The impact of Sovereign Wealth Funds on stock performance

A study of the materialization of abnormal returns

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Abstract

Since 2006, the number of Sovereign Wealth Funds (SWF) have accelerated alongside their total value which increased by about 250 % and they have attained a position as influential market players. SWF are a classification of investment funds which are state owned entities who mainly attain their surplus from the petroleum industry and non-commodity sources and primarily place their investments abroad.

SWF is a “modern” fund classification on which a limited amount of research has been conducted. Still, previous studies such as the ones conducted by Dewenter et al. (2010) and Kotter and Lel (2011) might lend support to this research and its pursue to study the effect of SWFs financial actions and to fill the identified research gap. A currently non-existent investment strategy being the main identified research gap. Also, the growth of SWFs leads to this research not only functioning as an update, but as a study that will contribute to the existing knowledge of SWF. The research question is the following:

What is the short-term effect of an announcement of a Sovereign Wealth Fund’s investment on the stock price behavior of the target firm?

The purpose is to clarify the difference between regular funds and SWF and to explore the effect SWFs announcements have on the behavior of targets’ stock price. This have been done by ways of a deductive and quantitative research method. An event study has been performed and regression analyses allowed for the usefulness of the findings from the event study to be built upon.

A theoretical framework has been created to support both the performance and analysis of the study. Its skeleton consists of theories concerning abnormal return (Campbell et al., 1997), efficient market hypothesis (Brealey et al., 2014) and behavioral finance (Brunnermeier, 2001).

The study provides a theoretical contribution by providing new knowledge of SWFs and their financial actions. A practical contribution is to produce an investment strategy that can be profitable for retail investors.

The event study allowed for the finding of a positive short term abnormal return stemming from the publication of SWFs announcement to purchase shares in a target company. It is possible for, mainly, retail investors to make use of this as an investment strategy, expecting a return exceeding index with 0,50 % when imitating the financial actions of SWFs. By allowing the findings of the reduced regression analysis to strengthen the model, investors might increase their return.

Keywords: Sovereign Wealth Funds, Abnormal return, Semi-strong market efficiency, Herd instinct, Equities, Retail investors, Investment strategy.
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Thank you.

Anette Berg    Robin Sjögren

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<th>Description</th>
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<tr>
<td>CAPM</td>
<td>CAPITAL ASSET PRICING MODEL</td>
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<td>CAR</td>
<td>CUMULATIVE ABNORMAL RETURN</td>
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<tr>
<td>CLT</td>
<td>CENTRAL LIMIT THEOREM</td>
</tr>
<tr>
<td>ESG</td>
<td>ENVIRONMENTAL, SOCIAL AND GOVERNANCE</td>
</tr>
<tr>
<td>GIC</td>
<td>GOVERNMENT OF SINGAPORE INVESTMENT CORPORATION</td>
</tr>
<tr>
<td>GPFG</td>
<td>GOVERNMENT PENSION FUND GLOBAL (NORWAY)</td>
</tr>
<tr>
<td>KIA</td>
<td>KUWAIT INVESTMENT AUTHORITY</td>
</tr>
<tr>
<td>OLS</td>
<td>ORDINARY LEAST SQUARES</td>
</tr>
<tr>
<td>SWF</td>
<td>SOVEREIGN WEALTH FUND</td>
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<td>TEMASEK HOLDINGS</td>
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I Introduction

In the introductory chapter, the Sovereign Wealth Funds (SWF) are presented as the topic of the study, accompanied by an introduction to the target area of the study. This will revolve around the behavior of the stock prices of the SWFs transaction targets. The research question is stated in this chapter as well as the authors hope for the theoretical and practical contribution. Ethical and social aspects are also discussed. Delimitations made to limit the research area are presented and the chapter ends in a disposition which will function as a skeleton for the study.

1.1 Background

Sovereign Wealth Funds are becoming massive! They are state owned entities that through investments become part of the economy of other countries and they have during recent years attained a position as influential market players. The rate at which the funds are created has accelerated since 2006 and according to World Finance, more than 40 Sovereign Wealth Funds were created in the time period between 2006 and 2013 alone (World Finance, 2013). A considerable amount, as the total number of SWFs worldwide at the end of 2016 is 73 (Swfi, 2017). Some countries have established one SWF and others, such as China and Singapore, have created more than one. In the same time span, a similar effect can be seen in the value of these funds. An increase of about 250 % since 2006 has led to Sovereign Wealth Funds receiving an increasing level of attention (Clark et al. 2015). The funds’ value increases with both returns on investments and deposits being made from governments’ surplus. These surpluses mainly derive from the petroleum industry and non-commodity sources. Since 2012, the total value of the world’s Sovereign Wealth Funds has stabilized, in part because of the drop in oil prices since the fall of 2014 and the following decline in deposits to many of the funds (Nasdaq, n.a). The rather stable values of the SWFs over the last five years provides a potential frame concerning the time horizon of the study.

These funds invest internationally in financial markets, real estate, bonds and obligations in order to obtain returns, and they dominate the list over the world’s largest funds. They must find viable ways of maneuvering through challenges of investing in foreign economies and have in previous years been met with some skepticism and a fear has been that investments could be politically motivated (Balding, 2012. p. 81). After several of the largest Sovereign Wealth Funds contributed to stabilizing the economic markets during and after the economic crisis of 2008, they have gained a better reputation and are by many viewed as leading and influential market players within the investment world (Balding, 2012, p. 72; Dedu & Nitescu, 2014, p. 15).

1.1.1 Theoretical point of departure

In 2009, Monitor Group & Feem stated that there did not exist a general widespread definition of what a Sovereign Wealth Fund is. At the present, that is still the case but there seems to exist a consensus about what criteria a fund must fulfill to be reviewed as a Sovereign Wealth Fund. The Sovereign Wealth Fund Institute is a global organization that is recognized worldwide as the information authority on Sovereign Wealth Funds. This institute defines the funds as “state-owned investment funds or entities that is
commonly established from balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, governmental transfer payments, fiscal surpluses, and/or receipts resulting from resource exports” (Swfi, n.a).

To complement this definition, a set of five criteria by Miracky and Chin (Monitor Group & Feem, 2009) is becoming well-known and provides a simple way of including or excluding funds from being classified as Sovereign Wealth Funds.

