENDIX VIII: OUTLIER IDENTIFICATION

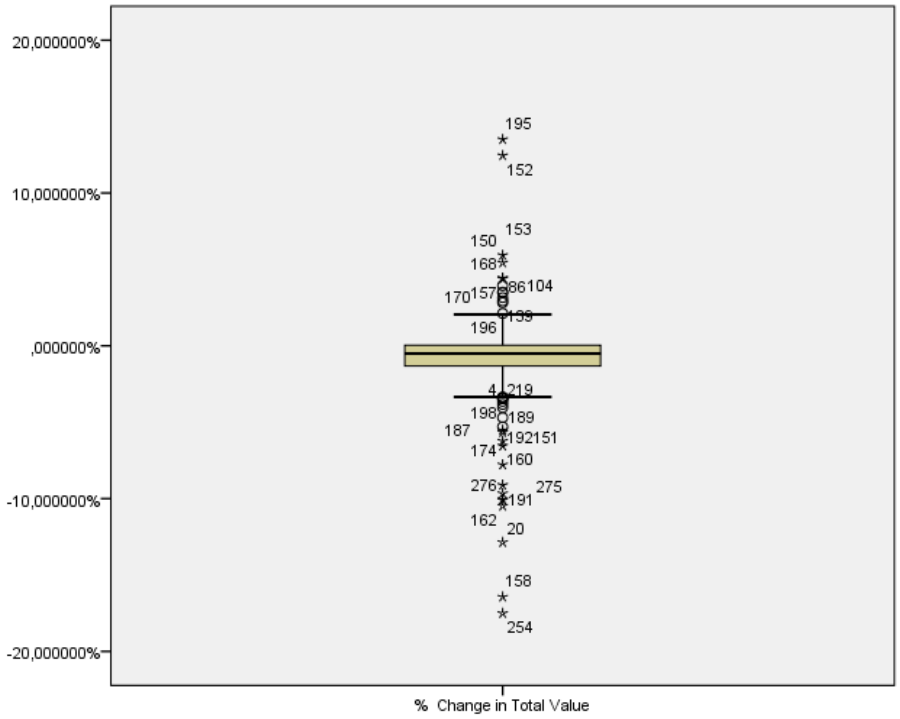


Figure 11 Histogram Outlier Identification Sample 1

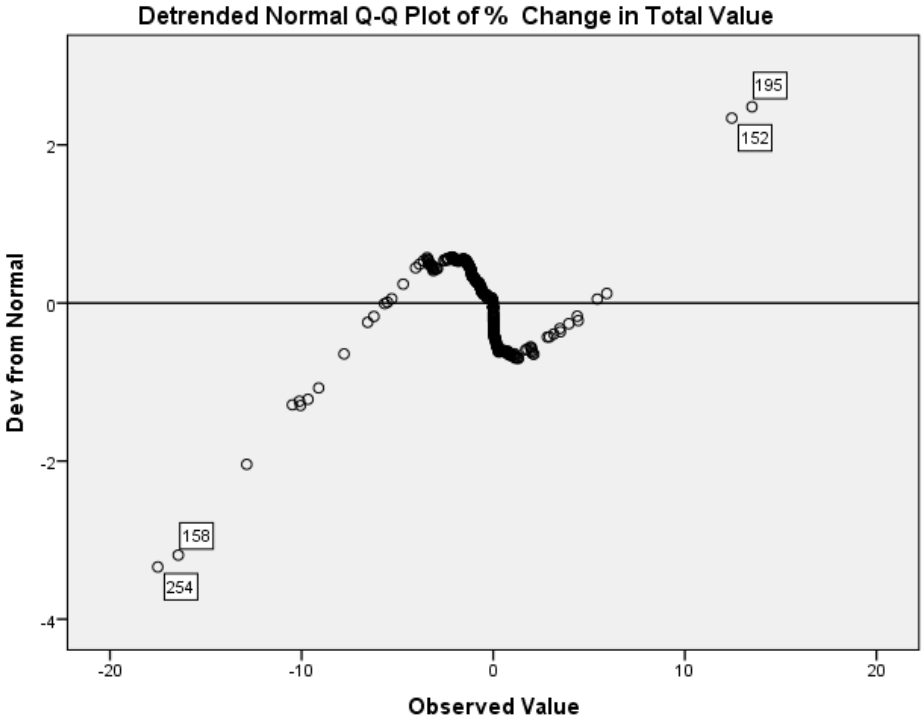


Figure 12 Detrended Normal Q-Q Plot Outlier Identification Sample 1

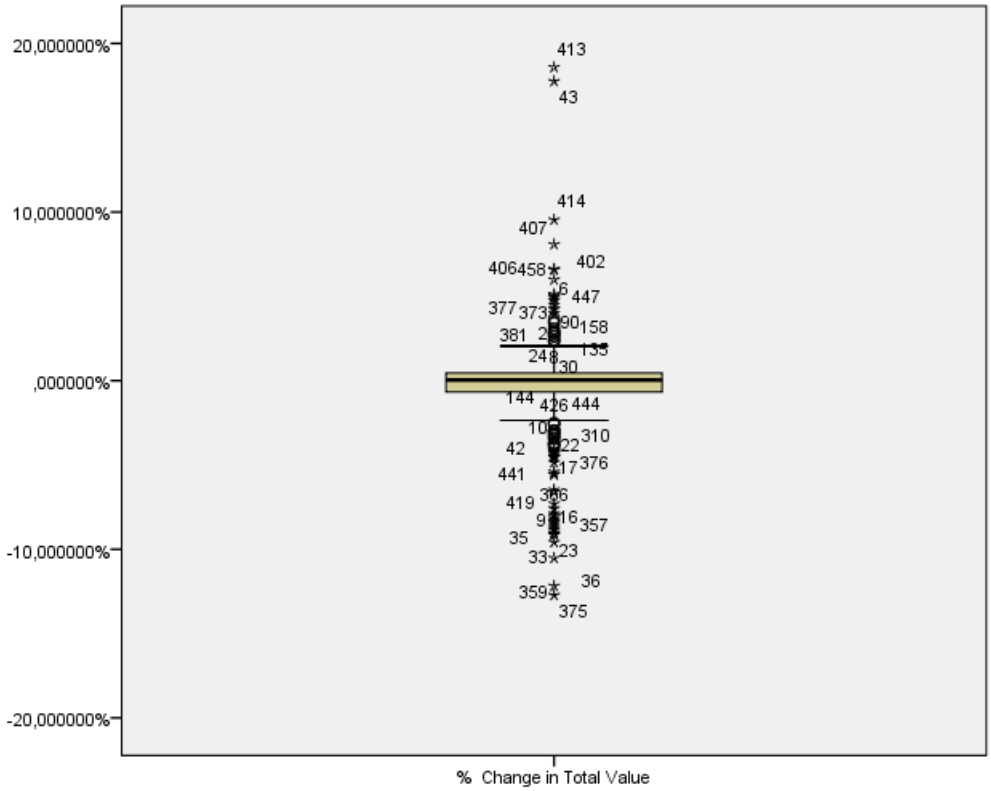


Figure 13 Histogram Outlier Identification Sample 2

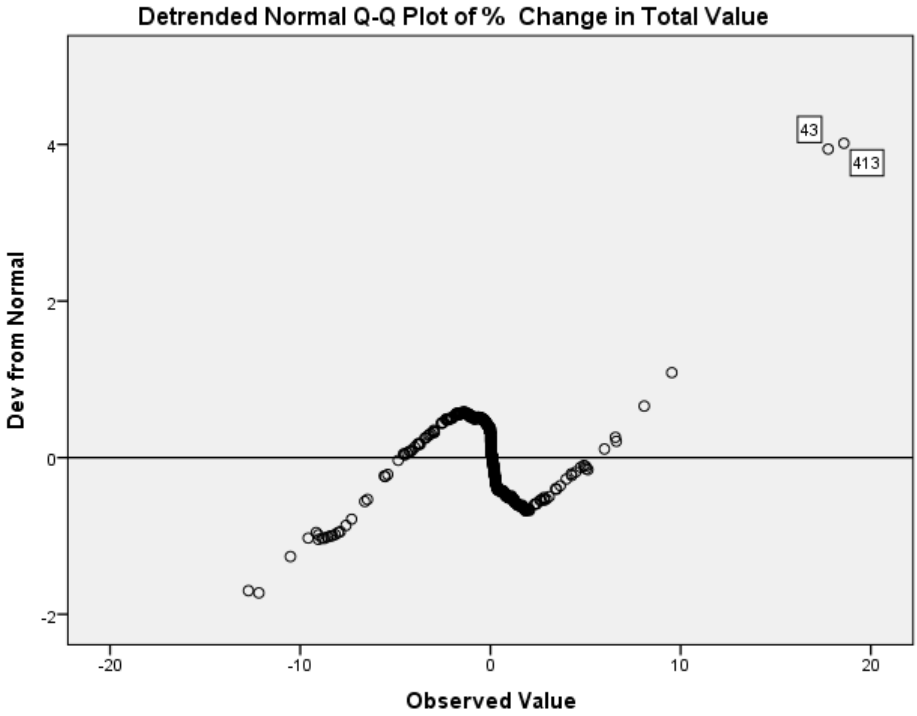


Figure 14 Detrended Normal Q-Q Plot Outlier Identification Sample 2

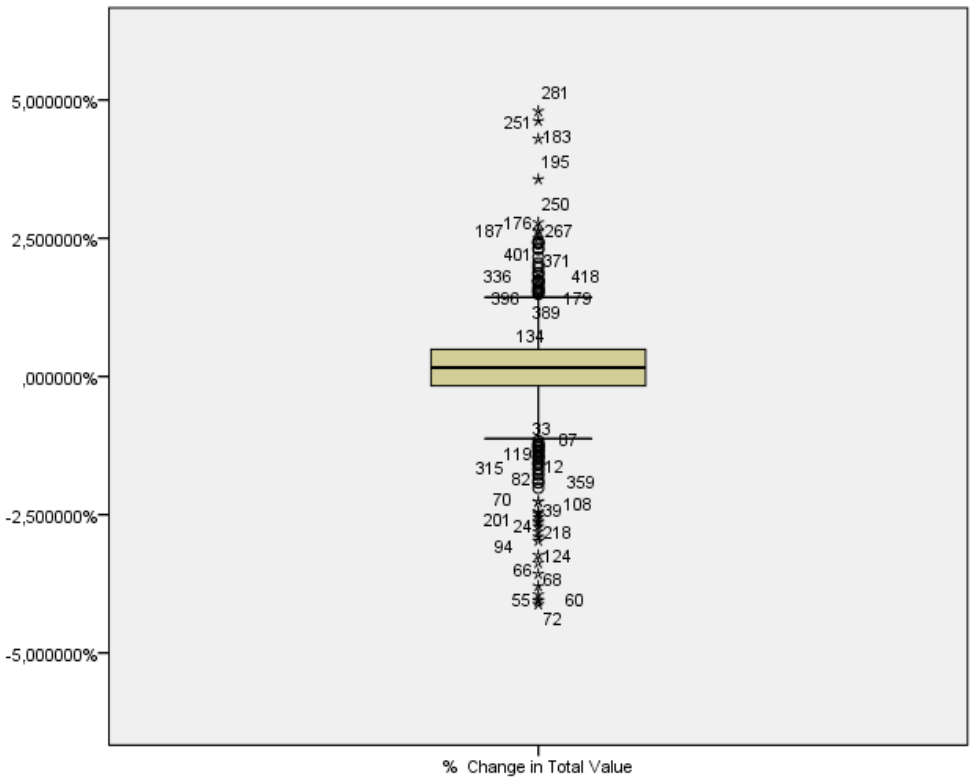


Figure 15 Histogram Outlier Identification Sample 3

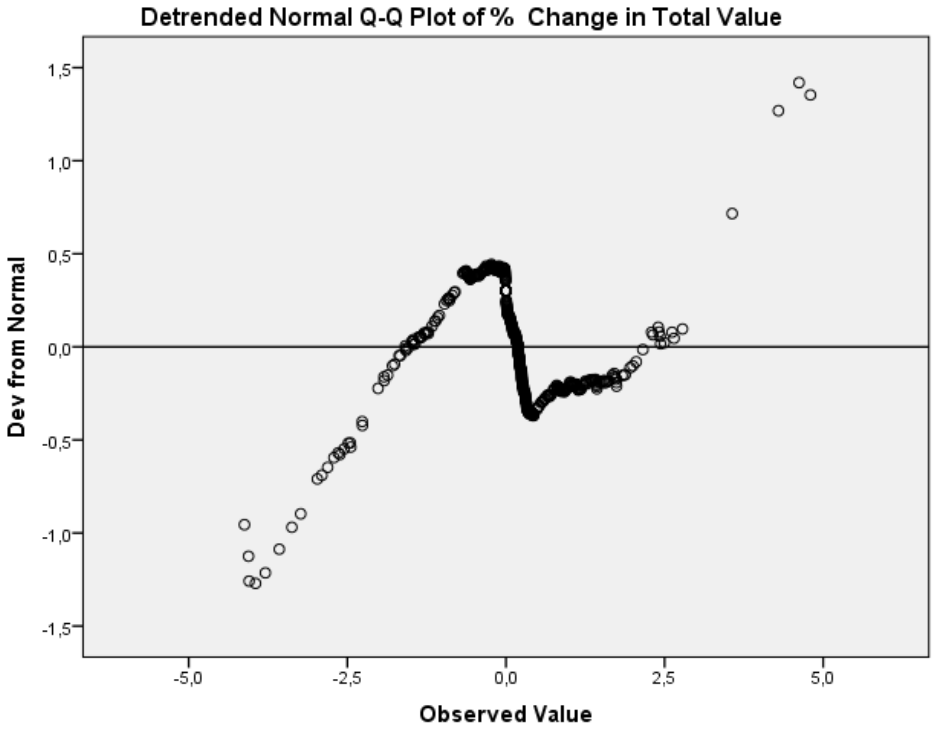


Figure 16 Detrended Normal Q-Q Plot Outlier Identification Sample 3

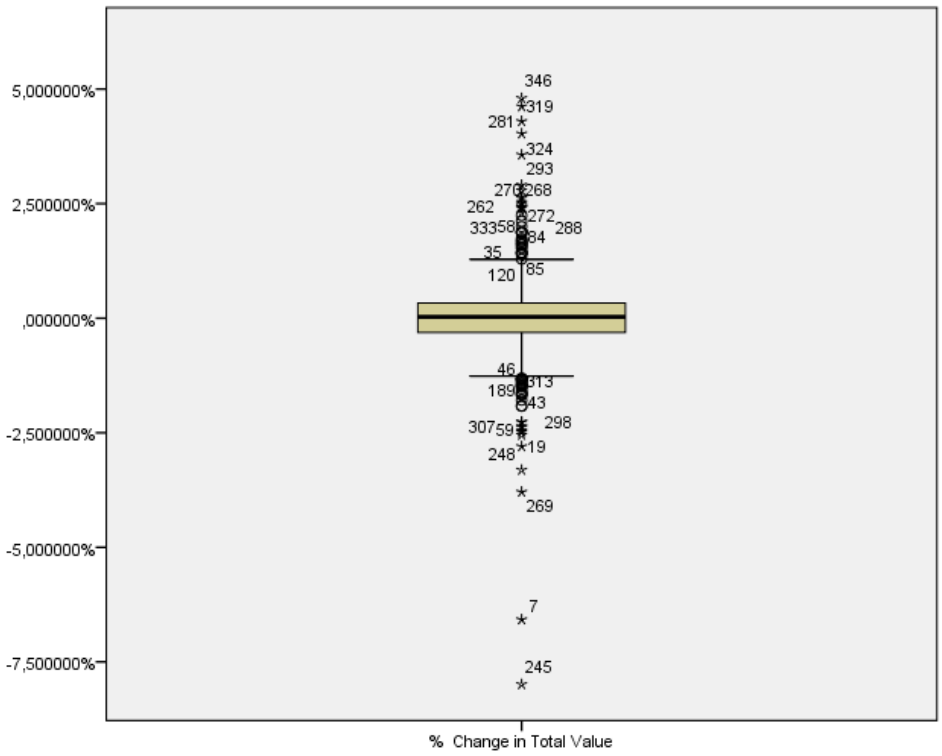


Figure 17 Histogram Outlier Identification Sample 4

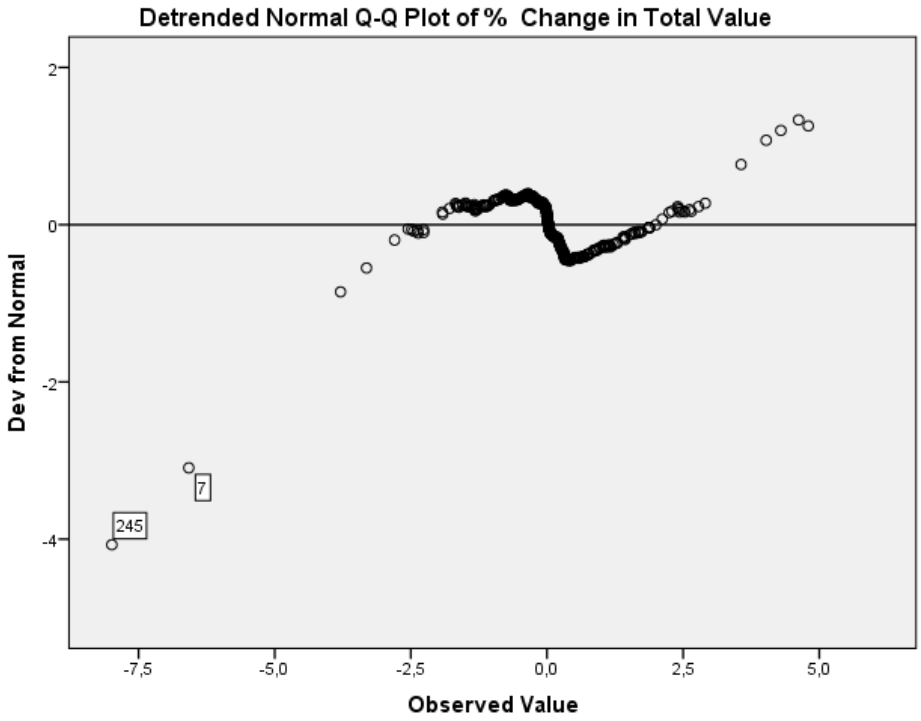


Figure 18 Detrended Normal Q-Q Plot Outlier Identification Sample 4

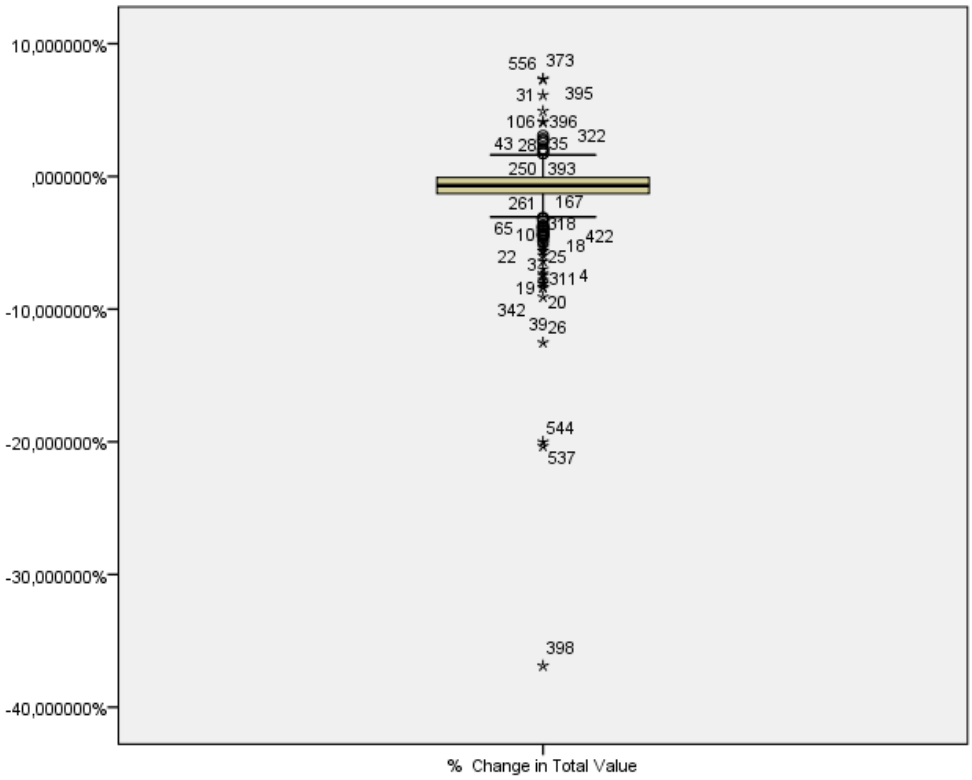


Figure 19 Histogram Outlier Identification Sample 5

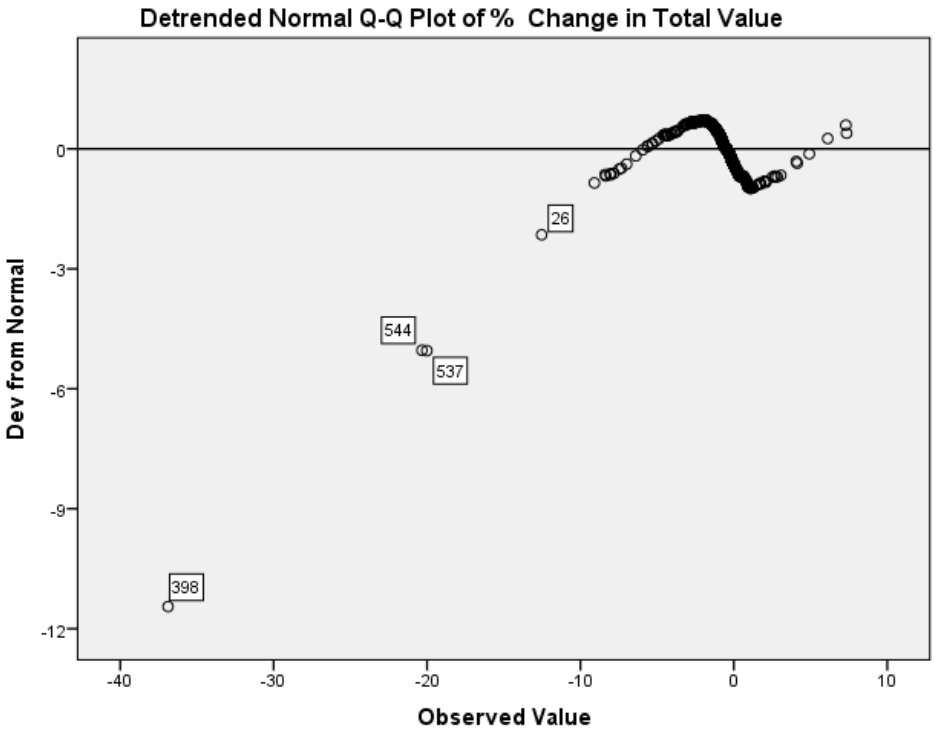


Figure 20 Detrended Normal Q-Q Plot Outlier Identification Sample 5

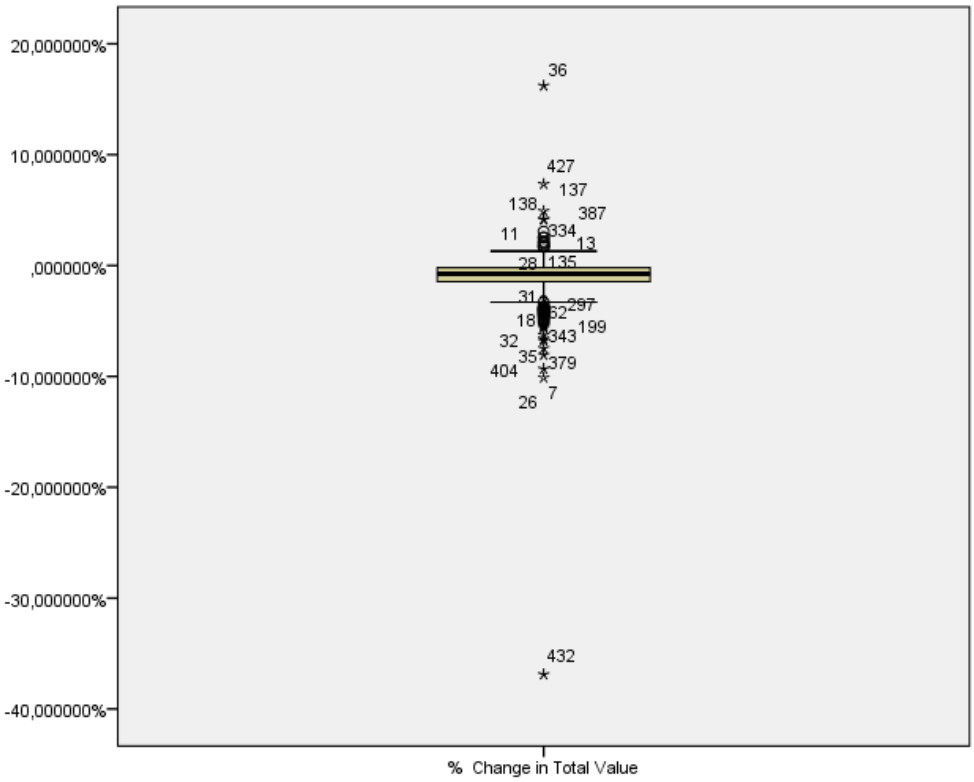


Figure 21 Histogram Outlier Identification Sample 6

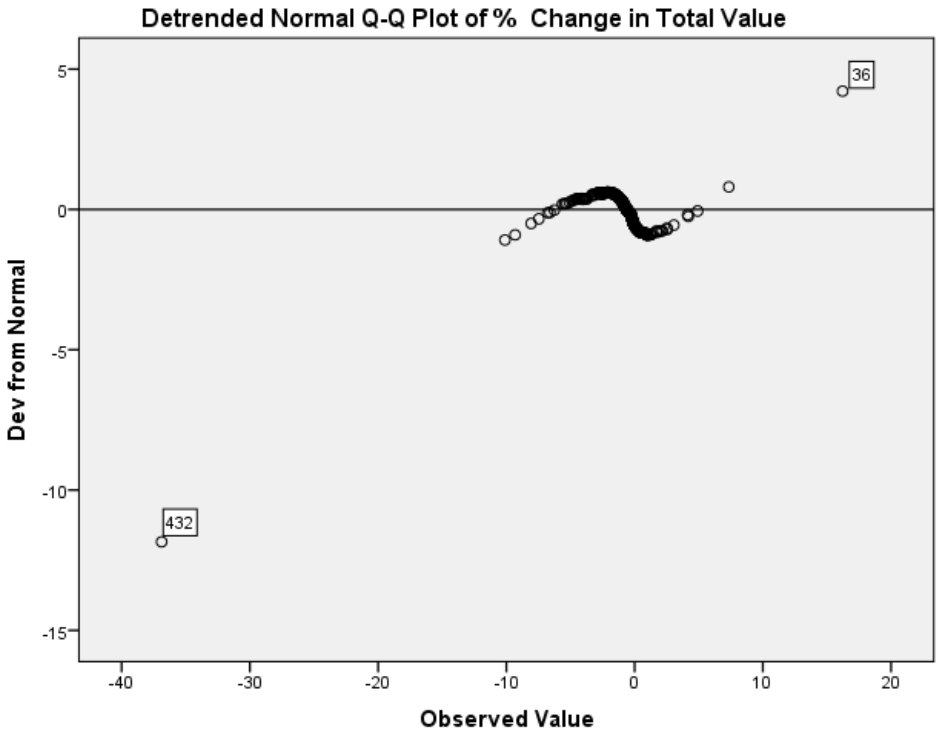


Figure 22 Detrended Normal Q-Q Plot Outlier Identification Sample 6

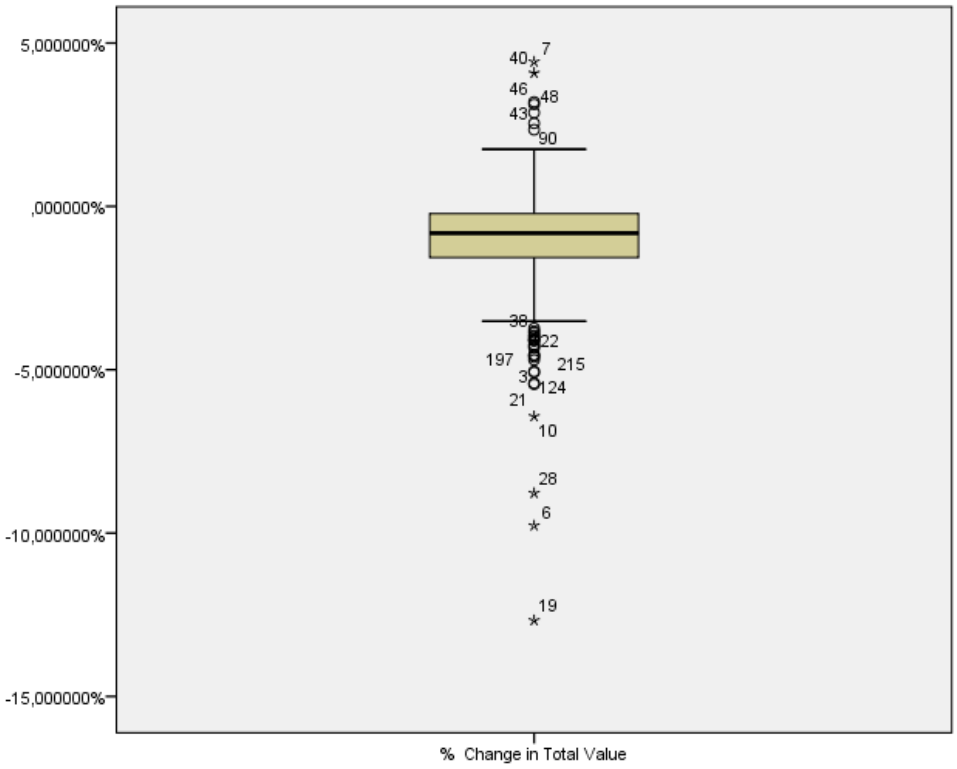


Figure 23 Histogram Outlier Identification Sample 7

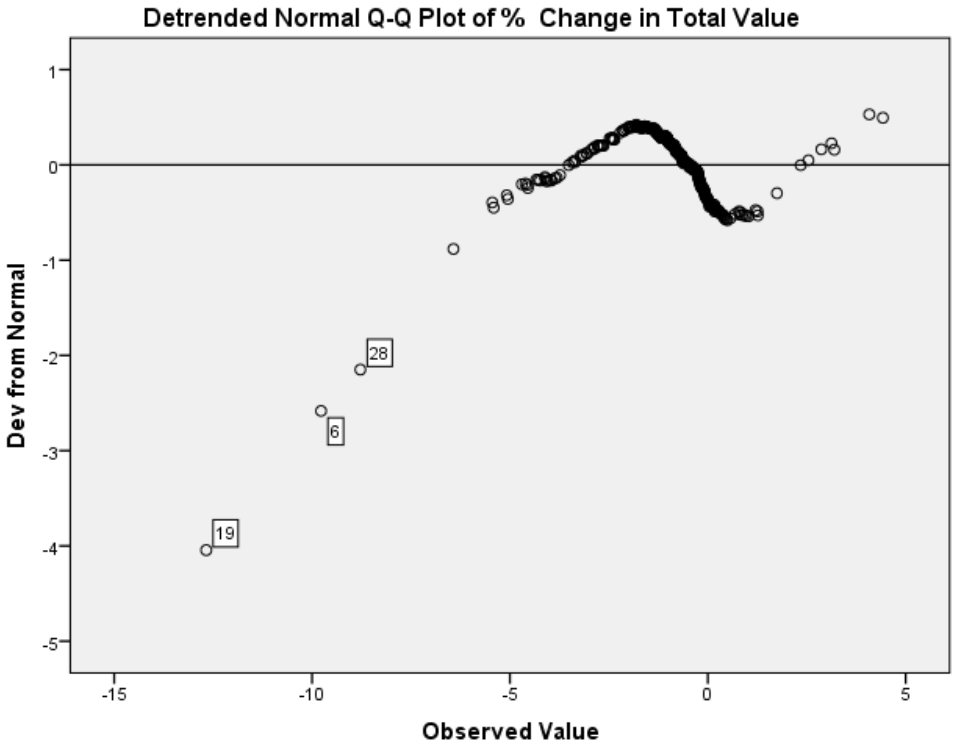


Figure 24 Detrended Normal Q-Q Plot Outlier Identification Sample 7

8.9 APPENDIX IX: DESCRIPTIVE STATISTICS

8.9.1 Sample 1

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	300	100,0%	0	0,0%	300	100,0%

Table 41 Sample 1 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		-0,8194839%	0,15913580%
	95% Confidence Interval for Mean	Lower Bound	-1,1326519%	
		Upper Bound	-0,5063158%	
	5% Trimmed Mean		-0,6667827%	
	Median		-0,5025025%	
	Variance		7,597	
	Std. Deviation		2,75631283%	
	Minimum		-17,506494%	
	Maximum		13,503876%	
	Range		31,010370%	
	Interquartile Range		1,363532%	
	Skewness		-1,365	,141
	Kurtosis		13,524	,281

Table 42 Sample 1 Descriptives Total Sample

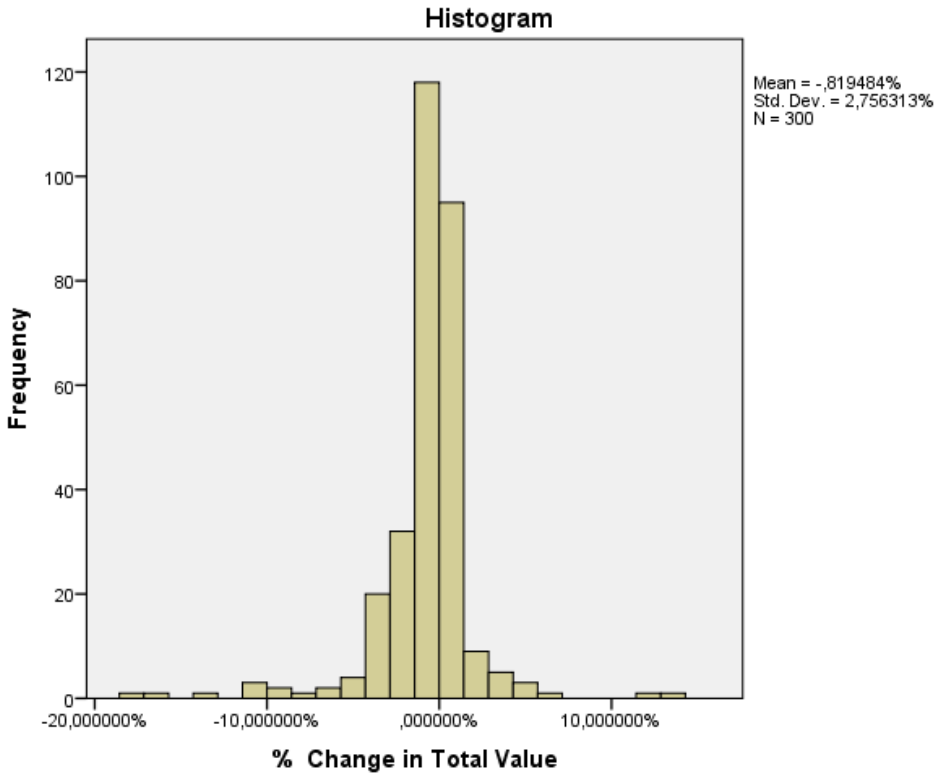


Figure 25 Sample 1 Histogram Total Sample

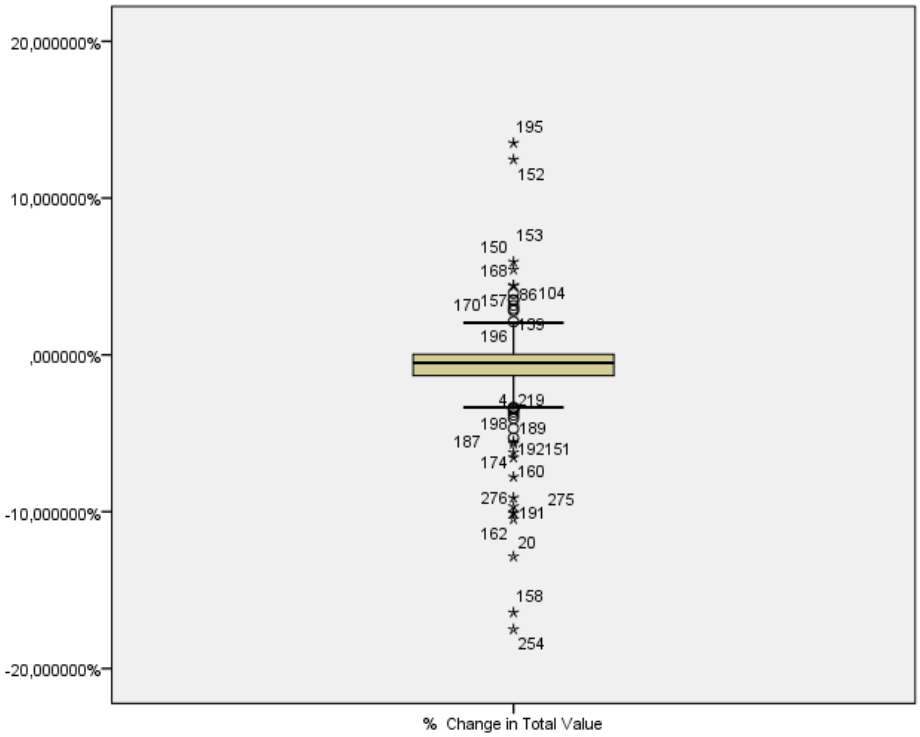


Figure 26 Sample 1 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	49	100,0%	0	0,0%	49	100,0%
	Change_Group	51	100,0%	0	0,0%	51	100,0%

Table 43 Sample 1 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-1,4859647%	0,28885933%
		95% Confidence Interval for Mean	Lower Bound	-2,0667553%	
			Upper Bound	-0,9051741%	
		5% Trimmed Mean		-1,2733273%	
		Median		-1,2277950%	
		Variance		4,089	