1. “It is owned directly by a sovereign government”
2. “It is managed independently of other state financial institutions”
3. “It does not have predominant explicit pension obligations”
4. “It invests in a diverse set of financial asset classes in pursuit of commercial returns”
5. “It has made a significant proportion of its publicly-reported investment internationally”

(Monitor Group & Feem, 2009)

The expression Sovereign Wealth Fund started becoming a well-known name as late as in 2005 and previous research is not very extensive. The conducted research has mainly been focused around Sovereign Wealth Funds as a means of investing for the benefit of future generations and as a method for increasing a country’s wealth without economic cycles directly affecting the economy. Carolyn Ervin (2008, p. 21) mentions both aspects and points to the funds ability to function as a cushion for economic fluctuations and that they in fact are amongst the most long-term investors on the planet as a result of the goal of saving for future generations. Another aspect that is relevant to this study is the increasing size of these funds, which has secured them a spot amongst the most important players within the global financial markets, and their power seems to increase along with their size. The funds long-term horizon and their willingness to obtain a large percentage of equity makes them major long-term owners and preferable alternatives in relation to private equity for the targets of their investments (Butt et al., 2008, p. 73). The extent of the influence possessed by Sovereign Wealth Funds was studied by Kotter and Lel (2011, p. 362). They found a positive relation between SWFs’ announcement of an intent to purchase and the behavior of target’s stock prices. Their work also suggests that transparent SWFs are viewed as profit-oriented investors by market participants, a view which seems to be increasing as SWFs in 2011 had initiated work to increase their transparency through better disclosure procedures (Kotter & Lel, 2011, p. 362). SWFs differ from regular investors by investing very long term (Ervin, 2008, p. 21.), a focus being on making ethical investments (Schubert & Barenbaum, 2010, p. 29) and by placing the investments abroad to avoid affecting the domestic economy (Monitor Group & Feem, 2009). Investments made by Sovereign Wealth Funds are thus different to those of regular investors in part because of the well-known long time frame which makes them preferable investors in relation to private equity and other investment funds and decreases the amount of stocks available to the public (Butt et al., 2008, p. 73).

Announcements of an intent to purchase stocks by Sovereign Wealth Funds will in theory affect the target’s stock prices. SWFs are long-term investors, but this study will focus on the short-term effects of an announcement. Studies such as Dewenter et al. (2010, p. 261) and Kotter and Lel (2011, p. 361) have previously examined this effect in a 3-day window, but their investigation was performed on observations from the late 1900’s and early 2000’s, making them less relevant in today’s financial climate. However, their approach of conducting an event study focusing on a 3-day window surrounding the announcement date is still relevant and by being inspired by their approach, this study
will look for a significant relationship in today’s financial environment that might be coherent with or contradict the results found in the previous studies.

For both new and seasoned retail investors, it can be challenging to find profitable investments and to avoid being influenced by emotions in the handling of an equity portfolio. Existing literature points to retail investors often lacking the ability to make a solid stock selection, that they are prone to selling of products that outperforms comparable listings and hold on to underperforming products, resulting in an overall underperformance of their equity portfolio (Entrop et al., 2016, p. 571). Other aspects making trading difficult comes from psychology. Studies show that retail investors might make less than optimal decisions concerning their investments because of emotional influence (Maymin & Fisher, 2011, p. 35). The fact that retail investors often lean on skilled investors and pay to attain their services or resort to place their money in funds, also point to the fact that maneuvering in the financial world and obtaining knowledge about variables such as expected return can be challenging (Savov, 2014, p. 213).

There exists a vast number of programs, different tactics concerning whether to trade on a daily or weekly basis and several well-known signs to look for when estimating trends to receive the maximum return. Still, it is often both a simpler approach and less stressful to buy stocks on a fundamental level and let time do the rest (Clapperton, 2003). Statistically, stocks yield an average annual return of around 8% (Blackrock, 2016, p. 2), which can be difficult to beat should you not know how to use several trading tools. The outcome from the research conducted by Dewenter et al. (2010, p. 265) could be utilized as a guideline for retail investors in predicting potential returns after an intent to purchase is announced by a SWF. However, previous research was conducted in the late 1990’s and the early 2000’s, and appears too old to be applicable in today’s financial climate. This leads to the need for research that is relevant and suited to be used as a guideline in the present environment.

1.2 Need for research

Previous studies have shown that large institutions and influential investors affect stock prices when buying and selling (Sias et al., 2001, p. 26), that when large funds make investments, this can show up as a notable change in the target’s stock price. In connection with their research on Sovereign Wealth Funds, Dewenter et al. (2010, p. 265) found a significant change in the behavior of a target’s stock price after the announcement of a SWFs intent to purchase. Research was conducted by Kotter and Lel (2011, p. 361) that concurred with their discoveries. This shows that studies have previously been completed with focus being on the announcement date, however, these studies are not recent (90s and early 2000s) and none of these studies have attempted to shape their findings into an applicable investment strategy. The financial environment is not stagnant. As no research has been conducted on the topic in today's financial environment, this becomes an interesting topic of research.

The SWFs in today’s financial climate are larger and exist in a greater quantity than during the time when previous research was conducted. While it is interesting to perform an updated study, the change within the population leads to this research not only functioning as an update, but as a study that will contribute to increasing the current knowledge of SWFs. In addition, a research gap is found in a currently non-existent
investment strategy, pertaining to the relationship that might occur because of Sovereign Wealth Funds financial decisions. This strategy will revolve around whether it can be profitable to follow the funds purchases of equity.

When summarizing theories and difficulties presented so far concerning this area, the information has led the authors to a research question which is in a relatively unexplored area of the financial world. It has prospects of yielding interesting results that can be presented in the form of an investment strategy aimed towards retail investors, thus possibly aiding the struggles of retail investors.

1.3 Research question

What is the short-term effect of an announcement of a Sovereign Wealth Fund’s investment on the stock price behavior of the target firm?

1.4 Purpose

In a first step, the study will seek to clarify the difference between regular funds and Sovereign Wealth Funds. As this classification of funds is relatively new, the existing literature on the topic is not extensive or conclusive. In connection with this clarification, it is also interesting to elaborate upon why SWFs, as a type of investment fund, are interesting in connection with private investments.

The main purpose of this study is to explore the relationship between an announcement of an intent to purchase shares by a Sovereign Wealth Fund and the behavior of the stock price of the target by performing an event study. The intention behind studying the effect in a short-term window from the announcement of an investment, is to create the opportunity to produce an advisable investment strategy. The goal of producing this strategy is to create an approach to short-term investments that can be profitable for retail investors. These investors are the target audience of this study.

This study becomes feasible by collecting a number of variables related to the data needed to calculate the behavior of the target prices. The authors will attempt to describe the behavior by contributing it to a number of variables, some of which might be the size of the purchase in question or the market on which the transaction is conducted. It is also interesting to examine the different weights these variables might have and whether they can strengthen the previously mentioned investment strategy.

1.5 Theoretical and practical contribution

A limited number of studies have been conducted on the topic of Sovereign Wealth Funds, and the authors have thus been able to immerse themselves in an area of research that is yet to be heavily explored. No matter the result of this study, it will be conducted within a relatively new and unexplored area of the financial world and can function as a theoretical contribution and a pillar for future research to build upon. The study will gather and add to the current knowledge of Sovereign Wealth Funds as well as clarify the difference between these funds and large investors or normal funds.
Additional theoretical contributions will be made by this study adding new knowledge to the literature on event studies as well as the set of theories which form the theoretical framework of this study.

The practical contribution of this study is to look for a significant relationship between the announcement of investments by Sovereign Wealth Funds and the behavior of target’s stock prices in a short-term window. What factors that affect this potential relationship, and to what extent, will also serve as a practical contribution.

Another aspect of this study’s practical contribution is to create a tool for retail investors. This tool will be in the form of an investment strategy that can be applied to achieve a profit. It will be based on the potential abnormal return resulting from a specific and easily identifiable event. The previously mentioned research gap will be filled up by the results of this study, as there does not yet exist an investment strategy aimed towards investors, mainly retail investors, within this area of the financial market.