		Std. Deviation		2,02201532%	
		Minimum		-12,864157%	
		Maximum		0,989021%	
		Range		13,853178%	
		Interquartile Range		1,570127%	
		Skewness		-3,844	,340
		Kurtosis		20,767	,668
	Change Group	Mean		-1,6086958%	0,42527434%
		95% Confidence Interval for Mean	Lower Bound	-2,4628845%	
			Upper Bound	-0,7545072%	
		5% Trimmed Mean		-1,1001357%	
		Median		-0,7696430%	
		Variance		9,224	
		Std. Deviation		3,03706628%	
		Minimum		-17,506494%	
		Maximum		1,131222%	
		Range		18,637716%	
		Interquartile Range		1,326792%	
		Skewness		-3,780	,333
		Kurtosis		16,296	,656

Table 44 Sample 1 Descriptives at T=-2

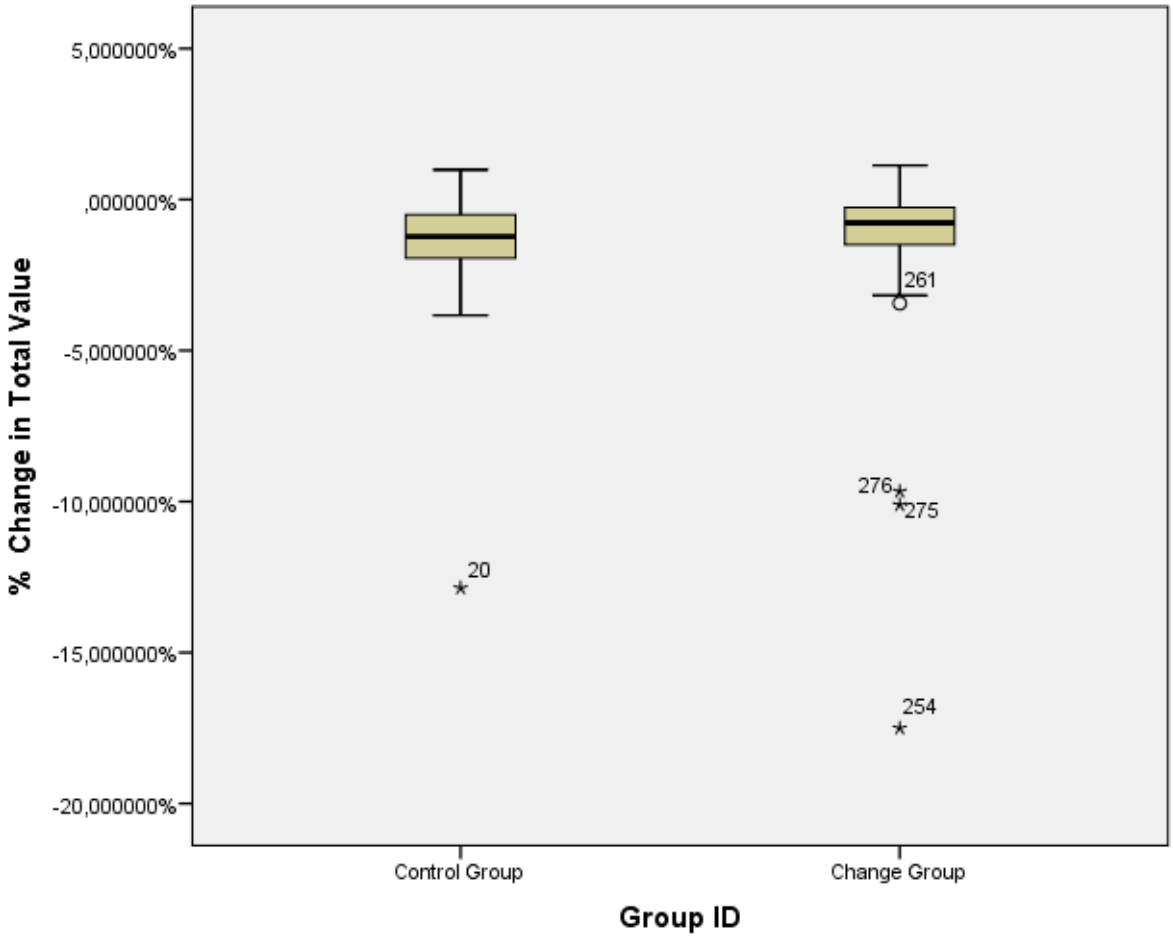


Figure 27 Sample 1 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	49	100,0%	0	0,0%	49	100,0%
	Change Group	51	100,0%	0	0,0%	51	100,0%

Table 45 Sample 1 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,6706244%	0,15480603%
		95% Confidence Interval for Mean	Lower Bound	-0,9818828%	
			Upper Bound	-0,3593661%	
		5% Trimmed Mean		-0,6724709%	
		Median		-0,4403770%	
		Variance		1,174	
		Std. Deviation		1,08364223%	
		Minimum		-3,276830%	
		Maximum		2,821869%	
		Range		6,098699%	
		Interquartile Range		1,147758%	
		Skewness		-,003	,340
		Kurtosis		1,804	,668
	Change Group	Mean		-0,5300623%	0,11549261%
		95% Confidence Interval for Mean	Lower Bound	-0,7620360%	
			Upper Bound	-0,2980885%	
		5% Trimmed Mean		-0,4705302%	
		Median		-0,5022900%	
		Variance		,680	
		Std. Deviation		0,82478220%	
		Minimum		-4,045584%	
		Maximum		0,746504%	
		Range		4,792088%	
		Interquartile Range		1,068942%	
		Skewness		-1,594	,333
		Kurtosis		5,262	,656

Table 46 Sample 1 Descriptives at T=-1

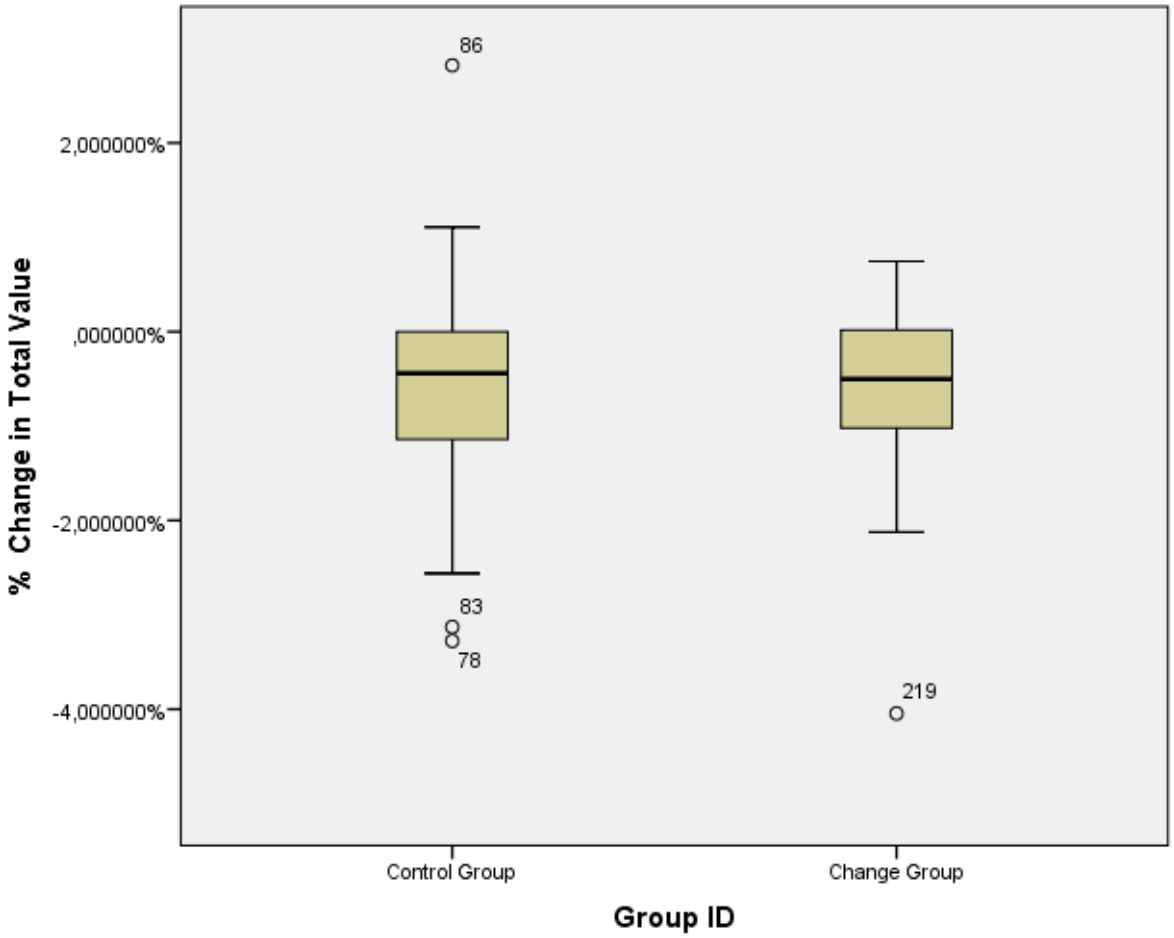


Figure 28 Sample 1 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	49	100,0%	0	0,0%	49	100,0%
	Change Group	51	100,0%	0	0,0%	51	100,0%

Table 47 Sample 1 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,24352022%	0,15697118%
		95% Confidence Interval for Mean	Lower Bound	-0,0720915%	
			Upper Bound	0,55913194%	
		5% Trimmed Mean		0,24505903%	
		Median		0,04172800%	
		Variance		1,207	
		Std. Deviation		1,09879826%	
		Minimum		-3,393705%	
		Maximum		3,479037%	
		Range		6,872742%	
		Interquartile Range		0,647145%	
		Skewness		-,096	,340
		Kurtosis		3,624	,668
	Change Group	Mean		-0,8436887%	0,72801699%
		95% Confidence Interval for Mean	Lower Bound	-2,3059539%	
			Upper Bound	0,61857642%	
		5% Trimmed Mean		-0,8670016%	
		Median		-0,6334130%	
		Variance		27,030	
		Std. Deviation		5,19908126%	
		Minimum		-16,434758%	
		Maximum		13,503876%	
		Range		29,938634%	
		Interquartile Range		5,341283%	
		Skewness		-,084	,333
		Kurtosis		1,933	,656

Table 48 Sample 1 Descriptives at T=0

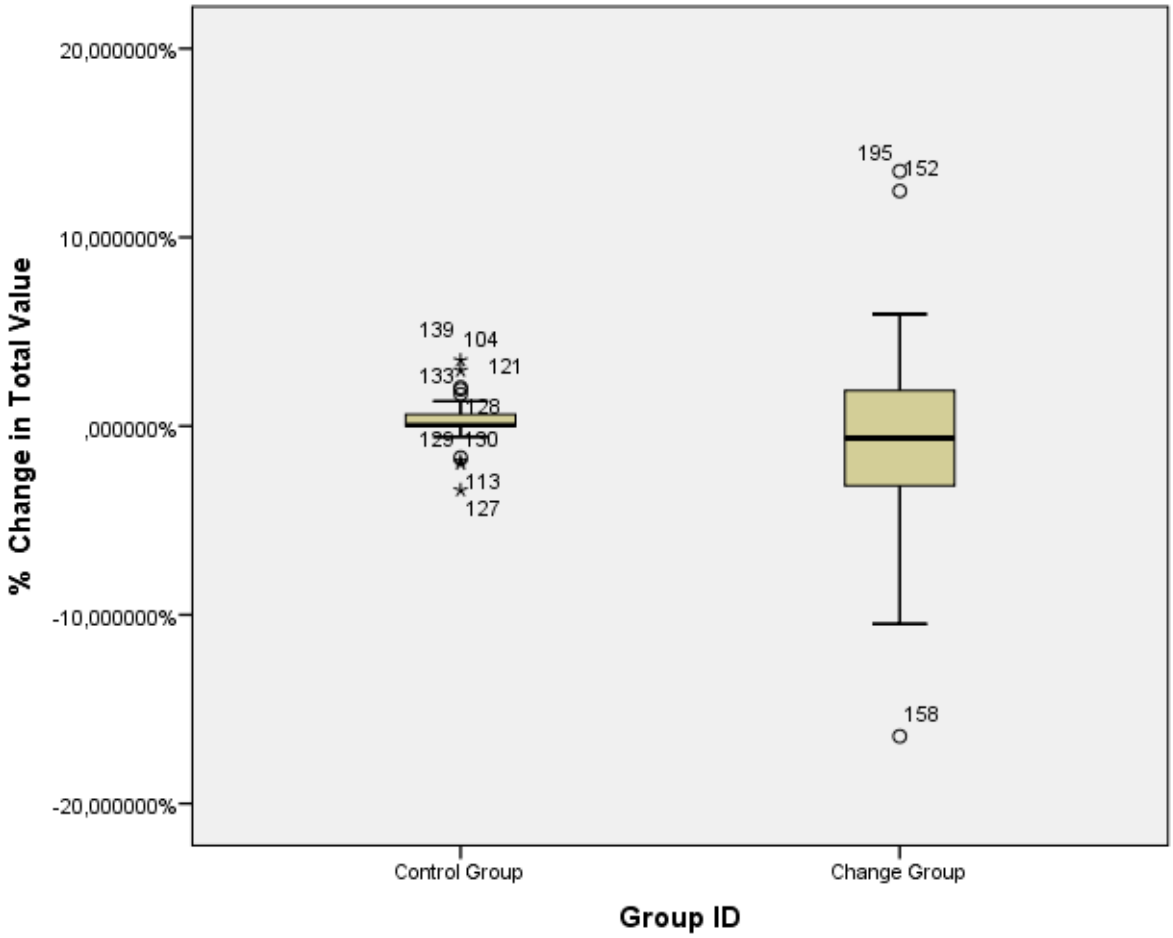


Figure 29 Sample 1 Boxplot at T=0

8.9.2 Sample 2

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	459	100,0%	0	0,0%	459	100,0%

Table 49 Sample 2 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		-0,2444589%	0,12799779%
	95% Confidence Interval for Mean	Lower Bound	-0,4959946%	
		Upper Bound	0,00707690%	
	5% Trimmed Mean		-0,1475873%	
	Median		0,03322100%	
	Variance		7,520	
	Std. Deviation		2,74226117%	
	Minimum		-12,722841%	
	Maximum		18,584759%	
	Range		31,307600%	
	Interquartile Range		1,140022%	
	Skewness		,199	,114
	Kurtosis		12,223	,227

Table 50 Sample 2 Descriptives Total Sample

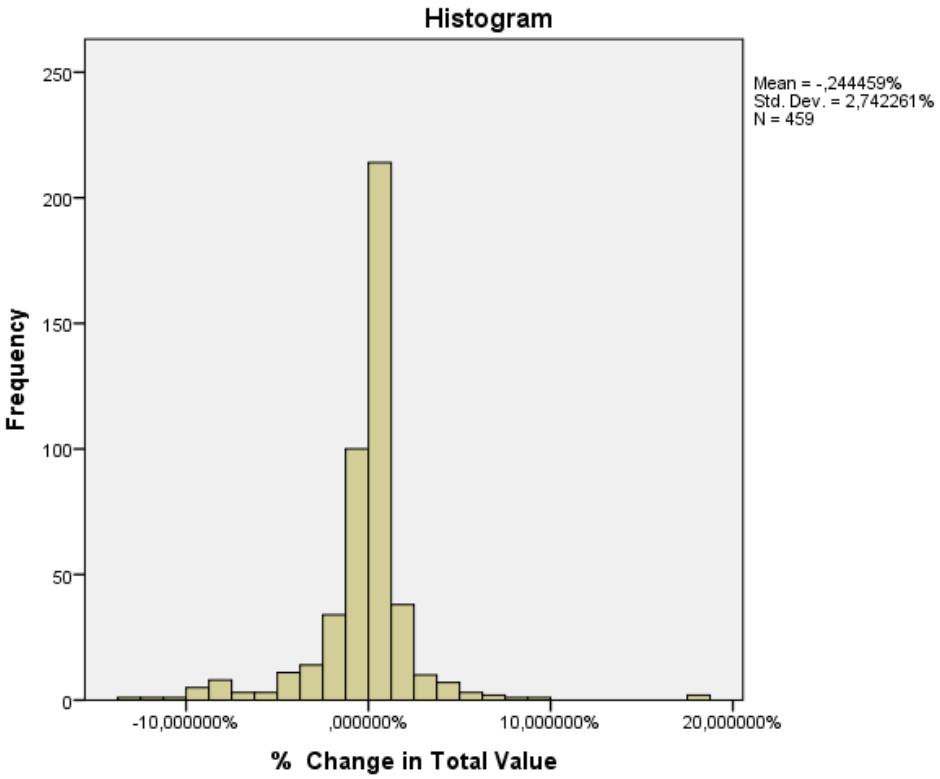


Figure 30 Sample 2 Histogram Total Sample

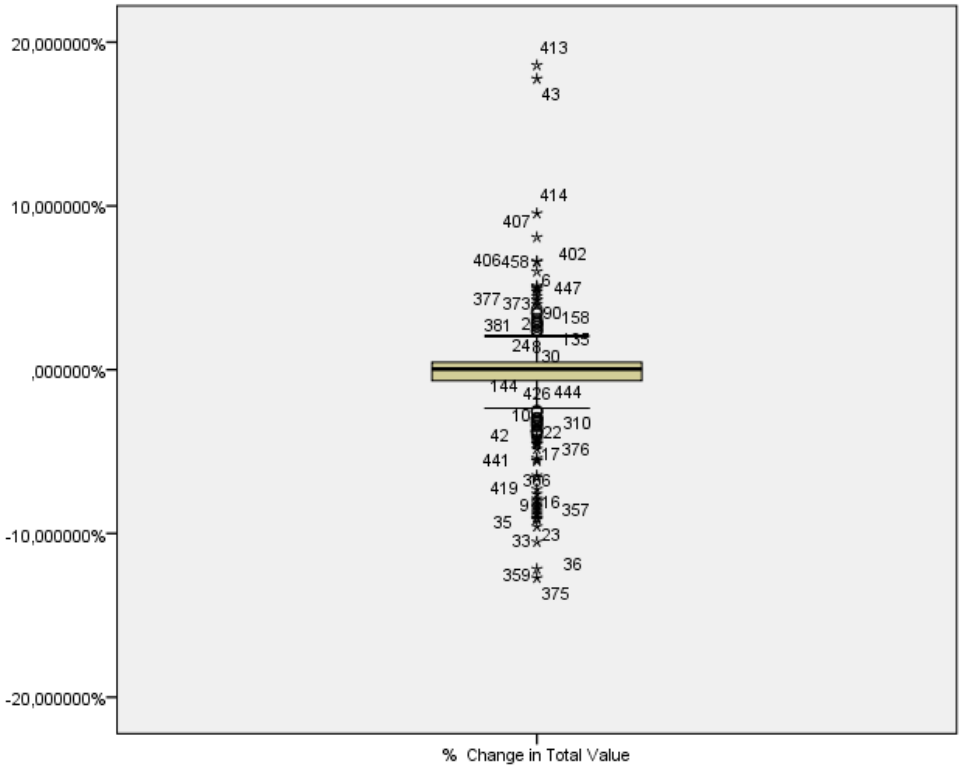


Figure 31 Sample 2 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	104	100,0%	0	0,0%	104	100,0%
	Change_Group	49	100,0%	0	0,0%	49	100,0%

Table 51 Sample 2 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,6892771%	0,40968067%
		95% Confidence Interval for Mean	Lower Bound	-1,5017821%	
			Upper Bound	0,12322790%	
		5% Trimmed Mean		-0,7613349%	
		Median		-0,2680115%	
		Variance		17,455	
		Std. Deviation		4,17793943%	
		Minimum		-12,722841%	
		Maximum		18,584759%	
		Range		31,307600%	
		Interquartile Range		1,822356%	
		Skewness		,628	,237
		Kurtosis		4,532	,469
	Change_Group	Mean		-0,6706244%	0,15480603%
		95% Confidence Interval for Mean	Lower Bound	-0,9818828%	
			Upper Bound	-0,3593661%	
		5% Trimmed Mean		-0,6724709%	
		Median		-0,4403770%	
		Variance		1,174	
		Std. Deviation		1,08364223%	
		Minimum		-3,276830%	
		Maximum		2,821869%	
		Range		6,098699%	
		Interquartile Range		1,147758%	
		Skewness		-,003	,340
		Kurtosis		1,804	,668

Table 52 Sample 2 Descriptives at T=-2

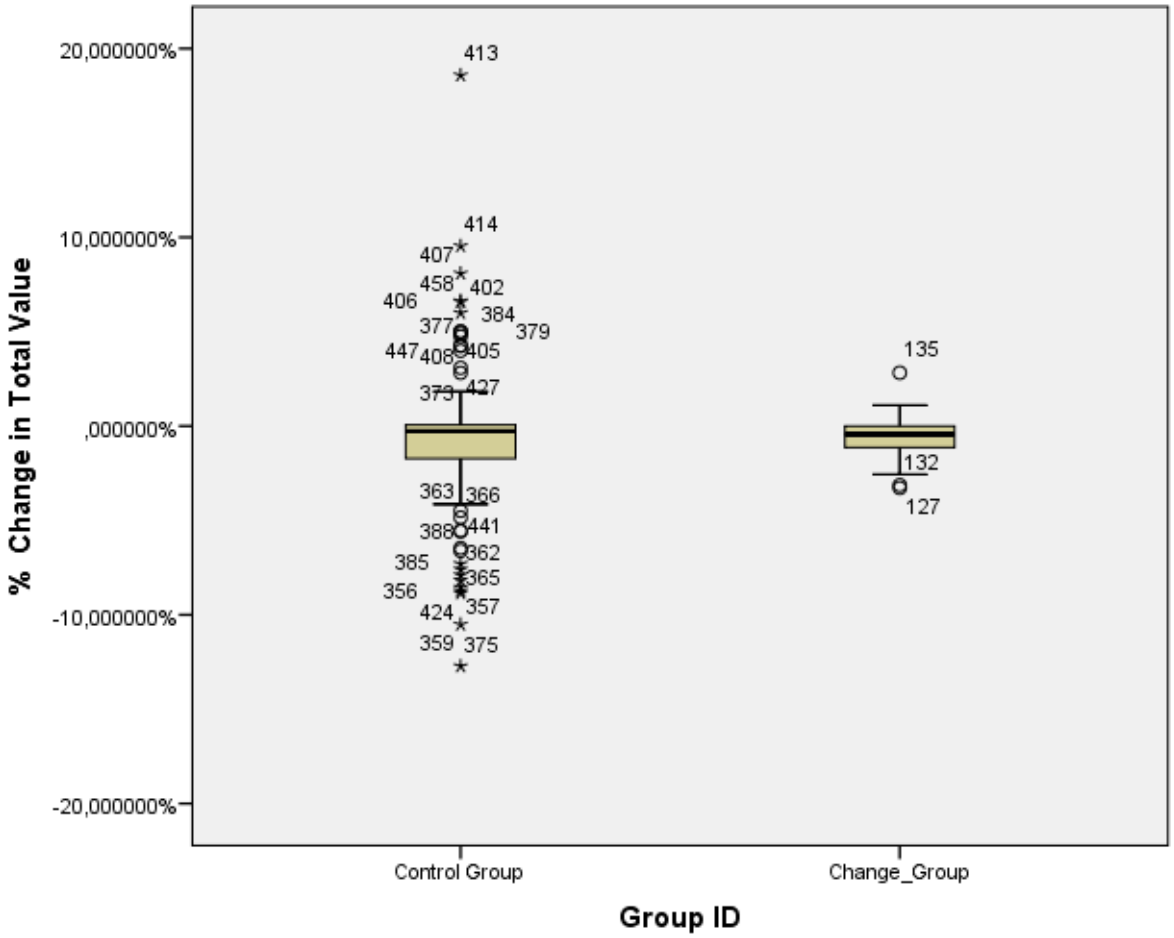


Figure 32 Sample 2 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	104	100,0%	0	0,0%	104	100,0%
	Change_Group	49	100,0%	0	0,0%	49	100,0%

Table 53 Sample 2 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,30779507%	0,08025495%
		95% Confidence Interval for Mean	Lower Bound	0,14862831%	
			Upper Bound	0,46696183%	
		5% Trimmed Mean		0,33140441%	
		Median		0,16394450%	
		Variance		,670	
		Std. Deviation		0,81844308%	
		Minimum		-3,753863%	
		Maximum		2,667875%	
		Range		6,421738%	
		Interquartile Range		0,652268%	
		Skewness		-,966	,237
		Kurtosis		6,299	,469
	Change_Group	Mean		0,24352022%	0,15697118%
		95% Confidence Interval for Mean	Lower Bound	-0,0720915%	
			Upper Bound	0,55913194%	
		5% Trimmed Mean		0,24505903%	
		Median		0,04172800%	
		Variance		1,207	
		Std. Deviation		1,09879826%	
		Minimum		-3,393705%	
		Maximum		3,479037%	
		Range		6,872742%	
		Interquartile Range		0,647145%	
		Skewness		-,096	,340
		Kurtosis		3,624	,668

Table 54 Sample 2 Descriptives at T=-1

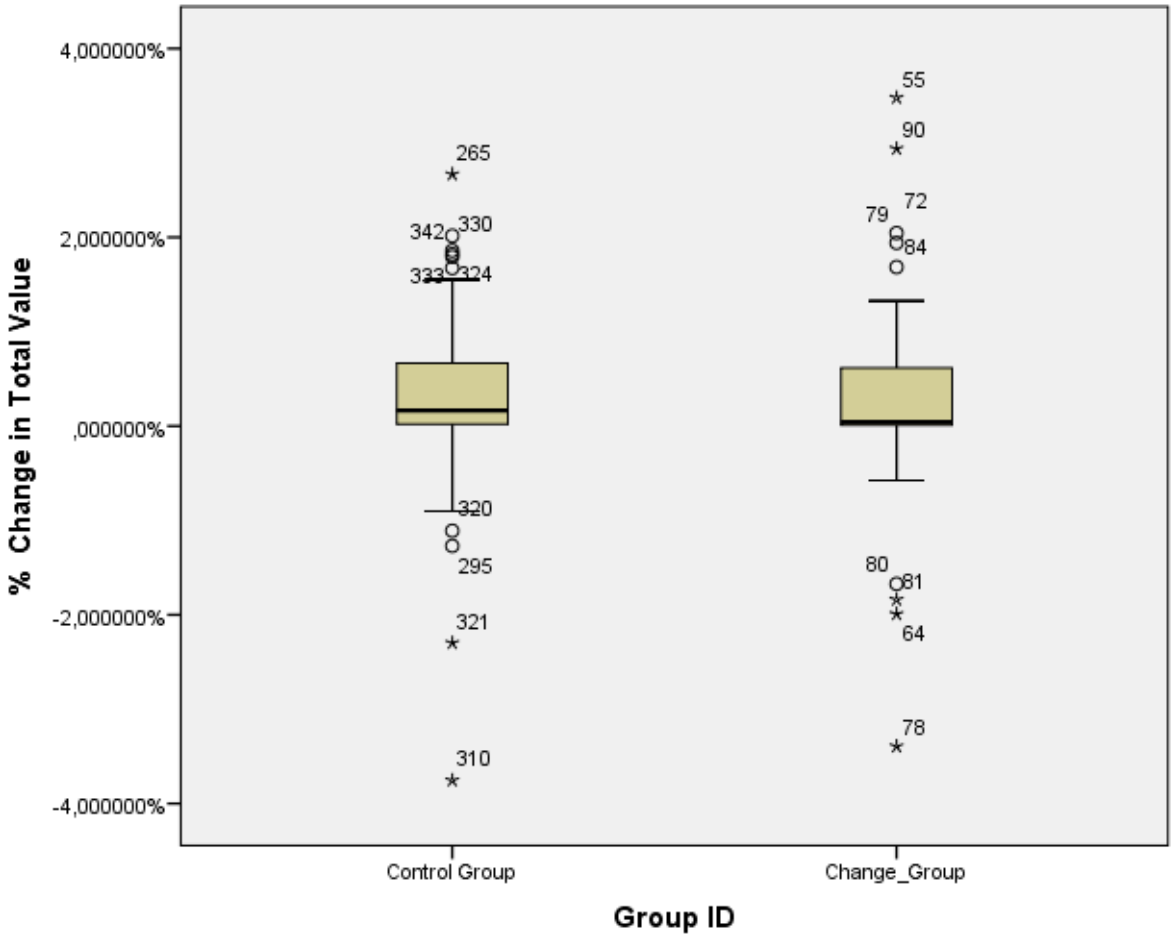


Figure 33 Sample 2 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	104	100,0%	0	0,0%	104	100,0%
	Change_Group	49	100,0%	0	0,0%	49	100,0%

Table 55 Sample 2 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,26929819%	0,08304776%
		95% Confidence Interval for Mean	Lower Bound	0,10459255%	
			Upper Bound	0,43400383%	
		5% Trimmed Mean		0,29534965%	
		Median		0,24666250%	
		Variance		,717	
		Std. Deviation		0,84692428%	
		Minimum		-2,973068%	
		Maximum		2,316404%	
		Range		5,289472%	
		Interquartile Range		0,900569%	
		Skewness		-,618	,237
		Kurtosis		1,789	,469
	Change_Group	Mean		-1,6247223%	0,71292039%
		95% Confidence Interval for Mean	Lower Bound	-3,0581449%	
			Upper Bound	-0,1912998%	
		5% Trimmed Mean		-1,7829497%	
		Median		-0,9842150%	
		Variance		24,905	
		Std. Deviation		4,99044273%	
		Minimum		-12,177149%	
		Maximum		17,757336%	
		Range		29,934485%	
		Interquartile Range		5,568003%	
		Skewness		,797	,340
		Kurtosis		3,648	,668

Table 56 Sample 2 Descriptives at T=0

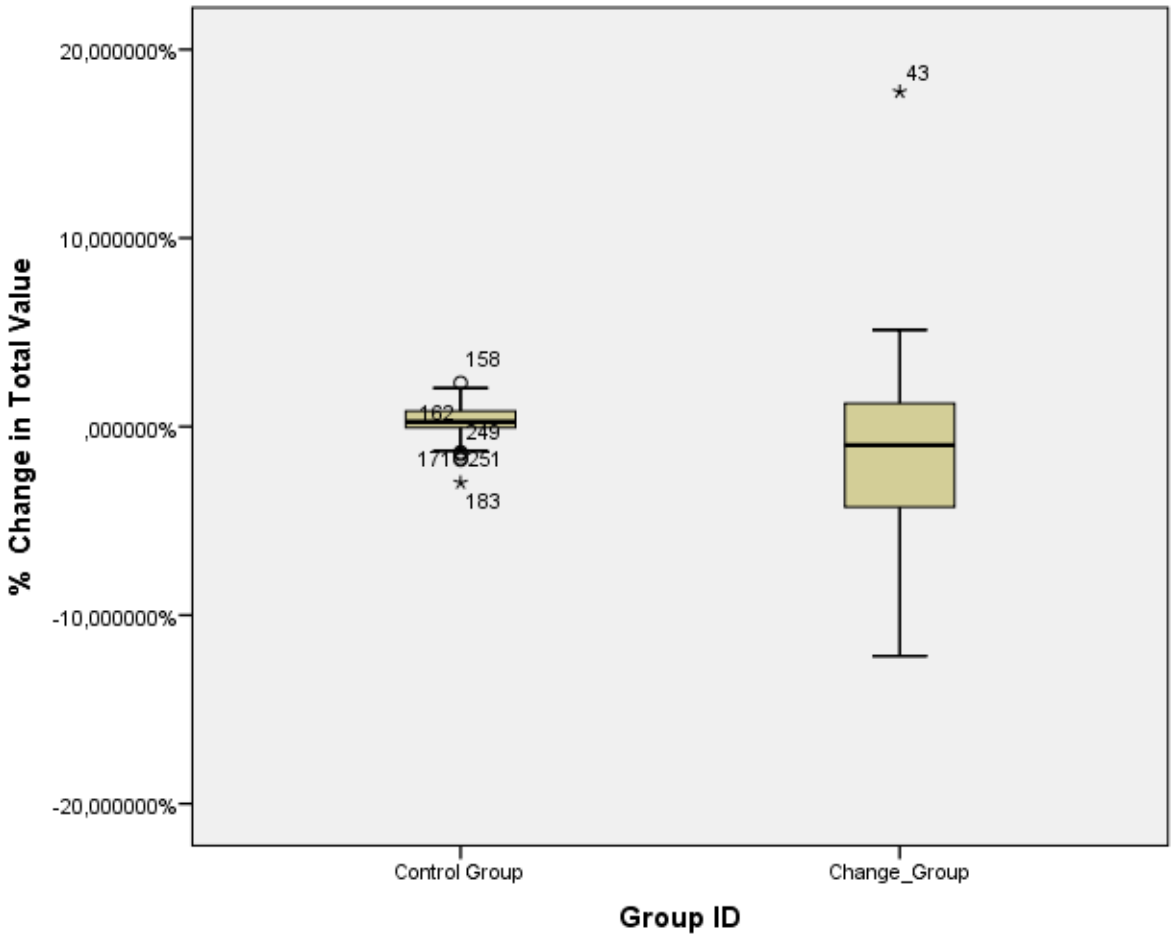


Figure 34 Sample 2 Boxplot at T=0

8.9.3 Sample 3

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	465	100,0%	0	0,0%	465	100,0%

Table 57 Sample 3 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		0,11726515%	0,05158565%
	95% Confidence Interval for Mean	Lower Bound	0,01589472%	
		Upper Bound	0,21863559%	
	5% Trimmed Mean		0,14895639%	
	Median		0,16037500%	
	Variance		1,237	
	Std. Deviation		1,11238574%	
	Minimum		-4,122412%	
	Maximum		4,799270%	
	Range		8,921682%	
	Interquartile Range		0,673693%	
	Skewness		-,428	,113
	Kurtosis		3,694	,226