It is not, however, only retail investors that can make use of the results of this study. A potential relationship, positive or negative, could improve the strategy of SWFs by better coordinating the announcement and the actual purchase in a manner that might maximize their value.

1.6 Delimitations

The authors have chosen to segment the population of SWFs into quartiles and focus on first quartile instead of performing a simple random selection or taking a systematic sample. By focusing of the largest 25 % of the SWFs, this study can examine the entire population. The top quartile holds 89,10 % of the total value placed in the world’s SWFs (Swfi, 2017), which could indicate that this quartile holds the most influential funds within the SWF-classification.

The study will revolve around the movements of targets’ stock prices short term, in connection with the announcement date, and not in conjunction with the completion date. The announcement date entails the intent to purchase is publicized, which is a phenomenon that is possible to monitor. The completion date is more challenging to observe, and as a purpose of the study is to create an investment strategy, the authors have chosen to build their research around the announcement date. The strategy is intended to be uncomplicated. To minimize unknown variables affecting the potential return, the authors have limited the research to a short-term window.

This study focuses on the investments being made by Sovereign Wealth Funds, and does not go into detail consider the geography of the funds. Nor does the study consider the country in which investments are made, in order to create a global model that works independently of markets, countries and industries. The study will, however, allow for the continent in which each transaction takes place to play a role in the study. The more detailed aspects of the funds’ activities are relevant variables that the authors leave future studies to elaborate upon.
1.7 Disposition

Chapter I: Introduction
In this section, the topic is presented together with a definition and a brief background. The focus of the study, in other words the research question, is also stated in this part. In order to narrow it all down, delimitations are disclosed and discussed as well. This section will accordingly work like a skeleton for the study, showing its theoretical and practical contributions. Lastly, ethical and social aspects are discussed.

Chapter II: Methodology
Methodology entails discussing the different branches of philosophy that might be best suited for conducting this study. Contrasting research approaches are also presented in order to execute the research in the best possible way and work towards arriving at a reliable answer to the research question.

Chapter III: Theoretical framework
The theoretical framework is a natural progression from the previous chapter which explored and concluded in an optimal way to approach the study in question. It is where relevant theories and previous research is elaborated upon and connected. The theoretical chapter is one of the core elements of the study and enables both research, the analysis and permits the authors to reach a conclusion that might answer the research question.

Chapter IV: Method
The empirical method builds on the theoretical chapter in order to convey the empirical component of the study. It gives the statistical methods that is needed for the chapter to lead to a testable model.

Chapter V: Results
This chapter presents the data collection process as well as discusses the gathered data points. This is one of the key chapters in the study and will be the part where the outcome of the research question and stated hypothesis is presented.

Chapter VI: Analysis
The analysis will discuss the results and evaluate them in regard to the theory presented in chapter III.

Chapter VII: Conclusion
Conclusion will be drawn from the results and theories that have been examined. If answers to the research question and recommendations are found in the study, this will be summed up here. This chapter will thus work as a summation of the whole research. Also, suggestions to further research question will we presented. Some suggestions for future research are stated in the delimitations and some are not mentioned earlier in the study. Lastly, this chapter will deal with the quality and truthfulness of the study through presenting quality criteria. The validity and reliability of the study is evaluated and discussed.
II Methodology

The second chapter discusses the methodology. It starts off by presenting the different branches of philosophy and the one that is best suited for the purpose of conducting this study. Then the ontological and epistemological assumptions which the study is built upon is given. Contrasting research approaches are also presented in order to execute the study in the best way possible, to work towards arriving at a reliable answer to the research question. The chapter ends with a presentation of the choice of literature and criticism directed at both sources and databases.

2.1 Choice of topic & preconceptions

As the authors have chosen finance as the specialization of their education at Umeå School of Business and Economics, a large part of their time during the latest semesters has been spent within the financial world; focusing on investments, the stock market and variables that might affect the market and values of shares and investments. Combined with the fact that one of the authors is from Norway and has a previously existing interest for the Norwegian Sovereign Wealth Fund, the “Government Pension Fund - Global”, this has led to an idea of a topic for our study that is not only interesting, but that hopefully also can make a theoretical and practical contribution to the existing theory. There is a possibility that the authors’ preconception could impact the interpretations of the results of this study. However, the authors view the existing knowledge pertaining to the subject as a positive because they are not completely new to the field of study. Being aware of this risk might even ensure objectivity in the process of obtaining the results and conducting the analysis.

2.2 Perspective of the study

This study primarily takes the perspective of the investor, giving that retail investors are the target audience. This is mainly because the outcome will be more suitable for private investors with a lack of experience in the financial market. A trustworthy and uncomplicated way to start trading stocks will be created for this target audience. Large institutes often develop systems and strategies themselves concerning investments, and thus, they fall outside the main audience of this study. The authors expect that most large institutes or investors have already mapped out this area of research. Should this study result in a profitable investment strategy, these investors have most likely already incorporated it into their strategies. A shift would however occur as retail investors now would be aware of this opportunity, and potential large investors would have to take that into account in regard to their own investments. SWFs themselves could also take advantage of the findings of the study in the process of planning their announcements of purchases.

2.3 Research philosophy

Before proceeding with the research, it is important to clarify the philosophical standpoints of the authors and the study itself (Burrell & Morgan, 1979, p. 1). As such, this will be presented in the following section, starting with the ontological and
epistemological assumptions. These two topics will point out the methodological direction that later guide the choices in regard to research approach, method and strategy.

2.3.1 Ontological assumptions: Objectivism

Saunders et al. (2012, p. 140) presents ontology as a branch of philosophy that concerns the researcher’s assumptions and views of the nature of reality. There are two forms of ontological views, most commonly referred to as objectivism and subjectivism as by Saunders et al. (2012, p. 131). In essence, the ontology concept concerns the existence of something (Bryant, 2017, p. 43).

The first step in research philosophy is to establish the view of the researcher. This is however not an approach that is chosen depending on the manner at which the researchers’ wants to perceive the world, but the view the researchers already possess. The question “what exists” is used to describe ontologism. It also correlates with philosophical problems, often classical ones such as the existence of god and the universe (Hofweber, 2011, p. 43). This type of philosophical problems is however not relevant to this study, as the continuing focus will lie on the already mentioned views, objectivism and subjectivism.

Objectivism entails that social entities ought to be seen as unaffected by perceptions of various actors in society, thus allowing them to be considered objective (Bryman and Bell, 2011, p. 32). Saunders et al. (2012, p. 131) uses a change in management as an example. When a former manager leaves a company, a new manager is employed. During this process, the structure of the management will remain the same as before, even though there has been a change in the positions. As a result of this example, the management of the company should be viewed as an objectivistic one, having the same structure regardless what person is in charge. As such, the company is unaffected of the external factors.

Bryman & Bell (2015, p. 32) shares this view of the world as an organization. People apply for jobs and adopt standardized procedures, they leave and are replaced with people doing exactly the same. When reflecting upon the world, cultures and subcultures work the same way (Bryman & Bell, 2015, p. 32). We are constrained to the world, its beliefs and values, and as such we live within an objectivistic ontological view.