Table 58 Sample 3 Descriptives Total Sample

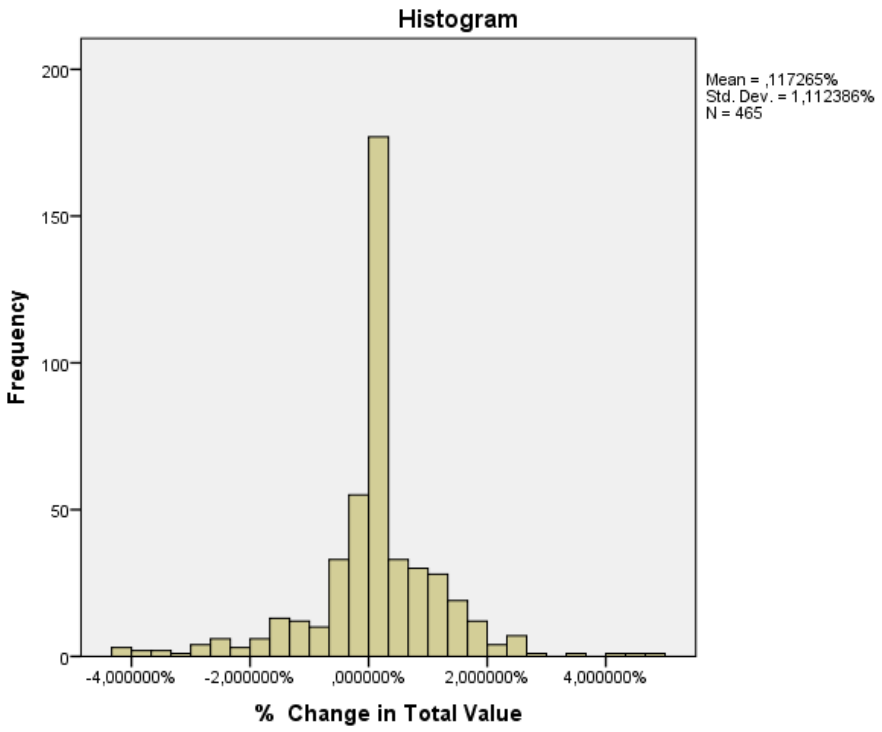


Figure 35 Sample 3 Histogram Total Sample

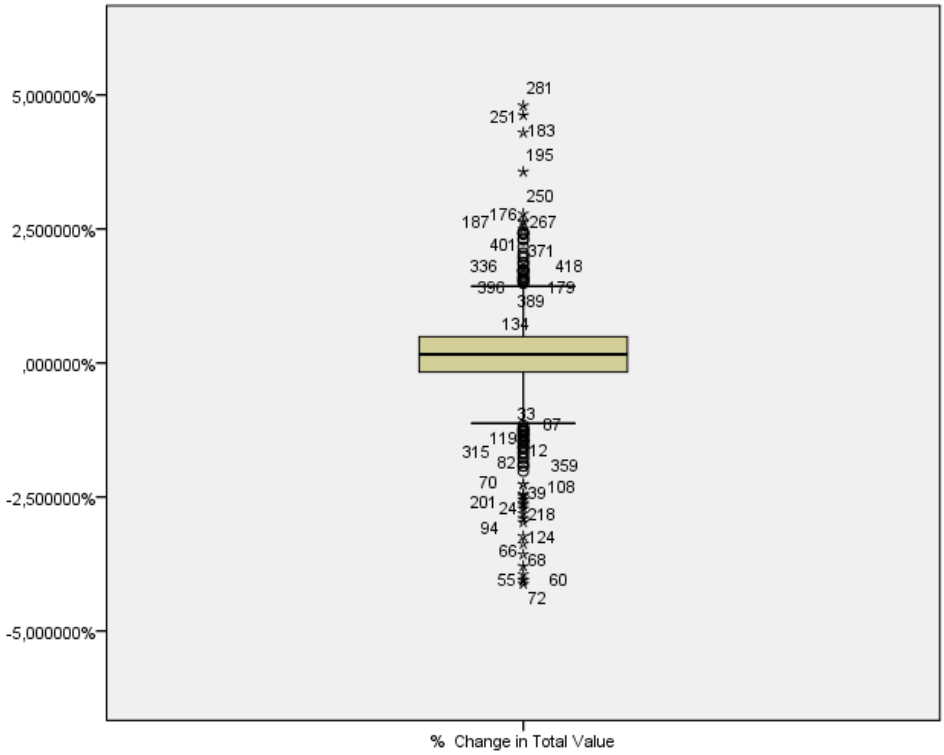


Figure 36 Sample 3 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	101	100,0%	0	0,0%	101	100,0%
	Change_Group	54	100,0%	0	0,0%	54	100,0%

Table 59 Sample 3 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,57605567%	0,05869177%
		95% Confidence Interval for Mean	Lower Bound	0,45961288%	
			Upper Bound	0,69249847%	
		5% Trimmed Mean		0,55758282%	
		Median		0,27684000%	
		Variance		,348	
		Std. Deviation		0,58984495%	
		Minimum		-0,621281%	
		Maximum		2,316404%	
		Range		2,937685%	
		Interquartile Range		0,924711%	
		Skewness		,684	,240
		Kurtosis		-,402	,476
	Change_Group	Mean		0,04189976%	0,13800003%
		95% Confidence Interval for Mean	Lower Bound	-0,2348932%	
			Upper Bound	0,31869277%	
		5% Trimmed Mean		0,06006669%	
		Median		0,11093350%	
		Variance		1,028	
		Std. Deviation		1,01408898%	
		Minimum		-2,973068%	
		Maximum		2,158191%	
		Range		5,131259%	
		Interquartile Range		1,504606%	
		Skewness		-,452	,325
		Kurtosis		,387	,639

Table 60 Sample 3 Descriptives at T=-2

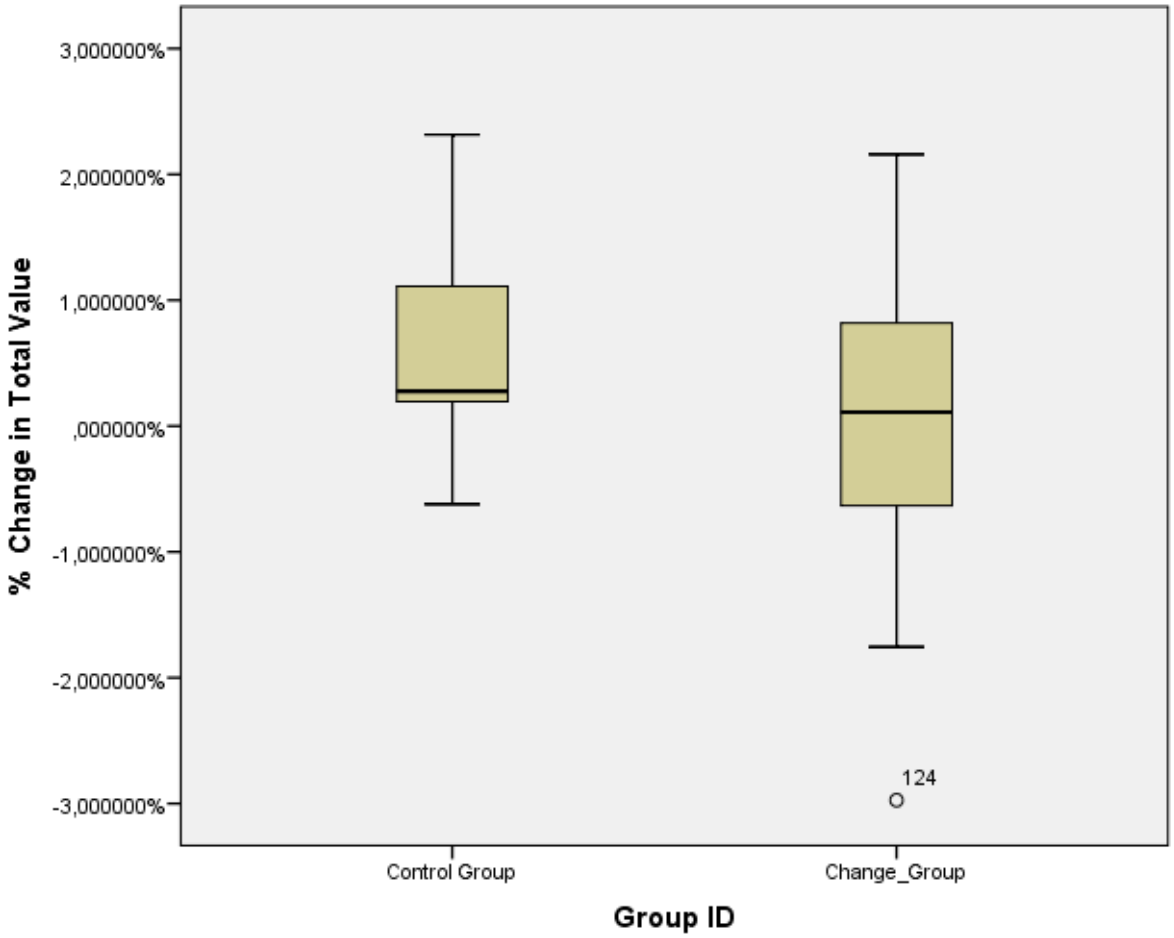


Figure 37 Sample 3 Boxplot at T=-2

Case Processing Summary

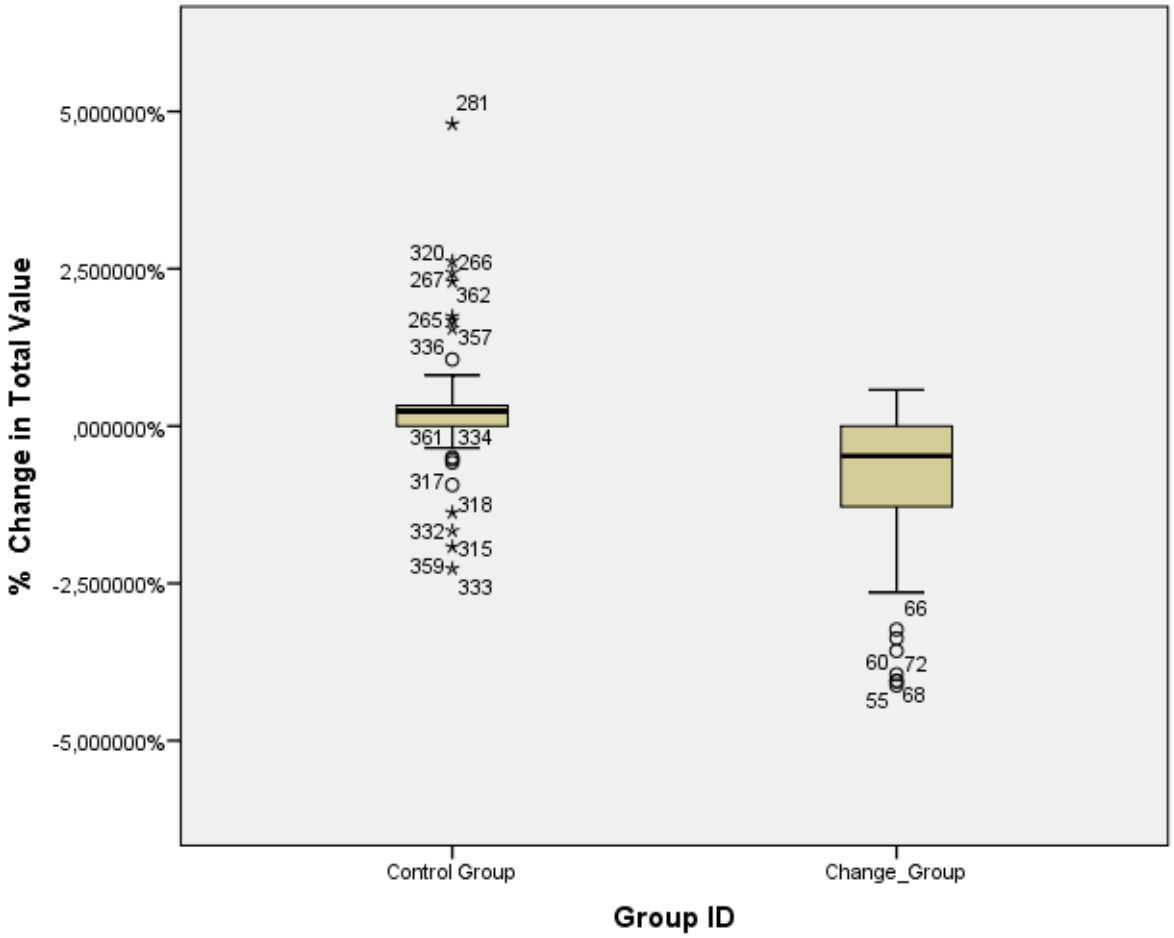
		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	101	100,0%	0	0,0%	101	100,0%
	Change_Group	54	100,0%	0	0,0%	54	100,0%

Table 61 Sample 3 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,25720594%	0,08182719%
		95% Confidence Interval for Mean	Lower Bound	0,09486313%	
			Upper Bound	0,41954875%	
		5% Trimmed Mean		0,22217606%	
		Median		0,23505000%	
		Variance		,676	
		Std. Deviation		0,82235308%	
		Minimum		-2,266402%	
		Maximum		4,799270%	
		Range		7,065672%	
		Interquartile Range		0,333287%	
		Skewness		1,702	,240
		Kurtosis		10,761	,476
	Change_Group	Mean		-0,9079736%	0,17854946%
		95% Confidence Interval for Mean	Lower Bound	-1,2660985%	
			Upper Bound	-0,5498487%	
		5% Trimmed Mean		-0,8087651%	
		Median		-0,4744620%	
		Variance		1,722	
		Std. Deviation		1,31206523%	
		Minimum		-4,122412%	
		Maximum		0,574407%	
		Range		4,696819%	
		Interquartile Range		1,297109%	
		Skewness		-1,361	,325
		Kurtosis		,734	,639

Table 62 Sample 3 Descriptives at T=-1



Graph 14 Sample 3 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	101	100,0%	0	0,0%	101	100,0%
	Change_Group	54	100,0%	0	0,0%	54	100,0%

Table 63 Sample 3 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,36334880%	0,13017878%
		95% Confidence Interval for Mean	Lower Bound	0,10507781%	
			Upper Bound	0,62161979%	
		5% Trimmed Mean		0,34776160%	
		Median		0,09467500%	
		Variance		1,712	
		Std. Deviation		1,30828053%	
		Minimum		-3,791529%	
		Maximum		4,620035%	
		Range		8,411564%	
		Interquartile Range		1,137333%	
		Skewness		,327	,240
		Kurtosis		1,997	,476
	Change_Group	Mean		-0,3622476%	0,13987555%
		95% Confidence Interval for Mean	Lower Bound	-0,6428024%	
			Upper Bound	-0,0816927%	
		5% Trimmed Mean		-0,3368896%	
		Median		-0,0170095%	
		Variance		1,057	
		Std. Deviation		1,02787114%	
		Minimum		-2,902340%	
		Maximum		1,958417%	
		Range		4,860757%	
		Interquartile Range		0,642437%	
		Skewness		-,837	,325
		Kurtosis		1,105	,639

Table 64 Sample 3 Descriptives at T=0

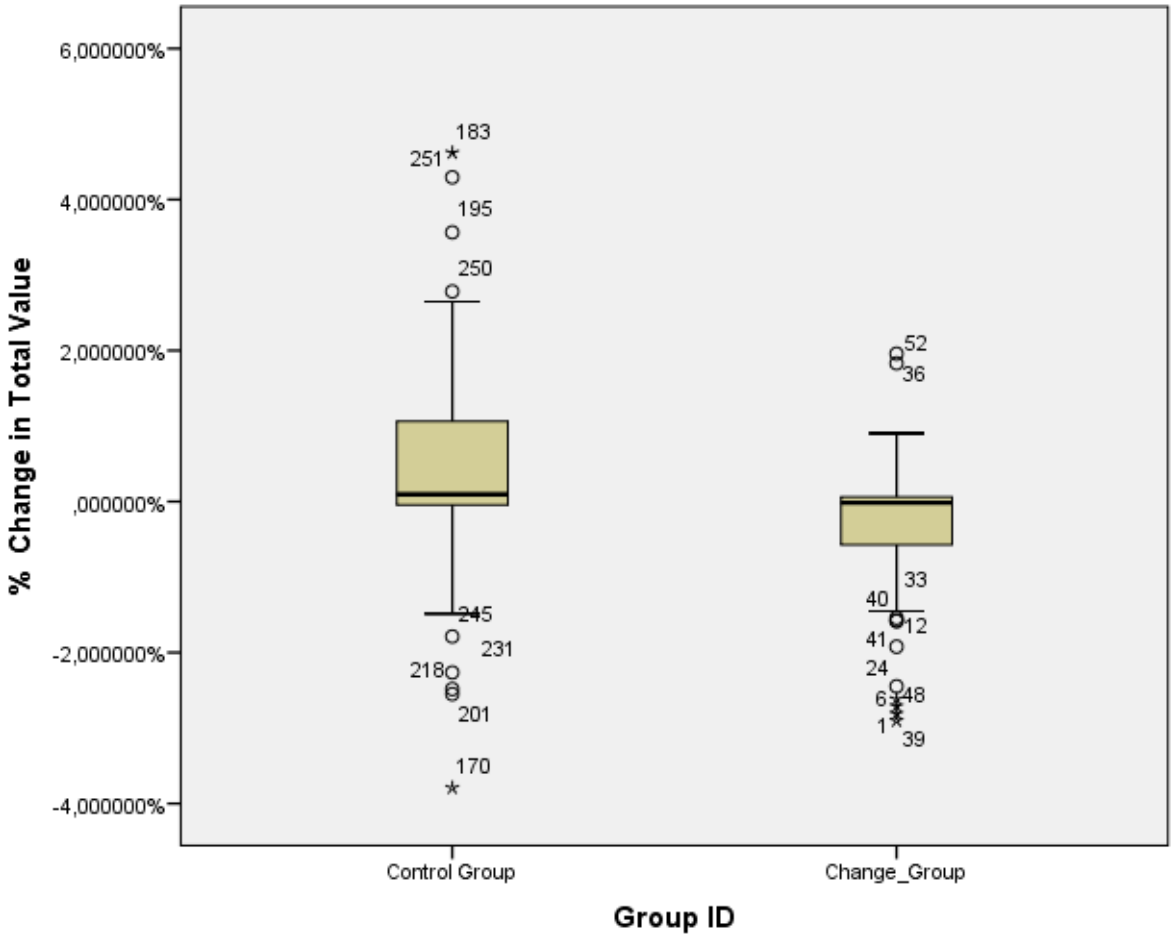


Figure 38 Sample 3 Boxplot at T=0

8.9.4 Sample 4

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	396	100,0%	0	0,0%	396	100,0%

Table 65 Sample 4 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		0,07159435%	0,05522499%
	95% Confidence Interval for Mean	Lower Bound	-0,0369773%	
		Upper Bound	0,18016602%	
	5% Trimmed Mean		0,05492556%	
	Median		0,02975250%	
	Variance		1,208	
	Std. Deviation		1,09896350%	
	Minimum		-6,576757%	
	Maximum		4,799270%	
	Range		11,376027%	
	Interquartile Range		0,641758%	
	Skewness		,042	,123
	Kurtosis		5,973	,245

Table 66 Sample 4 Descriptives Total Sample

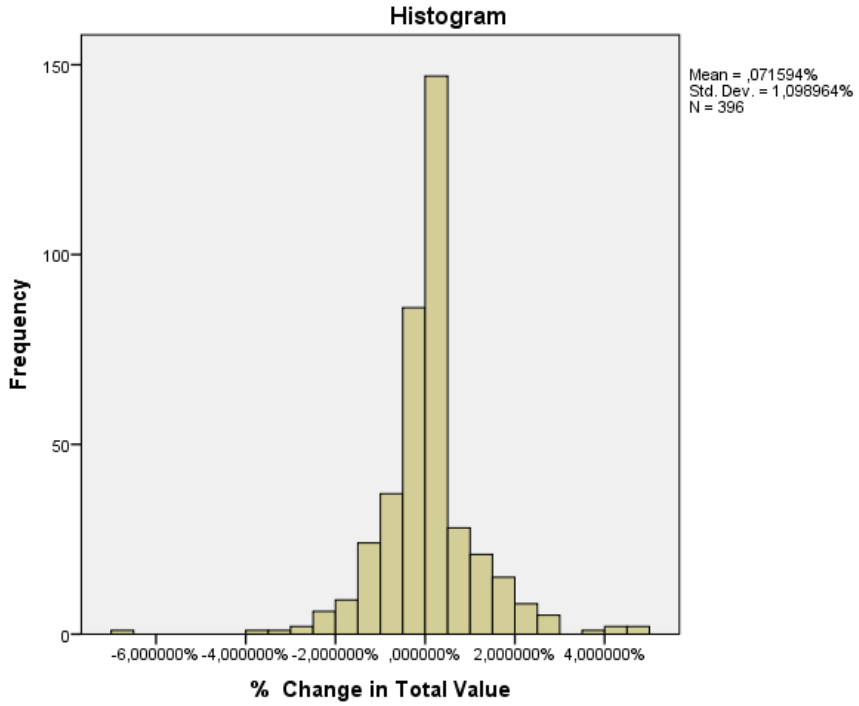


Figure 39 Sample 4 Histogram Total Sample

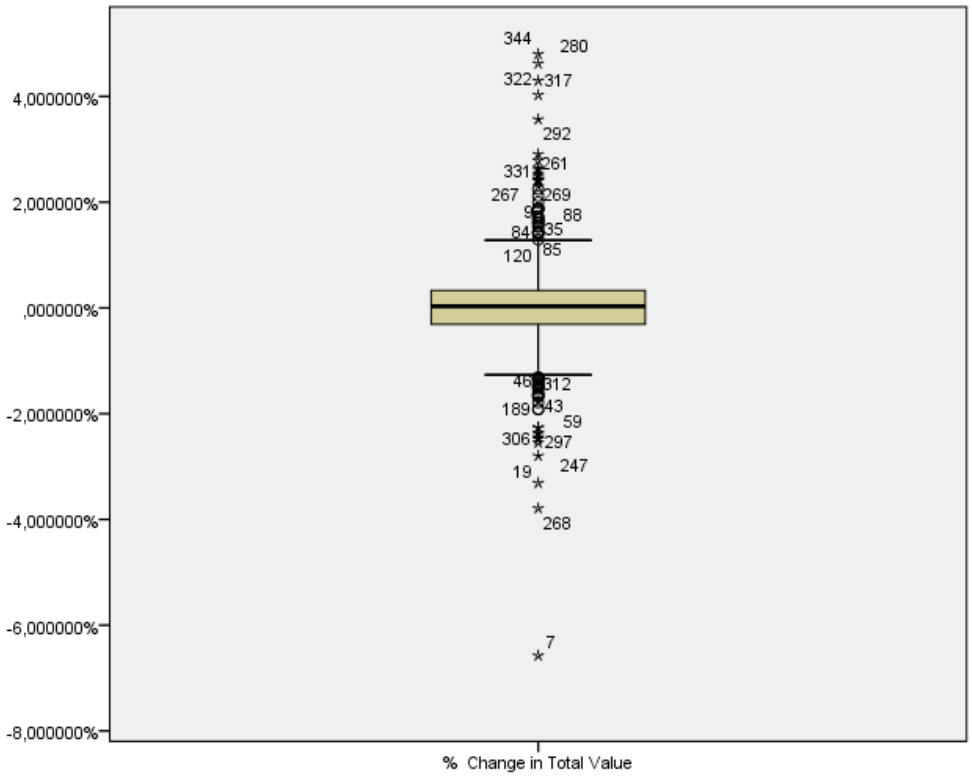


Figure 40 Sample 4 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	68	100,0%	0	0,0%	68	100,0%
	Change_Group	64	100,0%	0	0,0%	64	100,0%

Table 67 Sample 4 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,12625897%	0,11708361%
		95% Confidence Interval for Mean	Lower Bound	-0,1074409%	
			Upper Bound	0,35995883%	
		5% Trimmed Mean		0,06197849%	
		Median		0,02492550%	
		Variance		,932	
		Std. Deviation		0,96549616%	
		Minimum		-2,266402%	
		Maximum		4,799270%	
		Range		7,065672%	
		Interquartile Range		0,403899%	
		Skewness		1,955	,291
		Kurtosis		8,714	,574
	Change_Group	Mean		0,27692538%	0,05048028%
		95% Confidence Interval for Mean	Lower Bound	0,17604859%	
			Upper Bound	0,37780216%	
		5% Trimmed Mean		0,26549926%	
		Median		0,27294450%	
		Variance		,163	
		Std. Deviation		0,40384222%	
		Minimum		-1,920935%	
		Maximum		1,740942%	
		Range		3,661877%	
		Interquartile Range		0,129316%	
		Skewness		-1,241	,299
		Kurtosis		17,220	,590

Table 68 Sample 4 Descriptives at T=-2

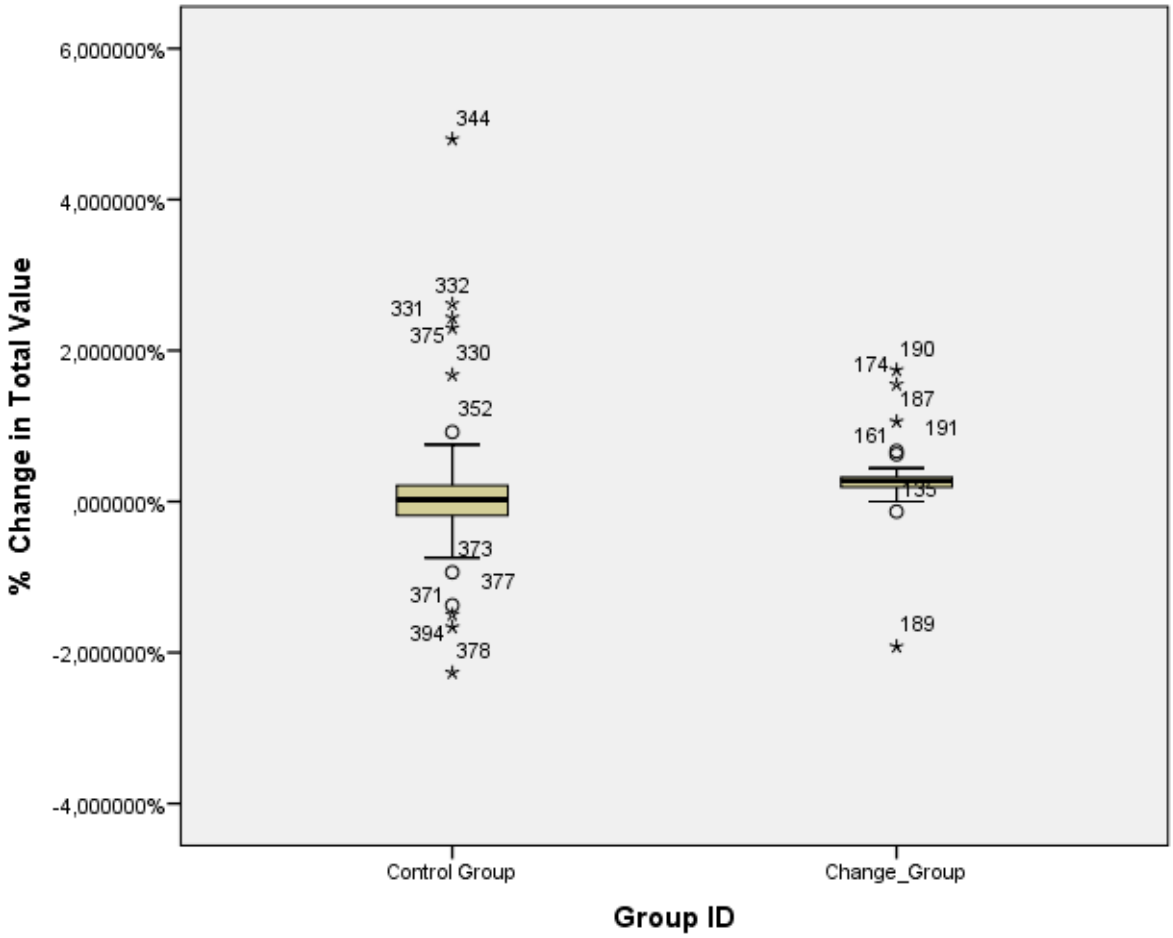


Figure 41 Sample 4 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	68	100,0%	0	0,0%	68	100,0%
	Change_Group	64	100,0%	0	0,0%	64	100,0%

Table 69 Sample 4 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		0,56934756%	0,19859441%
		95% Confidence Interval for Mean	Lower Bound	0,17295145%	
			Upper Bound	0,96574367%	
		5% Trimmed Mean		0,55685468%	
		Median		0,43339200%	
		Variance		2,682	
		Std. Deviation		1,63765148%	
		Minimum		-3,791529%	
		Maximum		4,620035%	
		Range		8,411564%	
		Interquartile Range		2,390287%	
		Skewness		,115	,291
		Kurtosis		,357	,574
	Change_Group	Mean		0,36993786%	0,08073288%
		95% Confidence Interval for Mean	Lower Bound	0,20860608%	
			Upper Bound	0,53126964%	
		5% Trimmed Mean		0,36822724%	
		Median		0,07203200%	
		Variance		,417	
		Std. Deviation		0,64586302%	
		Minimum		-0,968921%	
		Maximum		1,707343%	
		Range		2,676264%	
		Interquartile Range		1,012880%	
		Skewness		,421	,299
		Kurtosis		-,549	,590

Table 70 Sample 4 Descriptives at T=-1

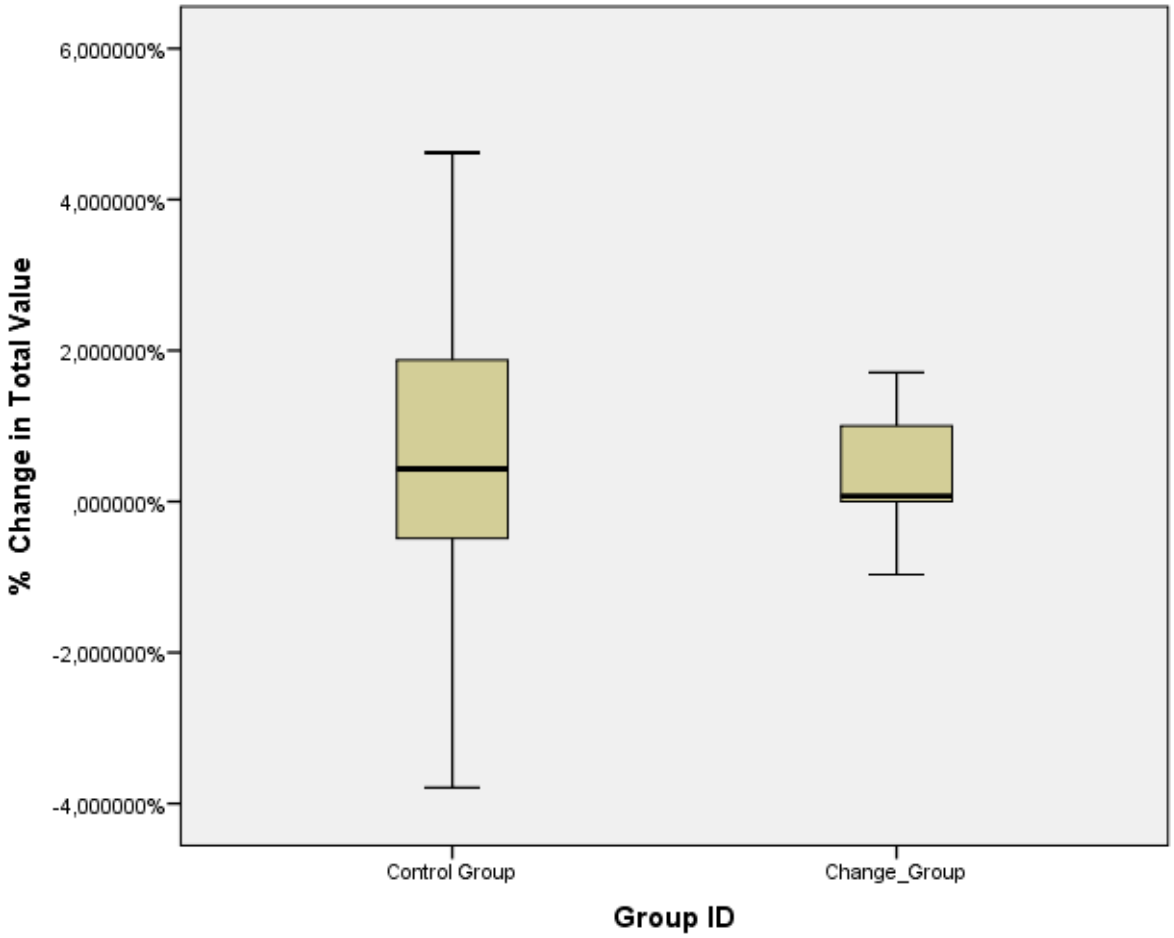


Figure 42 Sample 4 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	68	100,0%	0	0,0%	68	100,0%
	Change_Group	64	100,0%	0	0,0%	64	100,0%

Table 71 Sample 4 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,6869264%	0,08550408%
		95% Confidence Interval for Mean	Lower Bound	-0,8575932%	
			Upper Bound	-0,5162595%	
		5% Trimmed Mean		-0,6810803%	
		Median		-0,6952970%	
		Variance		,497	
		Std. Deviation		0,70508474%	
		Minimum		-3,313227%	
		Maximum		1,526844%	
		Range		4,840071%	
		Interquartile Range		0,887916%	
		Skewness		-,361	,291
		Kurtosis		3,026	,574
	Change_Group	Mean		-0,2130958%	0,15372863%
		95% Confidence Interval for Mean	Lower Bound	-0,5202980%	
			Upper Bound	0,09410631%	
		5% Trimmed Mean		-0,1445323%	
		Median		-0,0610925%	
		Variance		1,512	
		Std. Deviation		1,22982905%	
		Minimum		-6,576757%	
		Maximum		2,906135%	
		Range		9,482892%	
		Interquartile Range		0,279528%	
		Skewness		-2,199	,299
		Kurtosis		11,393	,590

Table 72 Sample 4 Descriptives at T=0

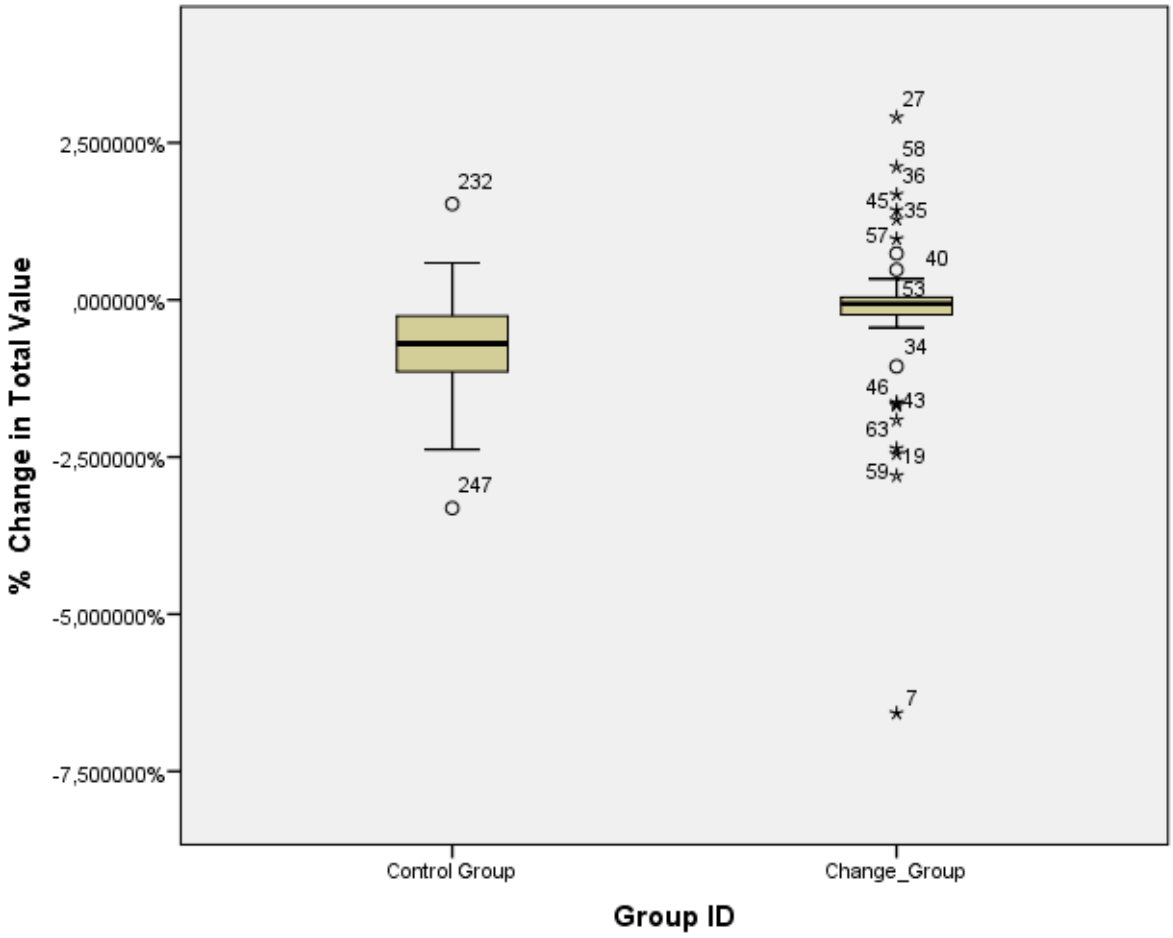


Figure 43 Sample 4 Boxplot at T=0

8.9.5 Sample 5

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	603	100,0%	0	0,0%	603	100,0%

Table 73 Sample 5 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		-0,8584293%	0,06848603%
	95% Confidence Interval for Mean	Lower Bound	-0,9929299%	
		Upper Bound	-0,7239288%	
	5% Trimmed Mean		-0,7430724%	
	Median		-0,6824770%	
	Variance		2,828	
	Std. Deviation		1,68174697%	
	Minimum		-12,529892%	
	Maximum		7,347389%	
	Range		19,877281%	
	Interquartile Range		1,181763%	
	Skewness		-1,608	,100
	Kurtosis		9,557	,199

Table 74 Sample 5 Descriptives Total Sample

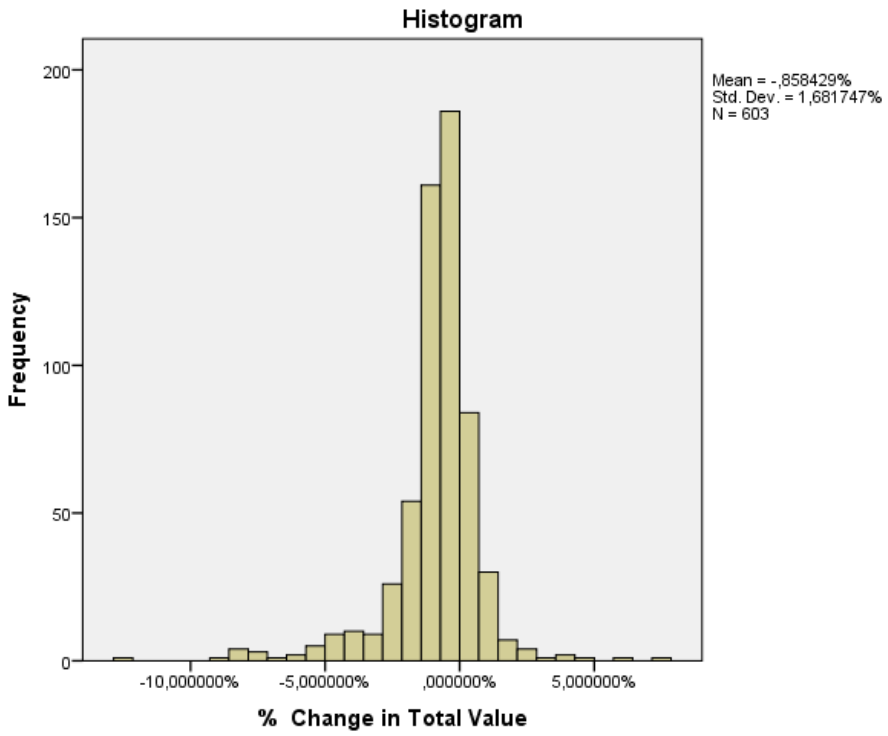


Figure 44 Sample 5 Histogram Total Sample

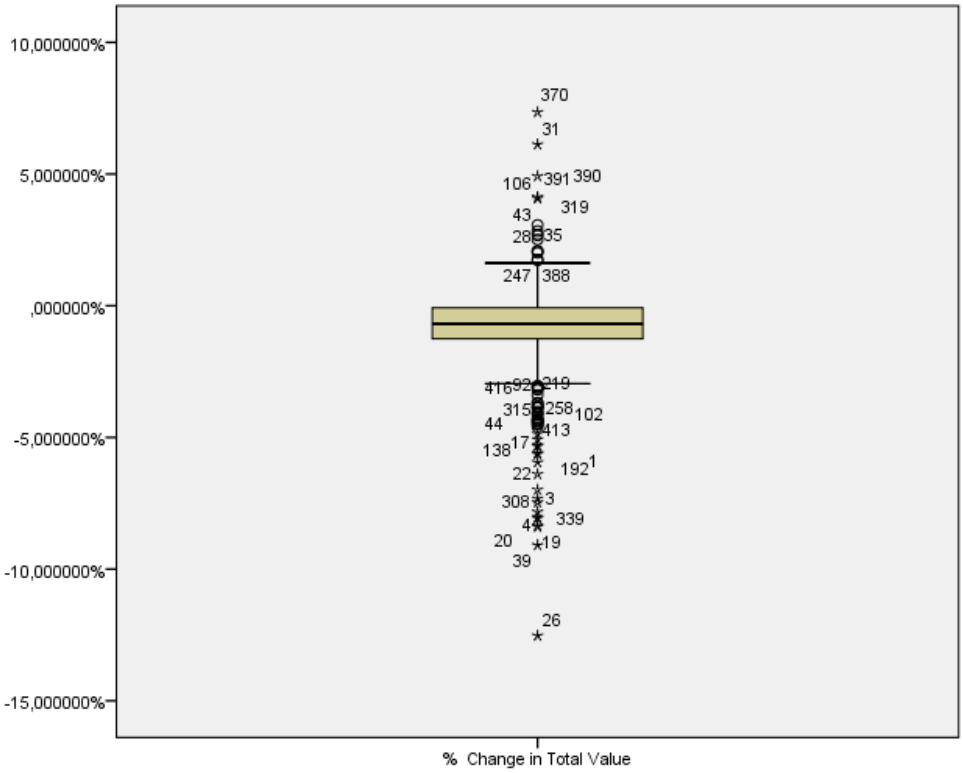


Figure 45 Sample 5 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	155	100,0%	0	0,0%	155	100,0%
	Change_Group	46	100,0%	0	0,0%	46	100,0%

Table 75 Sample 5 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,6304174%	0,09047814%
		95% Confidence Interval for Mean	Lower Bound	-0,8091559%	
			Upper Bound	-0,4516789%	
		5% Trimmed Mean		-0,5392363%	
		Median		-0,4097860%	
		Variance		1,269	
		Std. Deviation		1,12644378%	
		Minimum		-8,033469%	
		Maximum		1,030636%	
		Range		9,064105%	
		Interquartile Range		1,240556%	
		Skewness		-2,357	,195
		Kurtosis		11,546	,387
	Change_Group	Mean		-0,5835140%	0,20258925%
		95% Confidence Interval for Mean	Lower Bound	-0,9915497%	
			Upper Bound	-0,1754783%	
		5% Trimmed Mean		-0,5316099%	
		Median		-0,5382740%	
		Variance		1,888	
		Std. Deviation		1,37402718%	
		Minimum		-5,342249%	
		Maximum		4,069522%	
		Range		9,411771%	
		Interquartile Range		1,218573%	
		Skewness		-,433	,350
		Kurtosis		5,215	,688

Table 76 Sample 5 Descriptives at T=-2

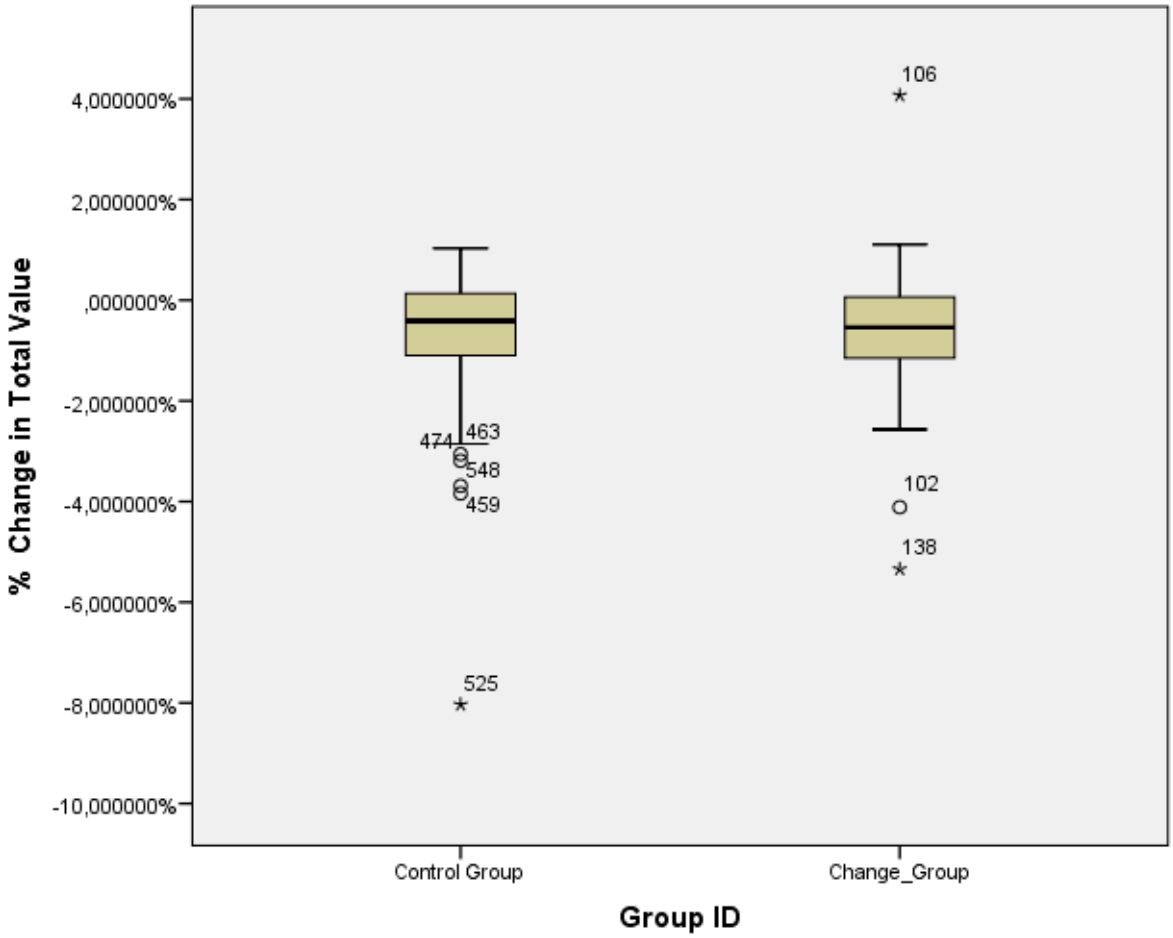


Figure 46 Sample 5 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	155	100,0%	0	0,0%	155	100,0%
	Change_Group	46	100,0%	0	0,0%	46	100,0%

Table 77 Sample 5 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,7970412%	0,12948363%
		95% Confidence Interval for Mean	Lower Bound	-1,0528345%	
			Upper Bound	-0,5412478%	
		5% Trimmed Mean		-0,7971366%	
		Median		-0,7620370%	
		Variance		2,599	
		Std. Deviation		1,61205823%	
		Minimum		-8,073106%	
		Maximum		7,347389%	
		Range		15,420495%	
		Interquartile Range		0,991553%	
		Skewness		,108	,195
		Kurtosis		9,086	,387
	Change_Group	Mean		-1,1482925%	0,15277422%
		95% Confidence Interval for Mean	Lower Bound	-1,4559956%	
			Upper Bound	-0,8405894%	
		5% Trimmed Mean		-1,0869771%	
		Median		-0,9549665%	
		Variance		1,074	
		Std. Deviation		1,03616518%	
		Minimum		-4,370596%	
		Maximum		0,803525%	
		Range		5,174121%	
		Interquartile Range		1,029495%	
		Skewness		-,971	,350
		Kurtosis		1,990	,688