In relation to an organizational culture, it would be perceived as a trait that the culture has instead of the subjective view which would entail that the culture is something that has developed over time and is still developing through social enactment (Saunders et al., 2012, p. 132). Subjectivism thus entails that social entities ought to be viewed as a construction of the perceptions of various actors in society (Bryman and Bell, 2011, p. 32). These social interactions are fluent and always in a state of change. This gives that it is imperative to review all aspects of studied situations in order to fully comprehend the reasons behind events or opinions (Saunders et al., 2012, p. 132). The subjective approach is not suitable in connection with the purpose of this study. The authors believe that the behavior of targets’ stock prices after SWFs financial decisions changes independently of social enactment.

The ontological view of the authors fits with the approach known as objectivism. The primary purpose of this study is to explore a relationship, only using historical facts and
figures. The authors would argue that this is something done with an objective approach by studying the “what exist”-question without personal valuations influencing data or results.

2.3.2 Epistemological assumptions: Positivism

As previously mentioned, ontology is the study of what exists. Epistemology on the other hand, focuses on “how we know” (Hofweber, 2011, p. 43). Steup (2005, p. 43) defines it as “the study of knowledge and justified belief”. Epistemology thus describes what is required for something to be constituted as acceptable knowledge and how information and knowledge is collected, studied and validated (Bryman & Bell, 2015, p. 26; Saunders et al., 2012, p. 132). A central discussion within this philosophical orientation is the question of whether the same procedures and principles practiced in natural science also can be applied to questions regarding the social world (Bryman & Bell, 2015, p. 26).

There are three ways to perceive the social world. These are known as positivism, realism and interpretivism (Saunders et al., 2012, p. 134; Bryman & Bell, 2011, p. 26). Positivism makes use of natural science methods when studying the social world (Saunders et al., 2012, p. 134). The positivistic goal is to observe the social reality in an objective manner without interfering, but still understanding it. It entails collecting data concerning an observable reality and then seeking to create generalizations by constructing a set of hypotheses. These hypotheses are tested and, depending on the outcome, confirmed or refuted (Saunders et al., 2012, p. 134). Regardless of the outcome, this method leads to development of the current theoretical literature and creates opportunities for further research to build on the findings.

Realism also allows for the approach of natural science in connection with studies of the social world, where a goal is to conceptualize an external reality (Bryman & Bell 2015, p. 28). It addresses what is perceived as reality and more precisely, it views objects as having an “existence independent of the human mind” (Saunders et al., 2012, p. 136). Realism is similar to positivism, but allows for the social world to be studied through both research and sense. It is responsive to observations in its search for an underlying truth (Bryman & Bell 2015, p. 28).

The last of the three epistemological assumptions aims to explain the world from an individual point of view, where looking for regularities and procedures from the social world is the main focus (Burrell & Morgan, 1979, p. 5). Interpretivism advocates for the importance of the researcher to be aware of and be able to discern the differences amongst humans as social players (Saunders et al., 2012, p. 137). The consensus of interpretivism is that the complexities of individuals and adopting an empathetic viewpoint in approaching them, is necessary to achieve insights into the world. An argument is that reducing this complex information to a series of observations or generalizations, will prevent this goal (Saunders et al., 2012, p. 137). Bryman & Bell (2015, p. 28) highlights that people and their establishments and institutions are vastly different from the world of natural science and so, the approach to studying the social world should also differ.

Positivism, and its essence of what is seen as knowledge, will be the point of departure for this study. The authors view themselves as positivists and believe that methods deriving from natural science are appropriate for completing a credible study. The research question and the purpose of the study are expected to explain a part of reality
and thus, it becomes valuable for the social world. By choosing a positivistic approach as the epistemological assumption, hypotheses developed from a theoretical base will be tested with the use of collected data. The study will have a structured chapter revolving around the method in order to facilitate the replication of the conducted tests (Gill & Johnson, 2010, p. 80). In conclusion, the authors are not attempting to uncover a deeper understanding of why investments by SWFs are made, but rather seek to examine the events that might occur as a result of them. Finding whether an abnormal return exists, and if it does, investigating what variables might hold the power to influence it, are parts of the purpose of this study. The authors’ view is that the best approach to new insights and knowledge concerning these areas is through a positivistic approach to research as it allows the “data to speak” by way of its properties and the relations between the variables in the dataset. Because this, they have chosen to follow it in their work.

2.4 Research approach: Deduction

Prior to making the choice of research method, it is necessary to specify what type of approach the research will have. A deductive or inductive approach have long been a two-headed road, but in recent years, a third option have occurred, called abduction (Bryman & Bell, 2011, p. 26). Abduction has some similarities with the two other approaches, but it does not fit with the execution of this study due to its qualitative nature (Mantere & Ketokivi, 2013, p. 76). A study’s starting point within an abductive approach is a “surprising fact” and the researcher then moves back and forth between theory and data to reach plausible theories concerning how the fact could take place (Saunders et al., 2012, p. 147). This method does not suit the purpose of this study, as the authors’ does not seek to create new theory, nor to modify existing theory. When precluding the abductive approach, deductive and inductive are the two options left to consider.

Deduction is an approach which allows for causal relationships between events and variables that might influence them (Saunders et al., 2012, p. 145). Hypotheses are developed based on existing theory and by analyzing quantitative data. The dataset is collected using highly structured methods to ensure the possibility of later studies replicating and verifying the results (Saunders et al., 2012, p. 145). A characteristic of the deductive approach is that the results can be generalized (Saunders et al., 2012, p. 145). This entails performing the study on a large and meticulously chosen sample. According to Bryman & Bell (2011, p. 23), the deductive theory is the most common view of the relationship between theory and research. As stated in previous sections, this study will have an objective and positivistic approach, which furthermore makes it natural to go the deductive way. By using existing theories and testing hypotheses created from these, the authors seek to examine and explain the results of the study.

There is a major difference between the deductive and inductive method. While the deductive approach uses theories to explain results, inductive method makes sense of the collected data in order to create new theories which will be added to the already existing ones (Bryman & Bell, 2011, p. 23). This new theory is often presented in the form of a conceptual framework (Saunders et al., 2012, p. 146). Research within the inductive branch places a larger weight on the context surrounding events than what is normal in deduction (Saunders et al., 2012, p. 146). The attention to detail makes studies involving a smaller number of subjects more appropriate than the large number that is often included in a deductive study (Saunders et al., 2012, p. 146).
Because this study will establish hypotheses based on already existing theories, the deductive method will be utilized. The method is also the most common and suitable in connection to the previous choice of objectivism and positivism. As this study will be performed by making use of the deductive method, data will be collected by observing reality without interfering or influencing.

2.5 Research method: Quantitative

According to Bryman & Bell (2011, p. 37) there are mainly two prevailing types of research strategies to choose from when conducting a study. Both methods focus on the individual’s thoughts and actions, but they make use of different approaches to conduct their investigations.