Table 78 Sample 5 Descriptives at T=-1

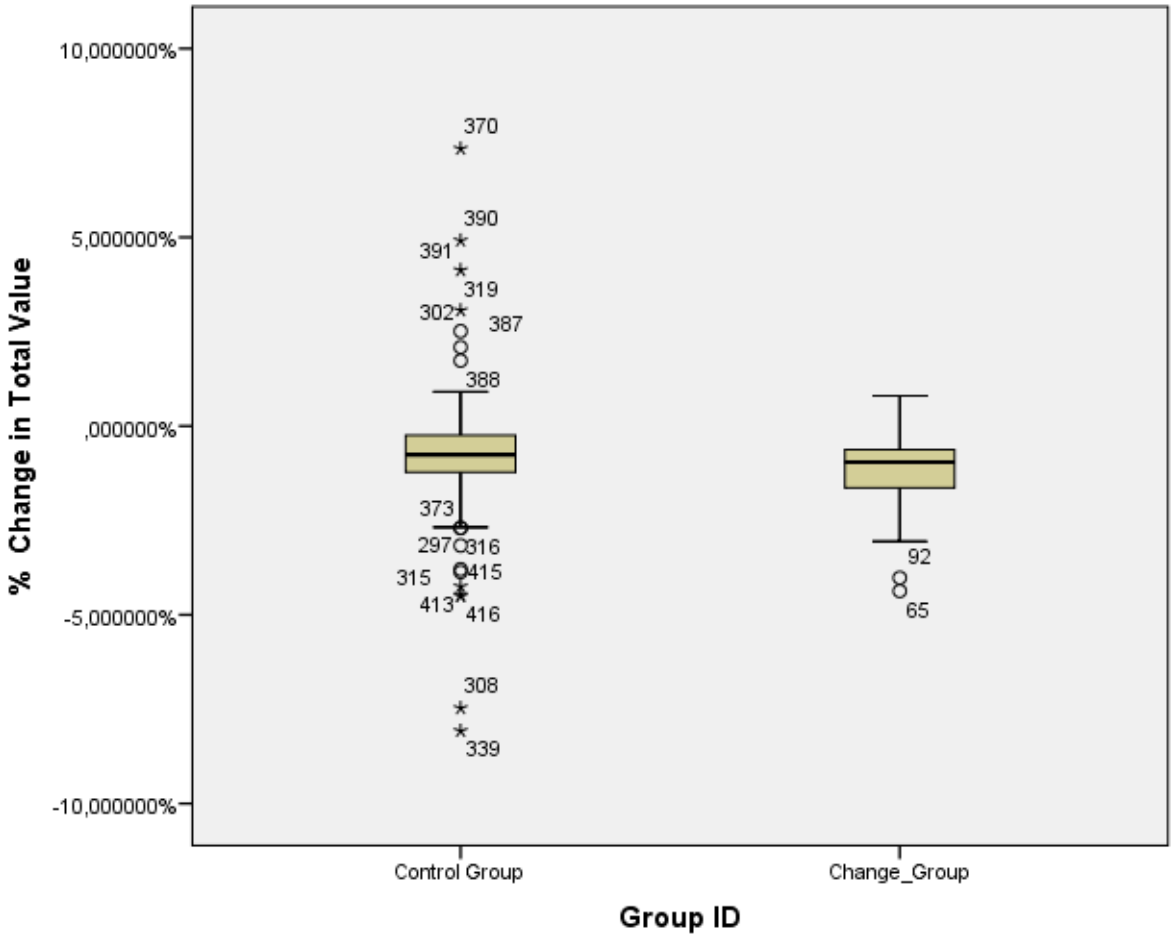


Figure 47 Sample 5 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	155	100,0%	0	0,0%	155	100,0%
	Change_Group	46	100,0%	0	0,0%	46	100,0%

Table 79 Sample 5 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,8091992%	0,08905442%
		95% Confidence Interval for Mean	Lower Bound	-0,9851252%	
			Upper Bound	-0,6332733%	
		5% Trimmed Mean		-0,7143382%	
		Median		-0,6402630%	
		Variance		1,229	
		Std. Deviation		1,10871859%	
		Minimum		-5,635767%	
		Maximum		1,748122%	
		Range		7,383889%	
		Interquartile Range		0,995161%	
		Skewness		-1,687	,195
		Kurtosis		4,651	,387
	Change_Group	Mean		-1,9845181%	0,58555085%
		95% Confidence Interval for Mean	Lower Bound	-3,1638780%	
			Upper Bound	-0,8051581%	
		5% Trimmed Mean		-1,8579379%	
		Median		-0,5668920%	
		Variance		15,772	
		Std. Deviation		3,97139906%	
		Minimum		-12,529892%	
		Maximum		6,121646%	
		Range		18,651538%	
		Interquartile Range		5,913041%	
		Skewness		-,558	,350
		Kurtosis		-,220	,688

Table 80 Sample 5 Descriptives at T=0

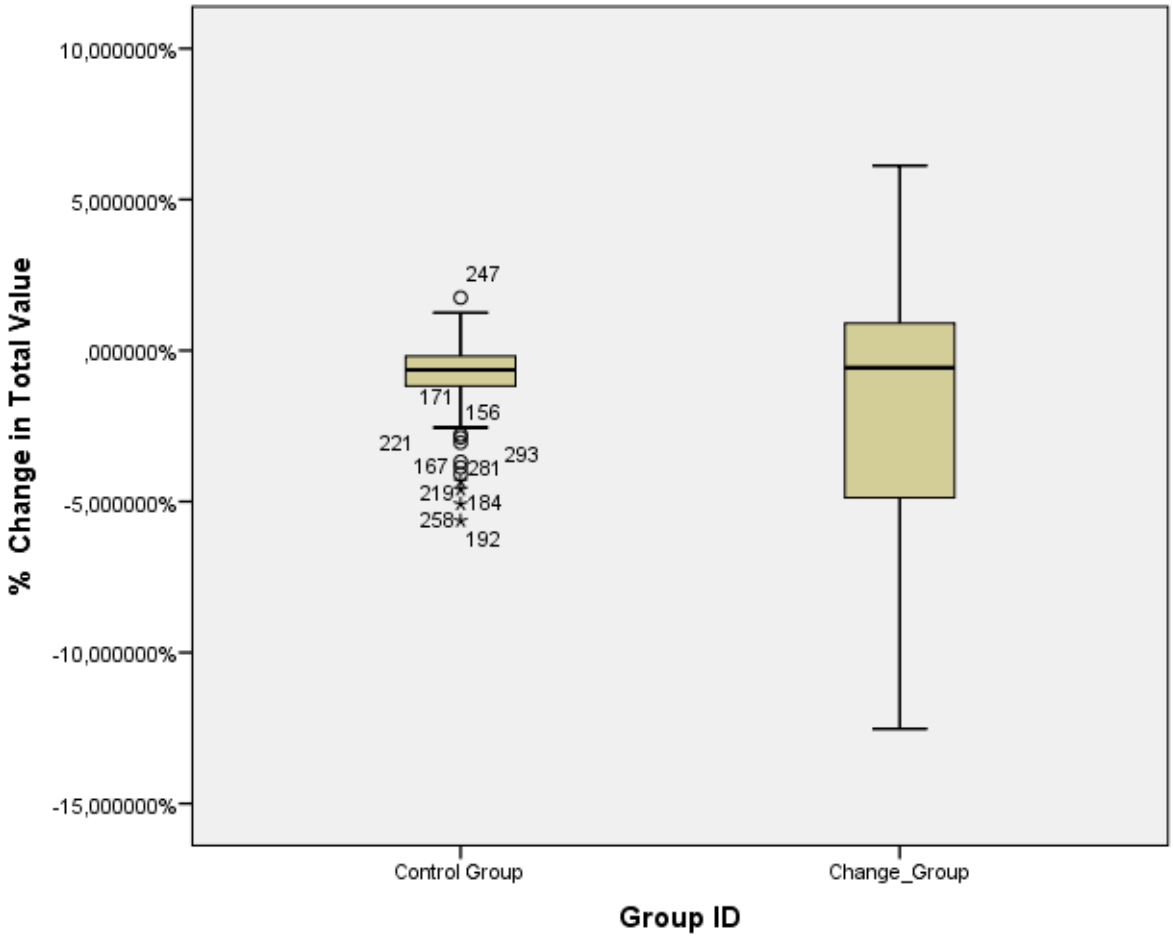


Figure 48 Sample 5 Boxplot at T=0

8.9.6 Sample 6

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	471	100,0%	0	0,0%	471	100,0%

Table 81 Sample 6 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		-0,9554254%	0,08292632%
	95% Confidence Interval for Mean	Lower Bound	-1,1183776%	
		Upper Bound	-0,7924731%	
	5% Trimmed Mean		-0,9056347%	
	Median		-0,7510560%	
	Variance		3,239	
	Std. Deviation		1,79971124%	
	Minimum		-10,112675%	
	Maximum		16,217742%	
	Range		26,330417%	
	Interquartile Range		1,246923%	
	Skewness		1,009	,113
	Kurtosis		21,533	,225

Table 82 Sample 6 Descriptives Total Sample

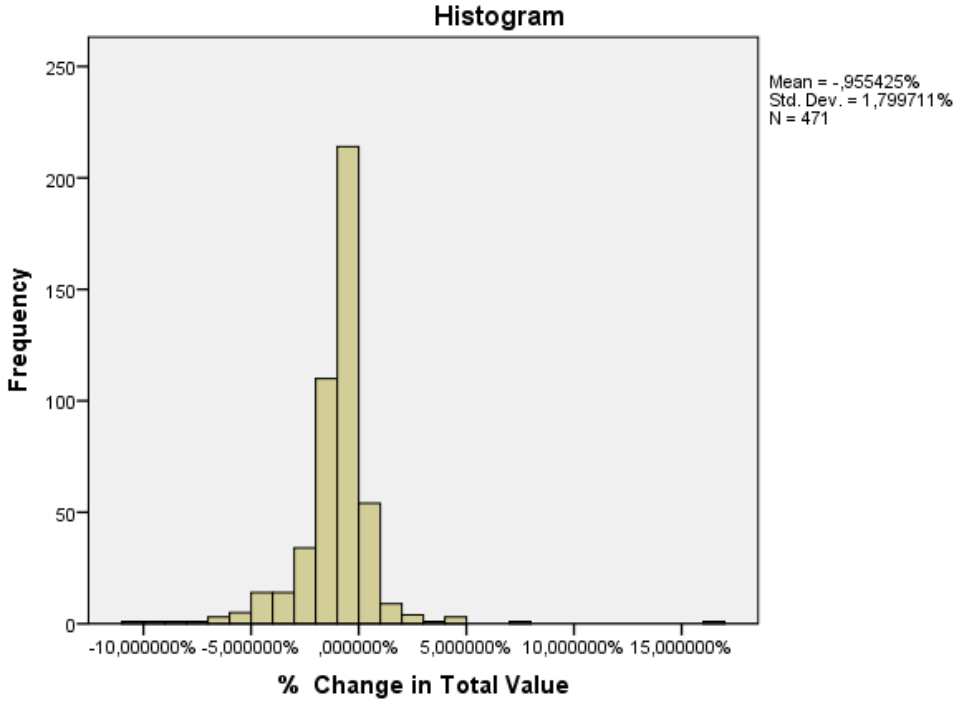


Figure 49 Sample 6 Histogram Total Sample

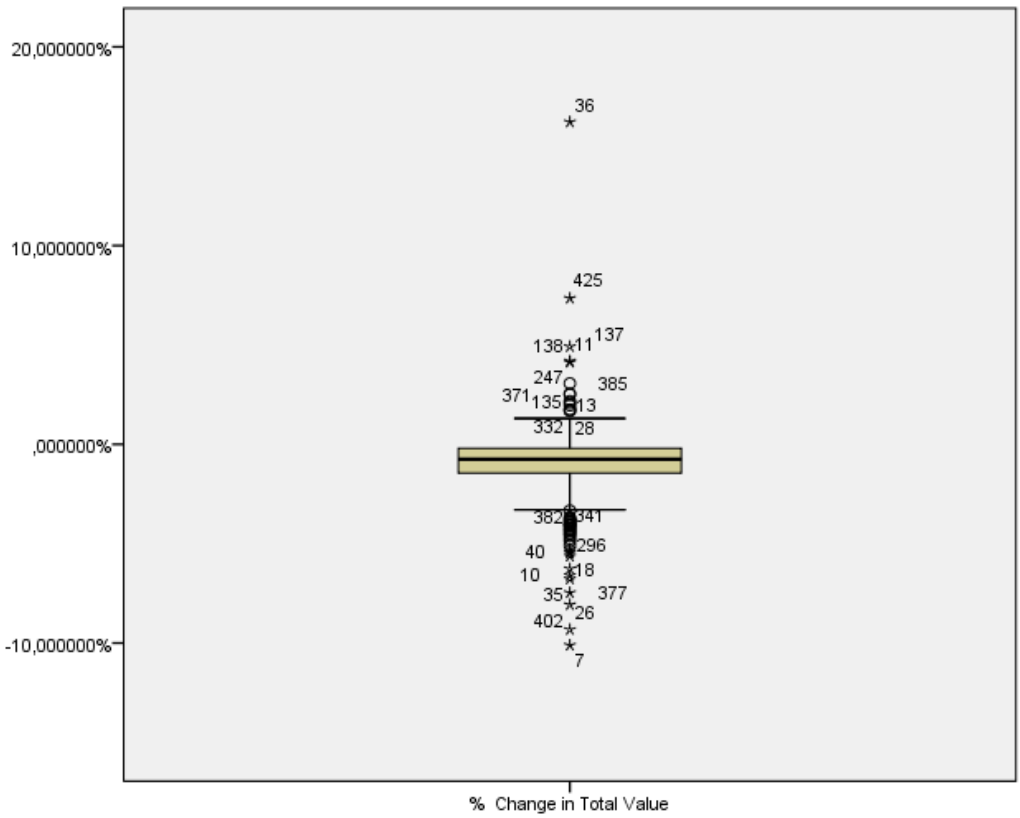


Figure 50 Sample 6 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	106	100,0%	0	0,0%	106	100,0%
	Change_Group	51	100,0%	0	0,0%	51	100,0%

Table 83 Sample 6 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,8934516%	0,15795881%
		95% Confidence Interval for Mean	Lower Bound	-1,2066547%	
			Upper Bound	-0,5802484%	
		5% Trimmed Mean		-0,8416613%	
		Median		-0,7890355%	
		Variance		2,645	
		Std. Deviation		1,62628552%	
		Minimum		-8,073106%	
		Maximum		7,347389%	
		Range		15,420495%	
		Interquartile Range		1,043043%	
		Skewness		-,276	,235
		Kurtosis		11,401	,465
	Change_Group	Mean		-0,6111072%	0,21700602%
		95% Confidence Interval for Mean	Lower Bound	-1,0469766%	
			Upper Bound	-0,1752378%	
		5% Trimmed Mean		-0,7122522%	
		Median		-0,7113110%	
		Variance		2,402	
		Std. Deviation		1,54973297%	
		Minimum		-4,479742%	
		Maximum		4,915162%	
		Range		9,394904%	
		Interquartile Range		1,070489%	
		Skewness		1,139	,333
		Kurtosis		4,080	,656

Table 84 Sample 6 Descriptives at T=-2

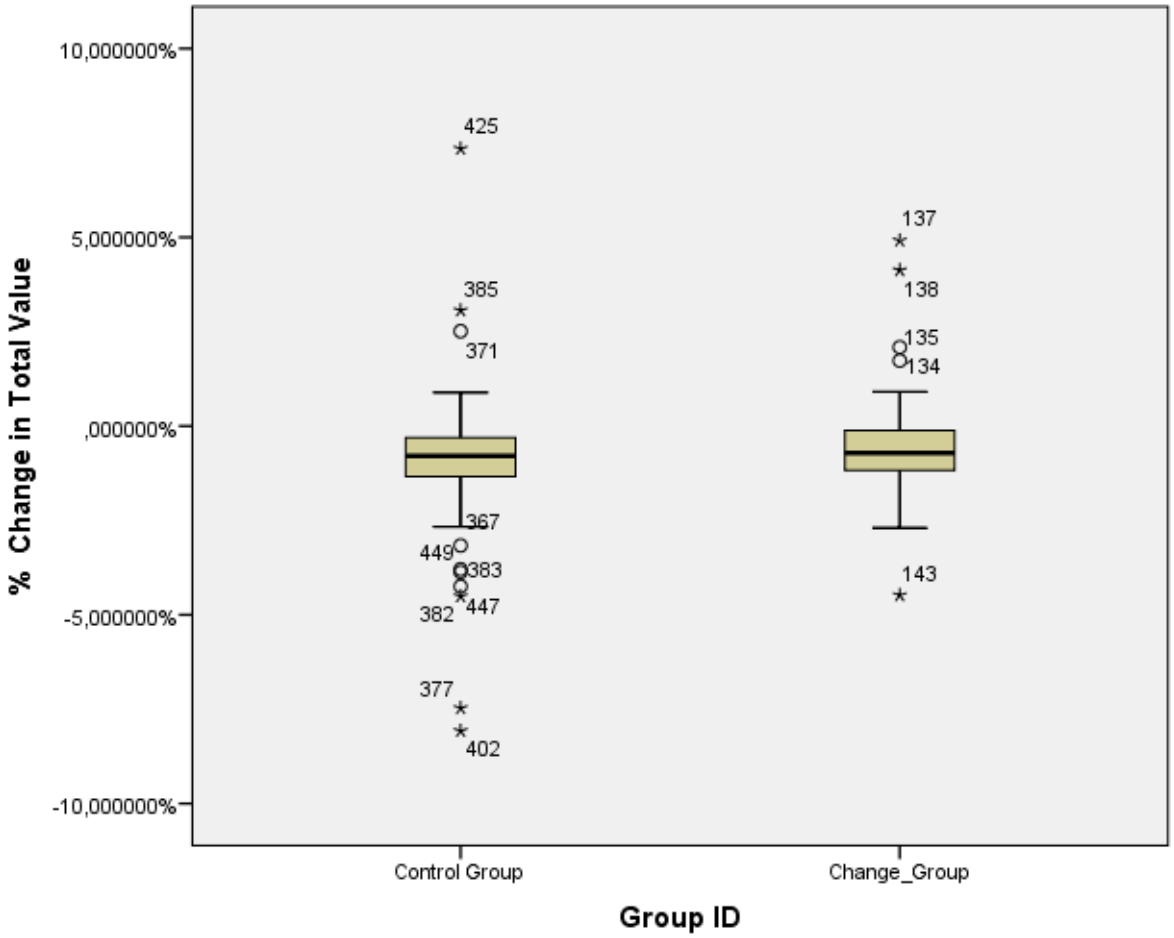


Figure 51 Sample 6 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	106	100,0%	0	0,0%	106	100,0%
	Change_Group	51	100,0%	0	0,0%	51	100,0%

Table 85 Sample 6 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,7819496%	0,10792021%
		95% Confidence Interval for Mean	Lower Bound	-0,9959355%	
			Upper Bound	-0,5679638%	
		5% Trimmed Mean		-0,6927947%	
		Median		-0,6325905%	
		Variance		1,235	
		Std. Deviation		1,11110657%	
		Minimum		-5,079934%	
		Maximum		1,748122%	
		Range		6,828056%	
		Interquartile Range		0,953357%	
		Skewness		-1,536	,235
		Kurtosis		4,053	,465
	Change_Group	Mean		-0,8876093%	0,15328192%
		95% Confidence Interval for Mean	Lower Bound	-1,1954851%	
			Upper Bound	-0,5797335%	
		5% Trimmed Mean		-0,7842840%	
		Median		-0,7150720%	
		Variance		1,198	
		Std. Deviation		1,09465183%	
		Minimum		-5,635767%	
		Maximum		0,813848%	
		Range		6,449615%	
		Interquartile Range		1,079470%	
		Skewness		-2,051	,333
		Kurtosis		6,657	,656

Table 86 Sample 6 Descriptives at T=-1

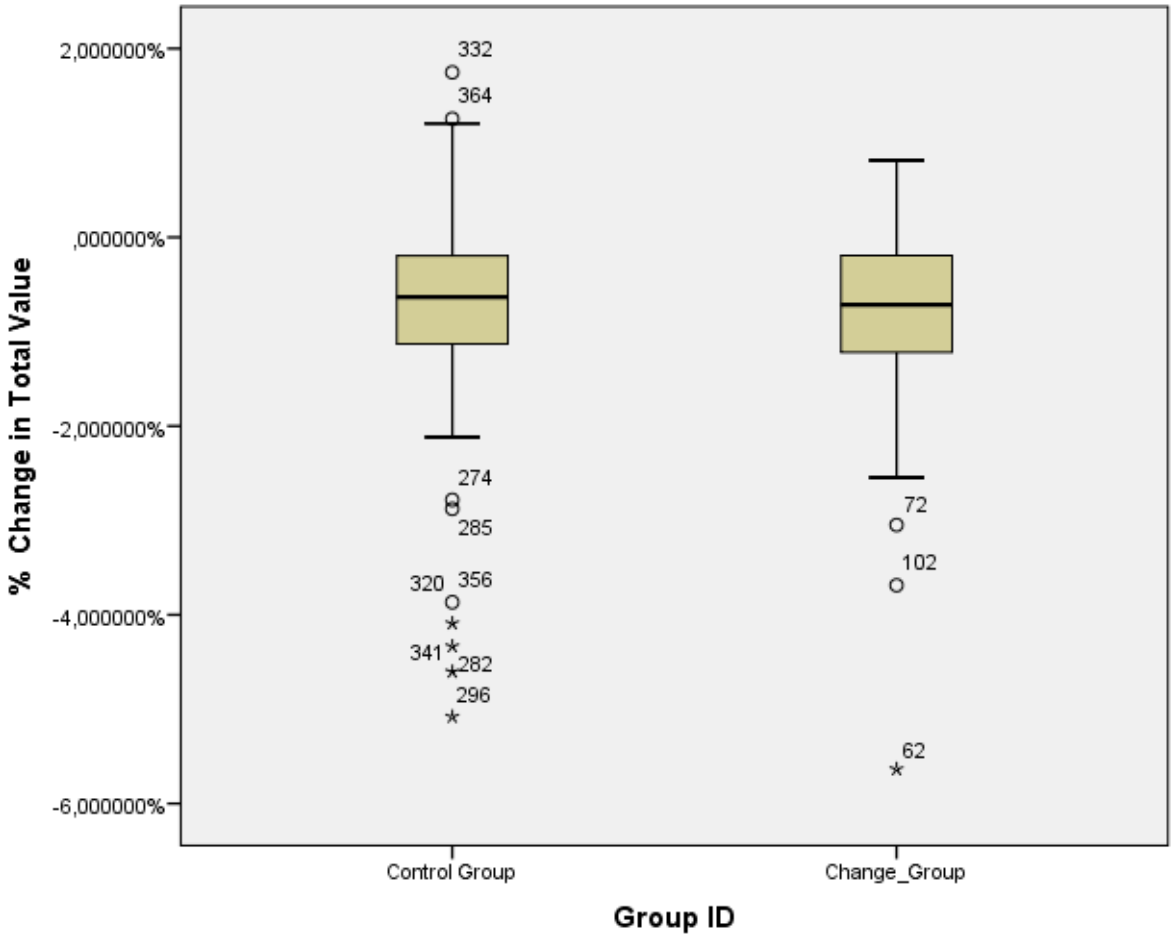


Figure 52 Sample 6 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	106	100,0%	0	0,0%	106	100,0%
	Change_Group	51	100,0%	0	0,0%	51	100,0%

Table 87 Sample 6 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,9846459%	0,12169412%
		95% Confidence Interval for Mean	Lower Bound	-1,2259428%	
			Upper Bound	-0,7433489%	
		5% Trimmed Mean		-0,9187822%	
		Median		-0,7557025%	
		Variance		1,570	
		Std. Deviation		1,25291768%	
		Minimum		-5,411625%	
		Maximum		2,543443%	
		Range		7,955068%	
		Interquartile Range		1,385537%	
		Skewness		-,882	,235
		Kurtosis		1,632	,465
	Change_Group	Mean		-1,7961924%	0,53289170%
		95% Confidence Interval for Mean	Lower Bound	-2,8665368%	
			Upper Bound	-0,7258479%	
		5% Trimmed Mean		-1,9616933%	
		Median		-1,9121200%	
		Variance		14,483	
		Std. Deviation		3,80560797%	
		Minimum		-10,112675%	
		Maximum		16,217742%	
		Range		26,330417%	
		Interquartile Range		3,341128%	
		Skewness		1,816	,333
		Kurtosis		9,458	,656