A simple distinction between the two is that the quantitative method entails making use of measurements and numerical data, while the qualitative method instead focuses on non-numerical data (Saunders et al., 2012, p. 161). This is, however, a superficial description (Bryman & Bell, 2011, p. 37). A quantitative study usually depends on the collection, interpretation and analyzing of data by making use of statistical techniques in connection to existing theories (Saunders et al., 2012, p. 162). Thus, it builds on a deductive research approach. It also encompasses natural science which connects the method to the positivism assumption, especially in conjunction with techniques of data collection that are highly structured (Bryman, 1984, p. 77; Saunders et al., 2012, p. 162).

The qualitative method diverges from these characteristics and relies for the most part on words and their content to conduct an analysis, thus linking it to an interpretive philosophy (Saunders et al., 2012, p. 163). This method often builds on an inductive approach in placing weight on interpretations of qualitative data to make a contribution to the creation of theory. Studies build on the perspective of the study's subject and the method is viewed as more flexible than the quantitative research strategy (Bryman, 1984, p. 78). For a qualitative study to be successful, the researcher is dependent on gaining access to each participant. It is also crucial to be able to create a sense of confidence between the researcher and the subject to obtain valuable information (Saunders et al., 2012, p. 164).

The presented research question shines a light on a problem that can be answered by making use of either of the two presented research methods. However, it would be both impractical and expensive to conduct the required number of interviews in order to perform a qualitative study. In addition, the methodological direction pointed out by previous subchapters, guides the choice of research method in the other direction. The ontological and epistemological assumptions of objectivism and positivism as well as choosing a deductive approach gives that the quantitative method is the most appropriate in order to reach a satisfactory answer to our research question. Another reason behind the choice of conducting a quantitative study, is that it is possible for the authors to gain access to the needed dataset.
2.6 Research strategy: Archival

When speaking of strategy in general terms, the expression aims on a plan of action to achieve a certain goal or a task (Saunders et al., 2012, p. 173.) The definition of a strategy is easy to apply in terms of research design, where it could be described as the way of which the research question will be answered by the researcher. According to Saunders et al. (2012, p. 173), different strategies can be more or less suitable to previously chosen methods and approaches. However, that one strategy is much superior to another one in combination with a certain philosophical approach is not something that should not be followed by law. To be able to answer the research question in the best way, it is important to choose the best strategy that is the most coherent with both the research question and previous choices regarding the methodology.

Within the archival research strategy, there are several options to choose from. Saunders et al. (2012, p.173) discusses eight different strategies where two common strategies are survey, which focuses on answering “what”, “who” and “where”, and ethnography that can be used when groups are studied. None of these two fit the research question of this study very well. The authors are not seeking to find any views or opinions of the public, and even though ethnography aims to study groups, it is better equipped in studies of cultures in society than when studying a special group of funds. When evaluating the eight different strategies, the authors have chosen to follow the archival research strategy. It has its roots in finding the primary source of data for a study by using administrative records and documents. According to the authors, this is the most suitable way to answer the presented research question in section 1.3. The reasons behind choosing this approach lies in the focus on secondary data, which will be used in the execution of this study. Saunders et al. (1973, p. 178) does however state that archival research strategy is something that should not be mistaken for a secondary data analysis. Even though all studies based on secondary data are a type of secondary data analysis, an archival strategy differs from this. The differences lie in the use of the data, where an archival research uses secondary data to a different purpose than the data was originally intended to serve. This fits the research in question, where the data concerning the values of the target companies initially were record to create a historical archive. The data related to the individual announcements were also initially collected to serve the same purpose. In this study, they will however be used to find a potential relationship between announcements made by SWFs and the behavior of their targets’ stock prices. The data used within archival research strategy can be difficult to obtain, as in the case with the data concerning the mentioned announcements. At the same time, it is a rewarding approach which allows for new information to be extracted from existing archives.

2.7 Time horizon: Cross-sectional

The time horizon of a study is often a natural progression from the research question and the purpose. There are several directions one can chose to follow, but Saunders et al (2012, p. 190) highlights two main paths; cross-sectional and longitudinal.

The longitudinal time horizon allows researchers to analyze events over the course of a given period (Saunders et al., 2012, p. 190). This approach can be conducted in two different ways. One is a panel study where a common procedure often involves a random national selection from which data is collected on at least two different occasions.
(Bryman & Bell, 2015, p. 66). The second is known as a cohort study, where an entire population which shares specific characteristics or a random sample of the cohort serves as the study’s source of new information (Bryman & Bell, 2015, p. 66). Should the authors follow this approach, they would be able to study changes and development over time when it comes to changes in the behavior of targets’ stock prices. The longitudinal approach might also provide both an increased control over and knowledge of the time order of variables, allowing for causal inferences to be formed (Saunders et al., 2012, p. 190; Bryman & Bell, 2015, p. 66).

The research question of this study makes it clear that the research will revolve around the effects of a specific and easily identifiable event. As specified in section 1.4, a purpose is to produce an investment strategy that can be applied in connection with the specified phenomenon which takes place at a specific time. The dataset will consist of observations stemming from the last five years but their place in time will not be included as a variable in this study. The totality of observations will be placed in the same sample in order to focus on analyzing a snapshot in time, and thus, cross-sectional becomes the preferable approach (Saunders et al., 2012, p. 190). The cross-sectional design supports the purpose of this study in it focusing on a specific point in time by analyzing a quantitative dataset (Bryman & Bell, 2015, p. 62). The concept demands a standardized and precise collection of data in order to find variations and patterns, as well as avoiding the possibility of the variables being manipulated (Bryman & Bell, 2015, p. 65). By performing this study in accordance with the cross-sectional time horizon, the collection of data surrounding the specific phenomenon of SWF announcing a purchase of shares will be performed in a meticulous manner.

2.8 Nature of Research Design: Explanatory

Saunders et al. (2012, p.170) presents three different directions that research design can take; exploratory, descriptive, explanatory or a combination of these. To begin with, the research question of this study has been worded in a manner that is compatible with an explanatory approach, but it is still interesting to look at the purpose of the study in connection with the different natures of research design.

Studies where information is collected through relatively unstructured interviews and which build their results and conclusions on the contribution of the participants, are classified as exploratory studies (Saunders et al., 2012, p. 171). This approach can be rewarding in unexplored areas, where the researchers develop the process accordingly as new information comes to light. It often starts with a broad idea which is then narrowed down as the work progresses (Saunders et al., 2012, p. 171). If this study were of an exploratory nature, the necessity for a number of interviews would arise. This would require the authors to make contact with, or optimally, travel around the world in order to conduct the necessary interviews to a satisfactory standard.

Descriptive studies allow a researcher to depict events or people in an accurate manner, and this approach can be utilized as a prerunner for the two other research designs. This stems from it being paramount to have good knowledge surrounding the phenomenon of interest (Saunders et al., 2012, p. 171). The approach entails carefully evaluating data in order to reach viable conclusions. Descriptive studies are often characterized as a means to an end and often function as the basis for exploratory studies (Saunders et al., 2012, p.
171). The descriptive approach would limit this study to describing and presenting the data without being able to reach the investment strategy that is one of the purposes of the study.