Table 88 Sample 6 Descriptives at T=0

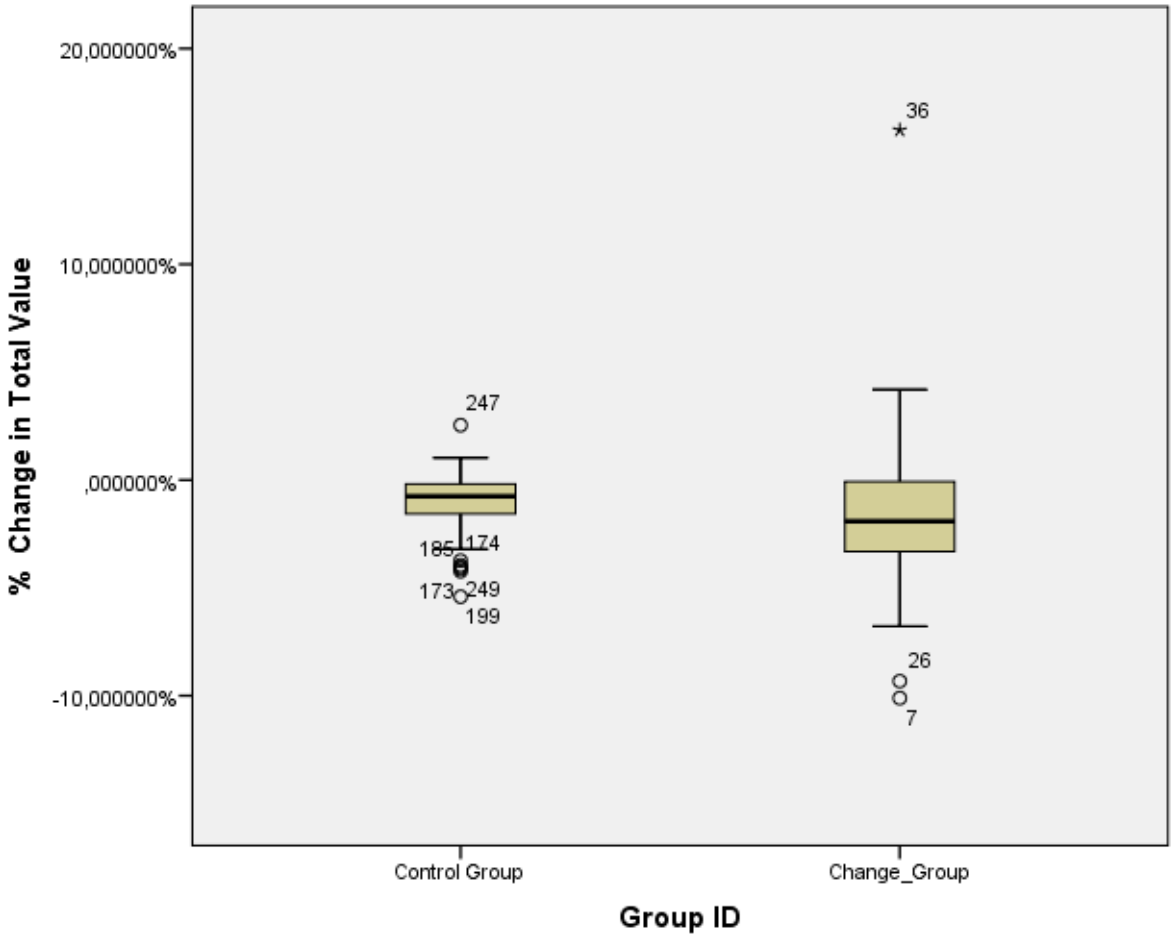


Figure 53 Sample 6 Boxplot at T=0

8.9.7 Sample 7

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
% Change in Total Value	318	100,0%	0	0,0%	318	100,0%

Table 89 Sample 7 Case Processing Summary Total Sample

Descriptives

			Statistic	Std. Error
% Change in Total Value	Mean		-1,0914041%	0,09583340%
	95% Confidence Interval for Mean	Lower Bound	-1,2799540%	
		Upper Bound	-0,9028542%	
	5% Trimmed Mean		-0,9994990%	
	Median		-0,8183775%	
	Variance		2,921	
	Std. Deviation		1,70895439%	
	Minimum		-12,673762%	
	Maximum		4,425357%	
	Range		17,099119%	
	Interquartile Range		1,347166%	
	Skewness		-1,849	,137
	Kurtosis		9,907	,273

Table 90 Sample 7 Descriptives Total Sample

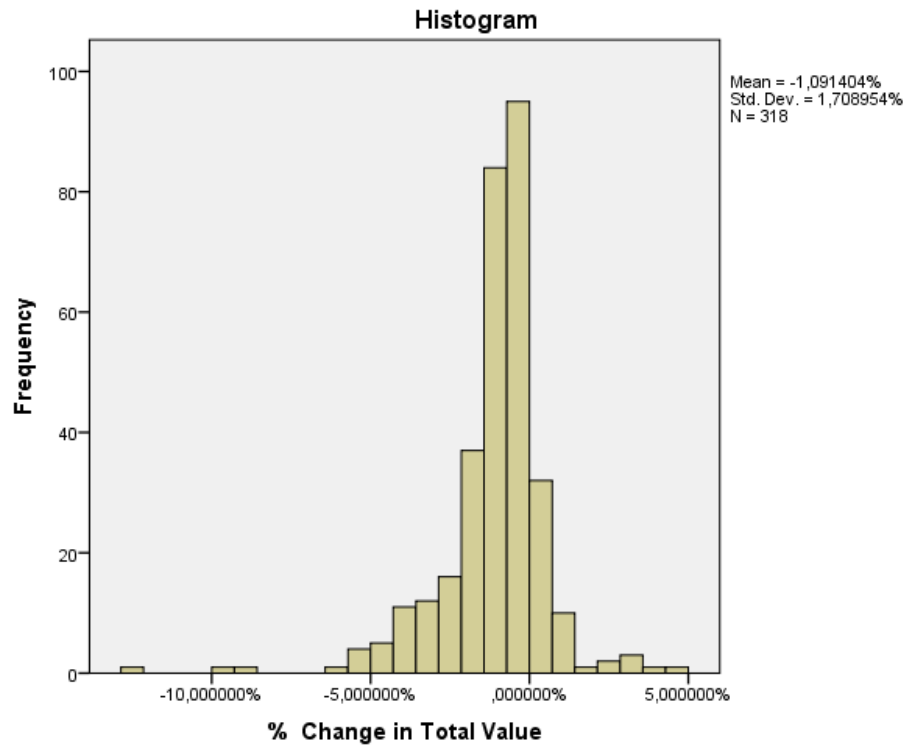


Figure 54 Sample 7 Histogram Total Sample

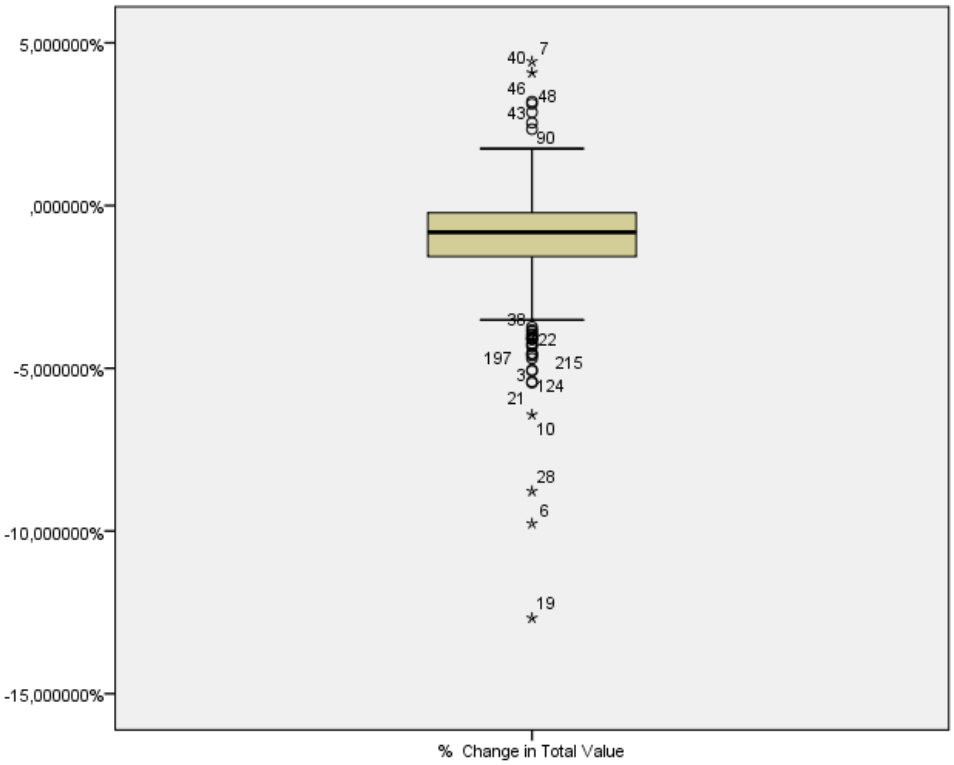


Figure 55 Sample 7 Boxplot Total Sample

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	58	100,0%	0	0,0%	58	100,0%
	Change_Group	48	100,0%	0	0,0%	48	100,0%

Table 91 Sample 7 Case Processing Summary at T=-2

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,5239076%	0,13216114%
		95% Confidence Interval for Mean	Lower Bound	-0,7885557%	
			Upper Bound	-0,2592595%	
		5% Trimmed Mean		-0,4668072%	
		Median		-0,4098460%	
		Variance		1,013	
		Std. Deviation		1,00650925%	
		Minimum		-4,333540%	
		Maximum		1,748122%	
		Range		6,081662%	
		Interquartile Range		0,809334%	
		Skewness		-1,353	,314
		Kurtosis		4,578	,618
	Change_Group	Mean		-1,0192602%	0,15002839%
		95% Confidence Interval for Mean	Lower Bound	-1,3210784%	
			Upper Bound	-0,7174420%	
		5% Trimmed Mean		-0,9217540%	
		Median		-0,8012830%	
		Variance		1,080	
		Std. Deviation		1,03942718%	
		Minimum		-5,079934%	
		Maximum		0,869982%	
		Range		5,949916%	
		Interquartile Range		0,865221%	
		Skewness		-1,864	,343
		Kurtosis		5,222	,674

Table 92 Sample 7 Descriptives at T=-2

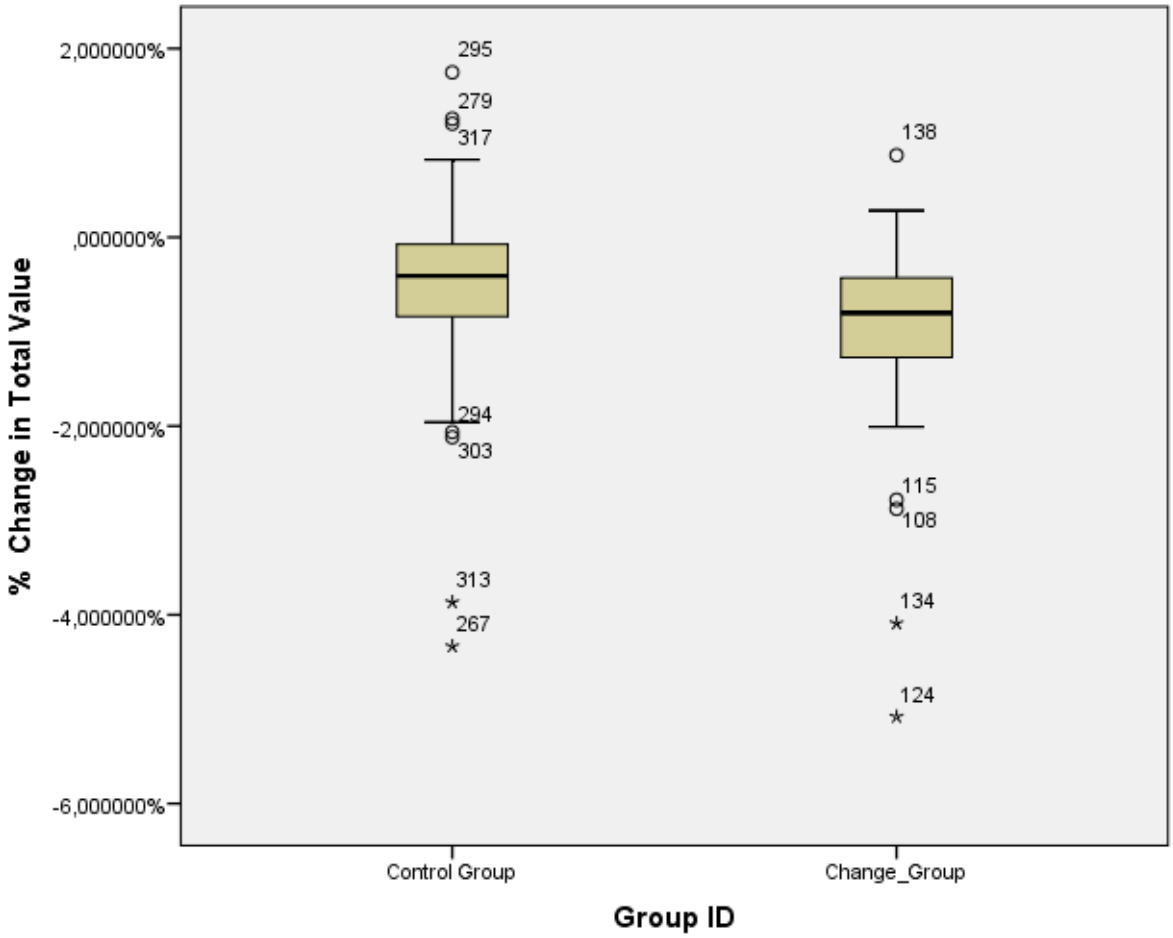


Figure 56 Sample 7 Boxplot at T=-2

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	58	100,0%	0	0,0%	58	100,0%
	Change_Group	48	100,0%	0	0,0%	48	100,0%

Table 93 Sample 7 Case Processing Summary at T=-1

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-0,8206334%	0,13797953%
		95% Confidence Interval for Mean	Lower Bound	-1,0969326%	
			Upper Bound	-0,5443341%	
		5% Trimmed Mean		-0,7185334%	
		Median		-0,5963650%	
		Variance		1,104	
		Std. Deviation		1,05082083%	
		Minimum		-5,411625%	
		Maximum		0,690427%	
		Range		6,102052%	
		Interquartile Range		1,121646%	
		Skewness		-1,921	,314
		Kurtosis		5,898	,618
	Change_Group	Mean		-1,1373302%	0,20909835%
		95% Confidence Interval for Mean	Lower Bound	-1,5579818%	
			Upper Bound	-0,7166786%	
		5% Trimmed Mean		-1,1245180%	
		Median		-0,9223995%	
		Variance		2,099	
		Std. Deviation		1,44867584%	
		Minimum		-4,233758%	
		Maximum		2,543443%	
		Range		6,777201%	
		Interquartile Range		1,817661%	
		Skewness		-,286	,343
		Kurtosis		,189	,674

Table 94 Sample 7 Descriptives at T=-1

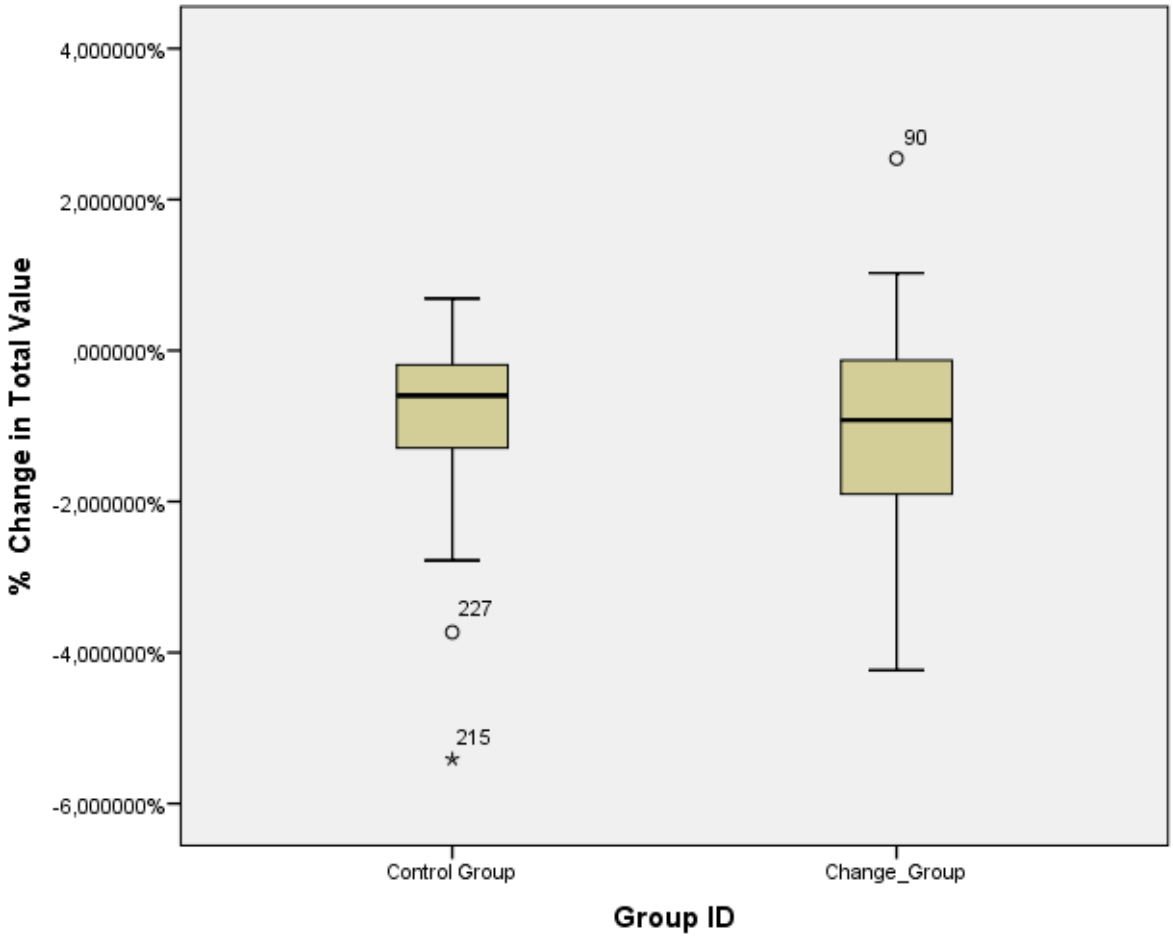


Figure 57 Sample 7 Boxplot at T=-1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Group ID	N	Percent	N	Percent	N	Percent
% Change in Total Value	Control Group	58	100,0%	0	0,0%	58	100,0%
	Change_Group	48	100,0%	0	0,0%	48	100,0%

Table 95 Sample 7 Case Processing Summary at T=0

Descriptives

	Group ID			Statistic	Std. Error
% Change in Total Value	Control Group	Mean		-1,0696223%	0,11169458%
		95% Confidence Interval for Mean	Lower Bound	-1,2932868%	
			Upper Bound	-0,8459577%	
		5% Trimmed Mean		-0,9883228%	
		Median		-0,9757055%	
		Variance		,724	
		Std. Deviation		0,85064054%	
		Minimum		-4,697906%	
		Maximum		0,036737%	
		Range		4,734643%	
		Interquartile Range		0,713683%	
		Skewness		-1,722	,314
		Kurtosis		5,166	,618
	Change_Group	Mean		-2,1568476%	0,48773164%
		95% Confidence Interval for Mean	Lower Bound	-3,1380371%	
			Upper Bound	-1,1756581%	
		5% Trimmed Mean		-2,0221216%	
		Median		-2,4051520%	
		Variance		11,418	
		Std. Deviation		3,37910392%	
		Minimum		-12,673762%	
		Maximum		4,425357%	
		Range		17,099119%	
		Interquartile Range		4,010692%	
		Skewness		-,521	,343
		Kurtosis		1,380	,674