The explanatory approach entails discovering and interpreting a relationship between variables (Saunders et al., 2012, p. 172). This suits both the research question and the purpose of this study. By examining the situation that occurs when SWFs announce an intent to purchase shares, the authors hope to explain the behavior of the targets’ stock prices and the relationship between different relevant variables that might explain the behavior. Finding relationships based on quantitative data or the results from statistical tests are examples of approaches to explanatory studies (Saunders et al., 2012, p. 172), which coincides with the objectives of this research.

2.9 Ethical and social considerations

The ethical and social considerations play a significant role from start to finish when conducting a study (Israel & Hay, 2006, p. 7). Ethics are defined as the manner in which you handle yourself in relation to the rights of the subjects of your investigation, or the people who are affected by it and the study itself will be affected by a number of influences where one of them is existing social norms (Saunders et al., 2012, p. 226). The social considerations describe the behavior a researcher should exhibit in situations, encapsulating a variety of ethical considerations (Saunders et al., 2012, p. 227). The Thesis Manual of USBE presents a set of ethical guidelines which the authors will act in accordance with throughout the work with this study (USBE, 2017, p. 6). The authors will also abide by the standards that are set by Umeå School of Business and Economics. In addition, the European Code of Conduct for Research Integrity lists a number of principles that researchers are obliged to follow. These principles include honesty, reliability, objectivity, independence, accessibility, duty of care, fairness in providing references and a responsibility towards the researchers of the future (European Science Foundation, 2011, p. 5). The authors have allowed these factors to play a leading role in their work with this study.

The topic and research question of this study have been self-imposed by the authors, without any affiliation or impact from external institutes, investors or other stakeholders that may have an interest regarding its outcome. This does not of course exclude bias or independency, but it reduces it. Truly independency is however something that cannot be achieved, according to Bryman & Bell (2012, p. 149). They state that every research funded by something or someone will be biased and the origin of the money will have interests in the outcome. This does not include only commercial sources but governments as well. However, this study is not funded, nor will it generate any revenues for the authors, which if not erase a conflict of interest, at least reduces it significantly. It is also worth mentioning that the study is a work of the authors. The research question is of financial and social scientific interest as well as having the potential to result in both theoretic and practical contributions to the current literature.

Modern processes of collecting, storing and handling data digitally raise new concerns related to ethical behavior. Whether all available information legally can be made use of in purposes other than what they were originally intended for, and whether ownership is respected once data becomes available online, are aspects that are becoming increasingly
relevant (Bryman & Bell, 2015, p. 146). In the process of the data collection in connection with this study, the authors will make use of online databases, in which they have legally obtained access, as well as Datastream, a database available for collection of data at Umeå University Library. Ensuring transparency, every collected data point is still available online and it is accessible for both readers and future researchers.

To ensure that the referencing is done in a correct manner, the USBE Thesis Manual will be followed (USBE, 2017, p. 37). It is of big importance to reference, not just to support your arguments but to credit the true source of the information (USBE, 2017, p. 37). Referencing also gives credibility to the study by facilitating accessibility to the utilized literature. This fulfills the responsibility that the researchers, according to the European Science Foundation (2011, p. 5) have towards scientists and researchers of the future.

2.10 Choice of literature and criticism

2.10.1 Literature search

When attempting to build a theoretical base and a framework that could support the study in its entirety, the authors immersed themselves in many books, academic articles and visited a significant number of homepages of relevant players within the area of study. The chosen research approach of deduction leads to the totality of the included literature being of a secondary nature. In the process of uncovering applicable and relevant studies and literature, the authors have made use of the database Business Source Premier and Emerald Insight through Umeå University Library’s homepage, the Library in itself and Google Scholar.

In the search for academic articles and texts concerning the topic at hand, the authors utilized the Business Source Premier, Emerald Insight and Google Scholar. All academic texts retrieved through these search engines have been filtered to only provide peer reviewed academic articles. A set of keywords was used in order to obtain the articles and texts that have been included in the texts. The main keyword being “Sovereign Wealth Fund” and it was paired up with the following terms in varying order and combinations: “Individual investors”, “Investment Funds”, “Performance”, “Stock price”, “Investment advisories”, “Target companies”, “Transparency” and “Organizational ideology”. The authors have also conducted some searches without the main keyword to find information in relation to large investment funds. When reading up on information relating to the theoretical base, the terms listed above were combined with a number of relevant phrases: “Event study”, “Efficient Market Hypothesis”, “Abnormal return” and “Behavioral Finance”.

2.10.2 Source criticism

Books and peer reviewed academic texts have been the main source of information in the work with this research. Regarding books, the latest editions have been utilized whenever possible to collect the newest and most reliable information when it comes to the research area. On the occasion that books or academic texts have cited other sources, the authors have also looked up the original source in order to avoid errors.
The authors have made use of some non-academic sources in their work with this study and are aware that using sources that might not have been peer reviewed can lead to some risk. However, it can also help in widening the point of view and allowing the authors to look at an issue from different perspectives. Homepages of institutions, annual reports and articles from renowned news outlets such as World Finance and The Guardian have been used in the process of building up the problem background, strengthening the research question and the purpose of the study.

The totality of the collected data is all of a secondary nature, as follows from the chosen research approach. In the process of collecting data, the authors have made use of a database made available online by the Sovereign Wealth Center. This database allowed the authors to collect information on a large number of transactions made by Sovereign Wealth Funds. The database does not include all transactions made by SWFs. Some of the transactions have been excluded based on them appearing to be a part of an index-linked strategy. The authors are aware of the possibility of this resulting is a skewed result, and have collected information on additional transactions available in Datastream.

2.11 Summation of Methodological Framework

When all the presented assumptions have been chosen and clarified, the study follows a distinct procedure. The authors have through this chapter created a path through the assumptions, the method and approach to build a research process which will result in a reliable procedure and credible results. This has resulted in an objective and positivistic view of nature with a deductive and quantitative method. Figure 1 illustrates the methodological framework.

![Diagram of Methodological Framework]

*Figure 1 – Our process to create knowledge*
III Theoretical framework

The theoretical framework is a natural continuation from the methodology which explored and concluded in an optimal way to approach the research question. This is where relevant theories and previous research are elaborated upon and connected to each other. The theoretical chapter is one of the core elements of the study and enables both the research and the analysis. It also permits the authors to come to a conclusion that might answer the research question.

3.1 Choice of theories

The theoretical framework is meant to function as a basis for the study as a whole, especially in regard to helping the authors analyze and place their findings within the existing theoretical literature. In order to build the framework and reach reliable conclusions, the authors have made use of existing theories and previous research that might help answer the study’s research question as well as fulfill the purpose, both stated in chapter one. When introducing each theory, the authors have highlighted their reasoning for including them and why they are relevant within the structure of this study.

3.2 Financial investments

Before introducing the chosen theories, this section will clarify what a financial investment is and what being a shareholder entails. This is relevant because the study revolves around events in the financial markets and the effects that might occur as a result of them. This clarification is made to ensure the reader’s understanding of the term “financial investment” matches that of the authors.

Individuals can choose between spending their means today or placing them in investments for times to come. Financial securities are the means of which individuals or firms in well-developed economies often hold their claim to real assets, where real assets are tangible resources that participates in the development of net income in an economy (Bodie et al., 2014, p. 2). These securities are transactional instruments that were traditionally held in paper-form, but are now electronic entries (Bodie et al., 2014, p. 2).

The expression financial investments encapsulate three different categories of securities; fixed income, equity and derivatives (Bodie et al., 2014, p. 3). When investing in fixed income securities, the investments guarantees a regular incoming cash flow during the period of validity (Bodie et al., 2014, p. 4). Derivative securities derive their value from other assets, thus the name (Bodie et al., 2014, p. 4). They are in the form of securities such as futures, options and swap contracts. This study will be conducted on equities, which involves the buying and selling of stocks. When the term financial investment is used throughout this study, it refers to this category of securities. Equities do not include guaranteed regular cash flows as in the case with fixed income. Instead they represent a percentage ownership in the real assets of a firm. This difference leads to equities being higher risk than fixed income, as the potential return is dependent on a positive change in the value of a firm as a result of its success, or firms deciding to pay dividends to their shareholders (Bodie et al., 2014, p. 4).
Stocks are traded on financial markets around the world. These are avenues for investors to allocate their assets and is where a market’s collective assessment of an asset’s current and future prospects is reflected (Bodie et al., 2014, p. 5). These assessments are constantly revised because of investors’ actions and their interpretation of new information, which allows the formation of efficient markets presented in the following section.

3.3 The Efficient Market Hypothesis

The efficient market hypothesis is relevant and needs to be elaborated upon as assumptions is to be made for the event study method to provide meaningful results. It is important to elaborate on the different levels of efficiency in order to conduct the practical aspect of the research, an event study, which will be presented in chapter four.

The idea behind the efficient market hypothesis is an optimally functioning financial market where all available information is reflected in the prices. It is assumed that stock prices immediately absorb new information that become available (Wärneryd, 2001, p. 18). Newman et al. (1992, p. 739) explains more in depth that for markets to be classified as efficient in respect to an information set, prices must remain unaffected should this set be revealed to all market participants. In addition, the point is made that it is not possible to make economic profits by buying and selling based on the previously mentioned information set (Newman et al., 1992, p. 739). The efficient market hypothesis can be split into three different components; weak market efficiency, semi-strong market efficiency and strong market efficiency (Brealey et al., 2014, p. 324).

3.3.1 Weak Form of Market Efficiency

The weak market efficiency entails that the available information fully reflects the historical sequences of prices and returns of the market (Campbell et al., 1997, p. 22). This form of market efficiency is based on the idea of a random walk, entailing that both increases and decreases in the price are equally as likely to take place. Changes in tomorrow’s price will only reflect tomorrow’s “news”. It will not be related to today’s price changes. Also, the news themselves are unpredictable and thus, tomorrow's price changes becomes unpredictable (Newman et al., 1992, p. 739). This results in it being impossible to devise an investment strategy that will predict future stock prices and yield consistent superior returns based on historic patterns (Newman et al., 1992, p. 739; Wärneryd, 2001, p. 18; Brealey et al., 2014, p. 324).

3.3.2 Semi-strong Form of Market Efficiency

Regarding the semi-strong level of market efficiency, the stock prices will include all publicly available information. This includes historical sequences as well as information made available through sources such as last quarterly earnings statements, IPO’s, financial papers or motions to merge (Campbell et al., 1997, p. 22; Brealey et al., 2014, p. 325). Stock prices will immediately incorporate information when it is made public and so, the technique of fundamental analysis will not function as an investment strategy that leads to steady superior returns (Newman et al., 1992, p. 740).
3.3.3 Strong Form of Market Efficiency

A strong market efficiency represents a financial market where prices encompass the totality of the information that is known to any market participant (Campbell et al., 1997, p. 22; Brealey et al., 2014, p. 325). This includes information which in other cases is seen as private and knowledge that can only be acquired by diligently analyzing companies and the economy as a whole (Brealey et al., 2014, p. 325). The result is a financial environment where investors can either be lucky or unlucky and the theory states that no investor can use privileged information to consistently beat the market (Newman et al., 1992, p. 741). Should a pattern occur, arbitrageurs would spot it immediately and the possibility for extra profit would be eliminated (Wärneryd, 2001, p. 18).

3.4 Abnormal Return

*Abnormal return plays a central role in exploring both the research question and the purpose of the study. When trying to find a common denominator in regard to the behavior of the target’s stock prices, the abnormal return will be one of the main variables. The analysis of this return will also function as a base for the investment strategy, that is mentioned in the study’s purpose.*

Since this study has it stand point in determining whether an opportunity to beat the expected return arises when Sovereign Wealth Funds announce their investment, it is important to define the measurement of this possible effect on the return, also known as abnormal return. The normal return is defined as the expected return, should the event in question not take place (Campbell et al., 1997, p. 151). Abnormal return is defined as “the actual ex post return of the security over the event window minus the normal return of the firm over the event window” (Campbell et al., 1997, p. 151; McWilliams & Siegel, 1997, p. 628). Campbell et al (1997, p. 22) connects the abnormal return to the efficient market hypothesis in stating that if the abnormal return is impossible to predict, then the market efficiency theory applies.

3.4.1 Approaches towards Abnormal Return

Prior to the calculations of the abnormal return, the predicted return needs to be calculated (Brown & Warner, 1980, p. 207). Campbell et al. (1997, p. 151) presents two common approaches; the constant mean return model and the market model. These are statistical models where the main differentiating aspect between them is that the market model includes the market index as a variable when calculating the predicted return, and the constant mean return model does not.

The market model relies on the idea that there is a stable linear relationship between the return given by the market index and the return on the individual stock (Armitage, 1995, p. 27; Campbell et al., 1997, p. 155). This approach represents a theoretical improvement in relation to the constant mean return model as it eliminates the portion of the return that can be contributed to movements in the index. The variance of the abnormal return is thus reduced (Campbell et al., 1997, p. 155). The idea behind this being that the elimination might simplify the process of identifying events-induced effects. The degree of the simplification depends on to what degree the variance of the abnormal return is decreased.
The constant mean return model is an uncomplicated model which assumes that the average return of a stock is constant over time (Campbell et al., 1997, p. 154). This assumption represents a lack of sensitivity within the model, but previous studies have found that the variation of the abnormal return seldom is reduced by a large amount as a result of replacing the model with a more advanced approach (Campbell et al., 1997, p. 154). The perceived stable values and returns of SWFs during the time frame of the study, also supports the utilization of this model.

The index model is a third option which functions in a similar fashion as the constant mean return model. However, it classifies the movements of index during the event window in question as the predicted return (Armitage, 1995, p. 31). The index in question being that of the domestic markets on which each target is listed during the event window. This model is by some viewed as slightly more powerful than the constant mean return model.

The capital asset pricing model (CAPM) is an example of another economic model that can be utilized to find the abnormal return. It is a theoretical model which gives an equilibrium relationship between the predicted return for a given asset and the return given by the market index (Armitage, 1995, p.28). It was a common player in a number of event studies during the 1970’s but today, it is rarely made use of in studies within that category (Campbell et al., 1997, p. 156). This is a result of the discovery of deviations from the model that created doubt in regard to the validity of the findings and the effects it had on the previously mentioned market model.