Table 96 Sample 7 Descriptives at T=0

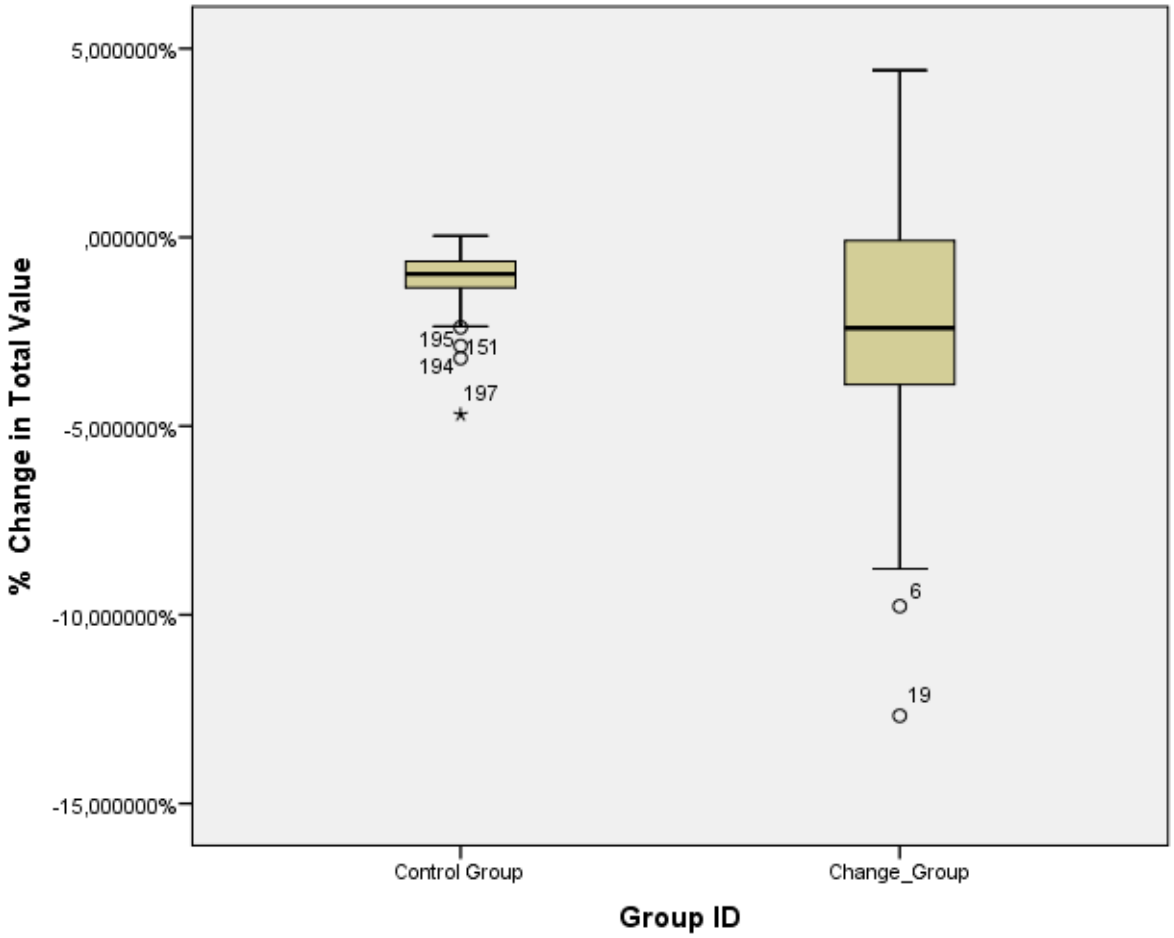


Figure 58 Sample 7 Boxplot at T=0

8.10 APPENDIX X: BOXPLOTS OF % CHANGE IN TOTAL VALUE PER SAMPLE

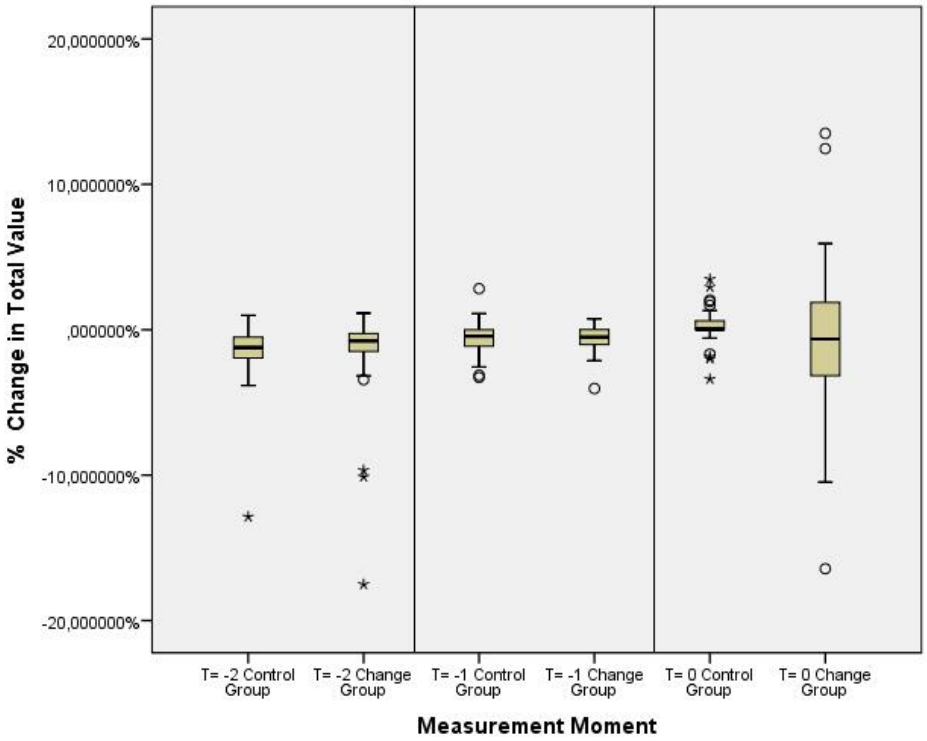


Figure 59 Sample 1 boxplot % change in Total Value

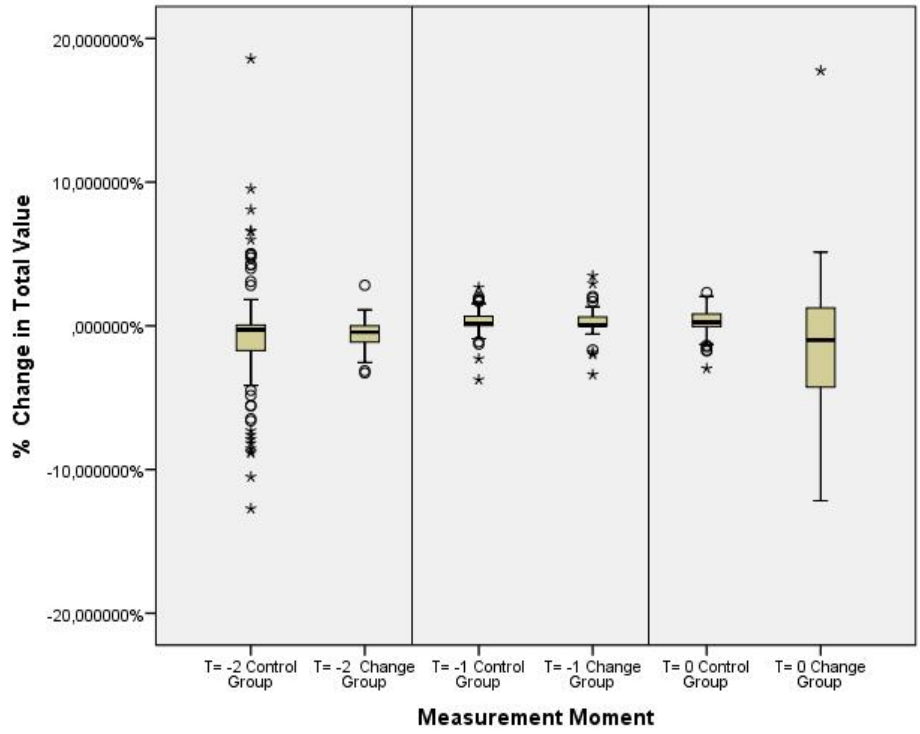


Figure 60 Sample 2 boxplot % change in Total Value

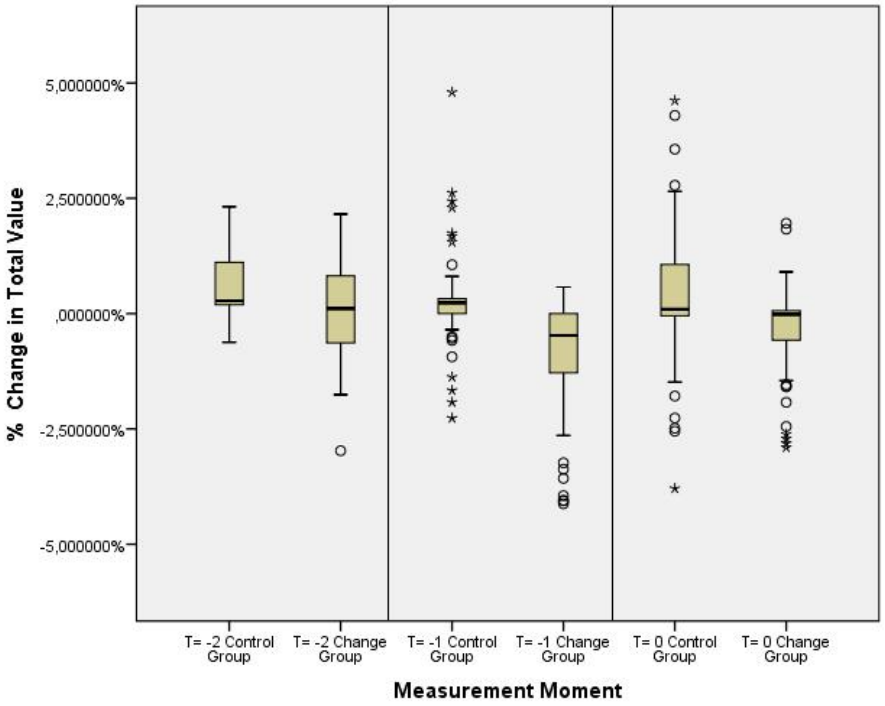


Figure 61 Sample 3 boxplot % change in Total Value

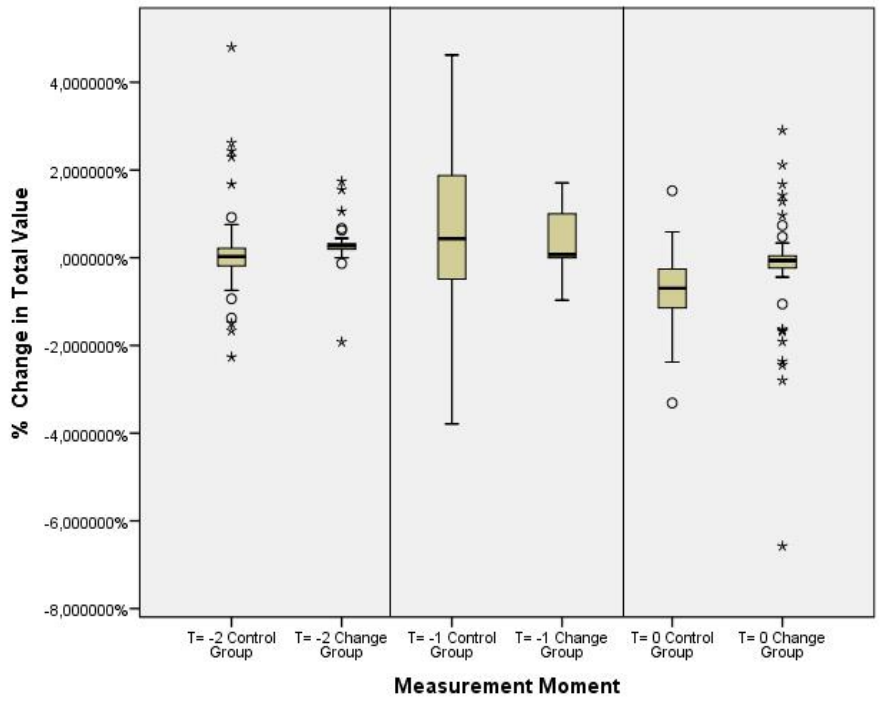


Figure 62 Sample 4 boxplot % change in Total Value

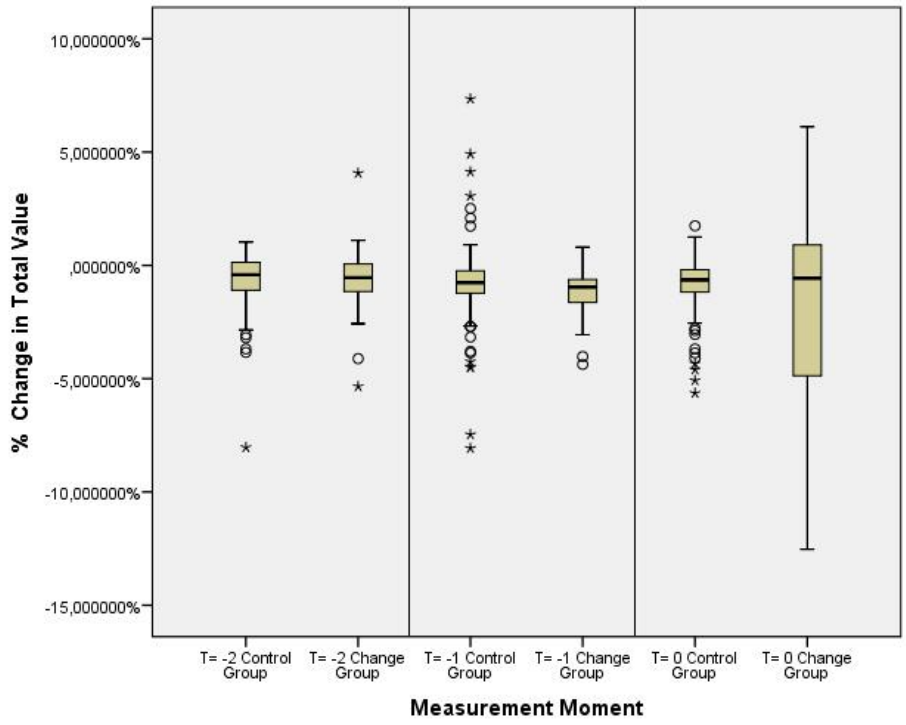


Figure 63 Sample 5 boxplot % change in Total Value

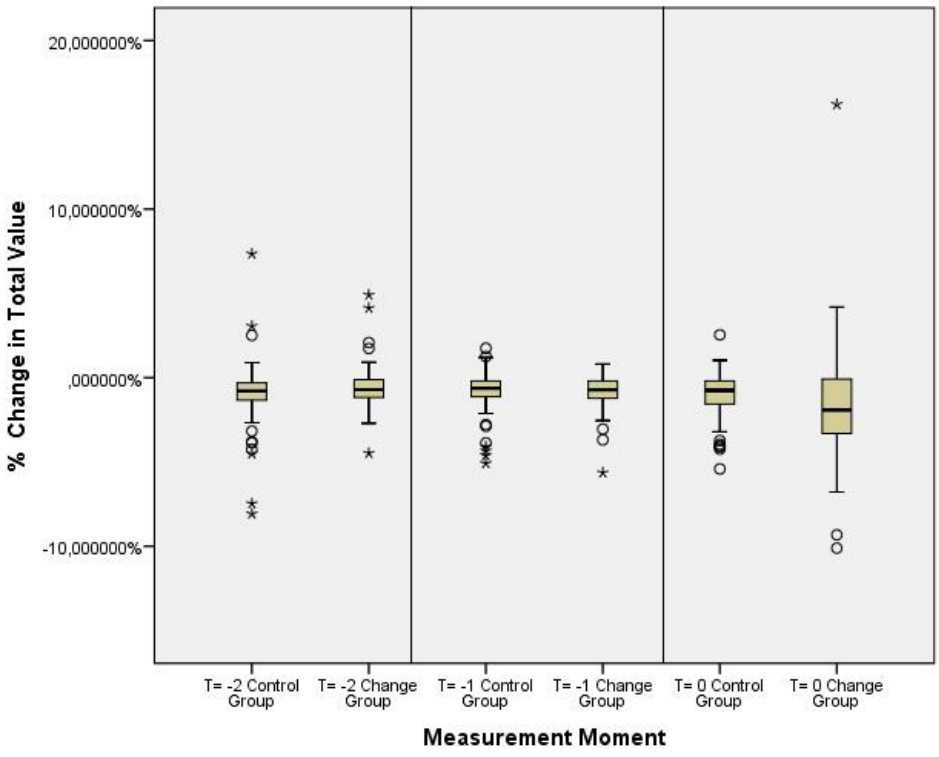


Figure 64 Sample 6 boxplot % change in Total Value

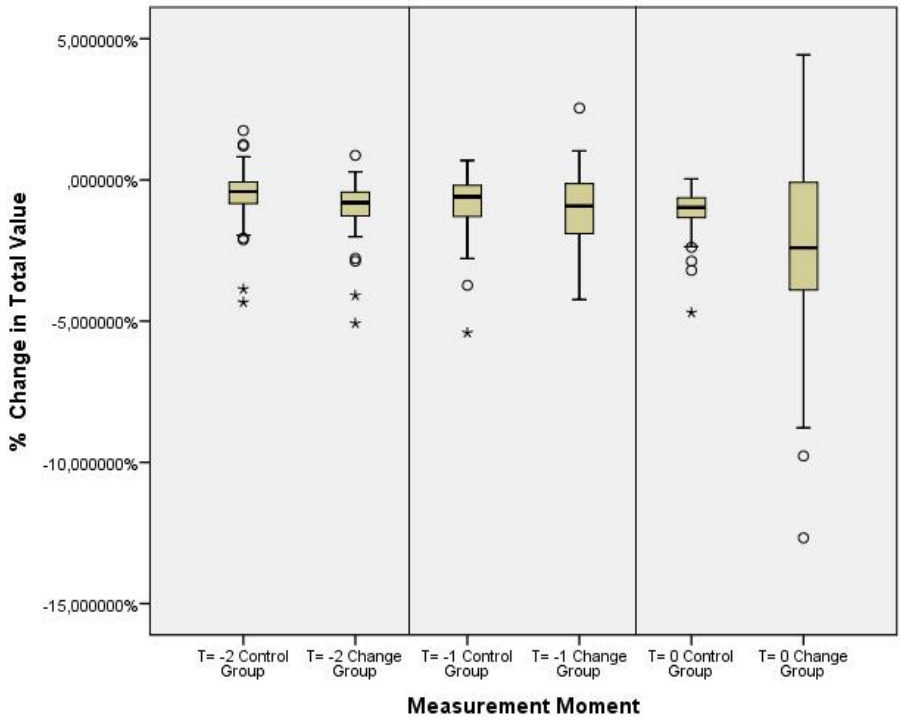


Figure 65 Sample 7 boxplot % change in Total Value

8.11 APPENDIX XI: EVENT STUDY STATISTICAL TEST RESULTS

8.11.1 Sample 1

Group Statistics

	Group ID	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	49	-1,4859647%	2,02201532%	0,28885933%
	Change_Group	51	-1,6086958%	3,03706628%	0,42527434%

Table 97 Sample 1 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	1,253	,266	,237	98	,813	0,12273113%	0,51812136%	-0,9054638%	1,15092610%
	Equal variances not assumed			,239	87,400	,812	0,12273113%	0,51409919%	-0,8990308%	1,14449303%

Table 98 Sample 1 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,248	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 66 Sample 1 Non-Parametric test results at T = -2

Group Statistics

	Group ID	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	49	-0,6706244%	1,08364223%	0,15480603%
	Change_Group	51	-0,5300623%	0,82478220%	0,11549261%

Table 99 Sample 1 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	1,565	,214	-,732	98	,466	-0,1405622%	0,19210426%	-0,5217868%	0,24066245%
	Equal variances not assumed			-,728	89,643	,469	-0,1405622%	0,19314101%	-0,5242914%	0,24316697%

Table 100 Sample 1 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,416	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 67 Sample 1 Non-Parametric test results at T = -1

Group Statistics

	Group ID	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	49	0,24352022%	1,09879826%	0,15697118%
	Change_Group	51	-0,8436887%	5,19908126%	0,72801699%

Table 101 Sample 1 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	31,807	,000	1,433	98	,155	1,08720897%	0,75863451%	-0,4182765%	2,59269446%
	Equal variances not assumed			1,460	54,634	,150	1,08720897%	0,74474740%	-0,4055229%	2,57994087%

Table 102 Sample 1 Independent Samples T-Test results at T = -0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,182	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 68 Sample 1 Non-Parametric test results at T = 0

8.11.2 Sample 2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	104	-0,6892771%	4,17793943%	0,40968067%
	Change_Group	49	-0,6706244%	1,08364223%	0,15480603%

Table 103 Sample 2 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	14,922	,000	-,031	151	,976	-0,0186526%	0,60719269%	-1,2183433%	1,18103803%
	Equal variances not assumed			-,043	128,876	,966	-0,0186526%	0,43795337%	-0,8851620%	0,84785676%

Table 104 Sample 2 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,757	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 69 Sample 2 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	104	0,30779507%	0,81844308%	0,08025495%
	Change_Group	49	0,24352022%	1,09879826%	0,15697118%

Table 105 Sample 2 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	1,201	,275	,405	151	,686	0,06427484%	0,15887473%	-0,2496297%	0,37817936%
	Equal variances not assumed			,365	74,017	,716	0,06427484%	0,17629750%	-0,2870042%	0,41555392%

Table 106 Sample 2 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,184	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 70 Sample 2 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	104	0,26929819%	0,84692428%	0,08304776%
	Change_Group	49	-1,6247223%	4,99044273%	0,71292039%

Table 107 Sample 2 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	80,519	,000	3,770	151	,000	1,89402054%	0,50237050%	0,90143745%	2,88660363%
	Equal variances not assumed			2,639	49,307	,011	1,89402054%	0,71774119%	0,45189297%	3,33614811%

Table 108 Sample 2 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,001	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 71 Sample 2 Non-Parametric test results at T = 0

8.11.3 Sample 3

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	101	0,57605567%	0,58984495%	0,05869177%
	Change_Group	54	0,04189976%	1,01408898%	0,13800003%

Table 109 Sample 3 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	14,259	,000	4,148	153	,000	0,53415591%	0,12878869%	0,27972222%	0,78858961%
	Equal variances not assumed			3,562	72,648	,001	0,53415591%	0,14996244%	0,23525680%	0,83305503%

Table 110 Sample 3 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,001	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 72 Sample 3 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	101	0,25720594%	0,82235308%	0,08182719%
	Change_Group	54	-0,9079736%	1,31206523%	0,17854946%

Table 111 Sample 3 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	22,183	,000	6,783	153	,000	1,16517953%	0,17178257%	0,82580756%	1,50455151%
	Equal variances not assumed			5,932	75,828	,000	1,16517953%	0,19640672%	0,77398731%	1,55637175%

Table 112 Sample 3 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 73 Sample 3 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	101	0,36334880%	1,30828053%	0,13017878%
	Change_Group	54	-0,3622476%	1,02787114%	0,13987555%

Table 113 Sample 3 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	1,734	,190	3,532	153	,001	0,72559636%	0,20541115%	0,31978808%	1,13140463%
	Equal variances not assumed			3,797	132,064	,000	0,72559636%	0,19108030%	0,34762231%	1,10357040%

Table 114 Sample 3 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 74 Sample 3 Non-Parametric test results at T = 0

8.11.4 Sample 4

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	68	0,12625897%	0,96549616%	0,11708361%
	Change_Group	64	0,27692538%	0,40384222%	0,05048028%

Table 115 Sample 4 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	11,173	,001	-1,157	130	,250	-0,1506664%	0,13026571%	-0,4083815%	0,10704872%
	Equal variances not assumed			-1,182	90,884	,240	-0,1506664%	0,12750227%	-0,4039383%	0,10260554%

Table 116 Sample 4 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 75 Sample 4 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	68	0,56934756%	1,63765148%	0,19859441%
	Change_Group	64	0,36993786%	0,64586302%	0,08073288%

Table 117 Sample 4 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	26,089	,000	,910	130	,365	0,19940970%	0,21921481%	-0,2342806%	0,63309999%
	Equal variances not assumed			,930	88,407	,355	0,19940970%	0,21437709%	-0,2265924%	0,62541180%

Table 118 Sample 4 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,358	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 76 Sample 4 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	68	-0,6869264%	0,70508474%	0,08550408%
	Change_Group	64	-0,2130958%	1,22982905%	0,15372863%

Table 119 Sample 4 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	1,044	,309	-2,736	130	,007	-0,4738305%	0,17321388%	-0,8165135%	-0,1311476%
	Equal variances not assumed			-2,694	99,091	,008	-0,4738305%	0,17590748%	-0,8228651%	-0,1247959%

Table 120 Sample 4 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 77 Sample 4 Non-Parametric test results at T = 0

8.11.5 Sample 5

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	155	-0,6304174%	1,12644378%	0,09047814%
	Change_Group	46	-0,5835140%	1,37402718%	0,20258925%

Table 121 Sample 5 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	,862	,354	-,235	199	,814	-0,0469034%	0,19929130%	-0,4398972%	0,34609036%
	Equal variances not assumed			-,211	63,998	,833	-0,0469034%	0,22187542%	-0,4901508%	0,39634400%

Table 122 Sample 5 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,906	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 78 Sample 5 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	155	-0,7970412%	1,61205823%	0,12948363%
	Change_Group	46	-1,1482925%	1,03616518%	0,15277422%

Table 123 Sample 5 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	,704	,403	1,393	199	,165	0,35125130%	0,25206751%	-0,1458149%	0,84831747%
	Equal variances not assumed			1,754	115,461	,082	0,35125130%	0,20026476%	-0,0454178%	0,74792039%

Table 124 Sample 5 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,040	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 79 Sample 5 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	155	-0,8091992%	1,10871859%	0,08905442%
	Change_Group	46	-1,9845181%	3,97139906%	0,58555085%

Table 125 Sample 5 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	155,604	,000	3,293	199	,001	1,17531887%	0,35687629%	0,47157435%	1,87906340%
	Equal variances not assumed			1,984	47,098	,053	1,17531887%	0,59228412%	-0,0161374%	2,36677510%

Table 126 Sample 5 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,920	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 80 Sample 5 Non-Parametric test results at T = 0

8.11.6 Sample 6

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	106	-0,8934516%	1,62628552%	0,15795881%
	Change_Group	51	-0,6111072%	1,54973297%	0,21700602%

Table 127 Sample 6 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	,210	,647	-1,034	155	,303	-0,2823444%	0,27300578%	-0,8216365%	0,25694773%
	Equal variances not assumed			-1,052	103,222	,295	-0,2823444%	0,26840753%	-0,8146538%	0,24996506%

Table 128 Sample 6 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,358	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 81 Sample 6 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	106	-0,7819496%	1,11110657%	0,10792021%
	Change_Group	51	-0,8876093%	1,09465183%	0,15328192%

Table 129 Sample 6 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	,001	,974	,561	155	,576	0,10565971%	0,18845096%	-0,2666039%	0,47792330%
	Equal variances not assumed			,564	100,139	,574	0,10565971%	0,18746231%	-0,2662538%	0,47757326%

Table 130 Sample 6 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,546	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 82 Sample 6 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	106	-0,9846459%	1,25291768%	0,12169412%
	Change_Group	51	-1,7961924%	3,80560797%	0,53289170%

Table 131 Sample 6 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	24,877	,000	1,989	155	,049	0,81154649%	0,40811967%	0,00535214%	1,61774083%
	Equal variances not assumed			1,485	55,279	,143	0,81154649%	0,54661049%	-0,2837609%	1,90685392%

Table 132 Sample 6 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,010	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 83 Sample 6 Non-Parametric test results at T = 0

8.11.7 Sample 7

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	58	-0,5239076%	1,00650925%	0,13216114%
	Change_Group	48	-1,0192602%	1,03942718%	0,15002839%

Table 133 Sample 7 Group Statistics at T = -2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	,059	,809	2,485	104	,015	0,49535261%	0,19932598%	0,10008170%	0,89062352%
	Equal variances not assumed			2,478	99,060	,015	0,49535261%	0,19993770%	0,09863580%	0,89206942%

Table 134 Sample 7 Independent Samples T-Test results at T = -2

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,003	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 84 Sample 7 Non-Parametric test results at T = -2

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	58	-0,8206334%	1,05082083%	0,13797953%
	Change_Group	48	-1,1373302%	1,44867584%	0,20909835%

Table 135 Sample 7 Group Statistics at T = -1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	6,368	,013	1,302	104	,196	0,31669679%	0,24321627%	-0,1656102%	0,79900377%
	Equal variances not assumed			1,264	83,749	,210	0,31669679%	0,25052040%	-0,1815123%	0,81490587%

Table 136 Sample 7 Independent Samples T-Test results at T = -1

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,213	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 85 Sample 7 Non-Parametric test results at T = -1

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
% Change in Total Value	Control Group	58	-1,0696223%	0,85064054%	0,11169458%
	Change_Group	48	-2,1568476%	3,37910392%	0,48773164%

Table 137 Sample 7 Group Statistics at T = 0

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
% Change in Total Value	Equal variances assumed	38,212	,000	2,364	104	,020	1,08722539%	0,45997108%	0,17508548%	1,99936529%
	Equal variances not assumed			2,173	51,941	,034	1,08722539%	0,50035770%	0,08315718%	2,09129359%

Table 138 Sample 7 Independent Samples T-Test results at T = 0

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of % Change in Total Value is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	,006	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Figure 86 Sample 7 Non-Parametric test results at T = 0