This study will make use of the constant mean return model. It is the most straightforward approach to calculating the predicted return and even given its uncomplicated nature, Warner & Brown (1980, p. 208) showed that results obtained through this model are often similar to results which are derived from more advanced methods. Warner & Brown (1980, p. 208) found that a more sophisticated model would not yield a much lower variance of the abnormal returns, thus justifying the authors’ choice of approach. The authors will also implement the index model, which also is a relied upon model, in an attempt to increase the possibility of reaching a profitable investment strategy.

3.5 Funds

The classification “Sovereign Wealth Funds” is relatively new within the realm of investment funds. The difference between these funds and other “normal” investment funds needs to be clarified, as stated in the first purpose of the study. This clarification is made in connection with the impact of the Sovereign Wealth Funds, which mainly focuses on results in previous literature and studies, similar to this one.

3.5.1 What is a fund

A fund is a term which describes the action of pooling assets, where the resources often are in the form of cash, shares or loans (Hudson, 2014, p. 3). An image that commonly is used to explain how a fund works is that of a fruit basket. The basket represents the fund and the fruit represents stocks and other securities. Private investors can buy the basket, but they do not have a say in what kind of fruit it holds (Avanza, n.a). A fund may have a single or a large number of owners, but a characterization is the presence of a fund
manager, who is in charge of advising and managing the fund to obtain the highest possible return while only allowing for an acceptable risk (Hudson, 2014, p. 3). There are a number of different classifications of funds that falls under the umbrella named investment funds. This study will focus on Sovereign Wealth Funds, and its characteristics will be discussed in the next section.

3.5.2 Differences between fund-classifications and the impact of their investments

As mentioned in the introductory chapter, large institutional investors have an influence on stock prices when buying and selling (Sias et al., 2001, p. 26). This entails the ability to affect the behavior of the targets’ stock price by engaging in trading. It is hard to distinguish the factors behind why this price effect occurs, but one of them, known as behavioral finance, will be discussed later on. This section will accordingly deal with the impact of Sovereign Wealth Funds in comparison to the impact of private investors.

In 2010, Dewenter et al. (p. 257) stated that large positions of shares bought by funds and private institutions affect the value of a target company. One of the underlying reasons behind this change in value was the information, or rather the appearance of superior information. In addition to this, Shleifer and Vishny (1986. p. 471) debates on the concern regarding the incentives of large shareholders to monitor the activities of a firm and why beneficial takeovers can enhance firm value. They also discuss that substantial shareholders might manipulate the activities of the acquired firm to improve their economic results, at the expense of the minority shareholders. This gives that the impact on firm value should account for the positive effects gained from increased monitoring and the possible negative effects resulting from tunneling activities.

The question relevant to this study is whether Sovereign Wealth Funds have the same impact as more common, large investors. These classifications of funds are different in regard to a number of important aspects (Sethi, 2008, 18). Many of the SWFs are massive state-owned players of the 21th century. They operate with a long-term philosophy and are amongst the most long-term investors in the financial world because of the goal of saving for future generations (Ervin, 2008, p. 21.). In regard to their pursuit of returns, the maximum yield is not a fixed goal. Dewenter et al. (2010, p. 257) found that SWFs often channel their investments towards stocks to further a number of nonfinancial social objectives in addition to pursuing a prosperous return. Large funds, such as publicly traded mutual funds, operate both on a short- and long-term, as their investors place different time horizons on their investments, often wanting to immediately see both a positive and maximized return (U.S. Securities and Exchange commission, n.a). Sovereign Wealth Funds are under a governmental ownership, and are made up of resources stemming from domestic commodities such as oil and gas. The SWFs are often controlled by an independent player, and not the state itself, to avoid political games. As there does not exist criteria connected to disclosure pertaining to the funds' investment decisions, there are still some funds that are quite reluctant to share information concerning this aspect of their financial activities. Common large investors and funds are not subject to government control when it comes to what investments are being made. They are funded by investors, mostly private, who do not have a say in what investments are being made. Another difference is the fact that funds, such as publicly traded mutual funds, are subject to disclosure demands set, amongst others, by the U.S. Securities and Exchange Commission (n.a).
Previous studies conducted by Dewenter et al. (2010, p. 265) and Kotter and Lel (2011 p. 361) show that Sovereign Wealth Funds also influence stock price behavior, similar to private investors. But, depending on the ownership of the funds, it is not obvious that the reasons behind the effect is similar to the effect caused by actions of private investors. Dewenter et al. (2010, p. 257) continue on the path of the governmental ownership, stating that SWFs are not only concerned with creating financial returns, but also focus on a broader “variety of nonfinancial social objectives” (Dewenter et al., 2010, p. 257) and that this leads to a change in the firm’s value, in addition to the effect from trading its stocks. As such, firms that are targeted by SWF will often pursue, for example, a higher technological production, choose employment levels as well as product mixes that may not be the best in terms of revenues, but instead lead to a greater social policy which in turn will have a positive effect on the value of the firm and the returns.

Different Sovereign Wealth Funds can also have a different impact on firms’ value, at least according to Kotter and Lel (2011, p. 361). Due to the lack of regulations around disclosure concerning their activities, a voluntary disclosure approach would indicate that the fund is viewed as more of a trustworthy investor with more financial objectivity. Transparent SWFs are often viewed as profit-oriented investors by market participants, a view which seems to be increasing as SWFs in 2011 initiated work to increase their transparency through better disclosure procedures (Kotter & Lel, 2011, p. 362).

3.6 Behavioral Finance

Both the research question and the final purpose of the study state that the behavior of the stock prices is central within this research. It is of interest to look for underlying reasons of why stock prices behave the way they do, and so Behavioral Finance which looks at the psychology of investors, becomes both interesting and a necessary aspect of the theoretical framework.

The previously mentioned efficient market hypothesis assumes that stock prices reflect all available information at all times. However, studies have shown that investors do not always act rationally, thus contradicting the ideas behind an efficient market (Shiller, 2000, p. 151). Stock prices do not always fall in line with their fundamental values. Behavioral finance are physiologically based theories that aim to clarify market anomalies by explaining, in part, how humans are not 100% rational at all times and this can affect both individual’s perspective on risk and how they chose to handle it (Brealey et al, 2014, p. 333). Within the branches of behavioral finance, the way new information makes its way to investors and different biases they might possess, will determine their investment decisions and the movements of the market as a whole.

The prospect theory is one of the larger sub-theories within behavioral finance. It states that investors are prone to place greater weight on negative changes in a security's value than on an equally as large positive change in the value, as well as their reaction overall being dependent on the security's performance since the acquisition (Brealey et al, 2014, p. 333). Studies have added to this idea by showing that the reaction to negative (or positive) changes in value seems to turn out stronger, should the investor recently have experiences other economic losses (or gains) (Brealey et al, 2014, p. 333). Investors seldom have vast experience in the field of probabilities, which leads investors to often
look to the past in attempting to predict the future. This gives that economic wins or losses are allowed to play a meaningful role in an investor's likeliness to expose themselves to risk in the future (Brealey et al, 2014, p. 333). Individuals also suffer from different biases. Conservatism leads investors to take more time in adjusting their investment tactics and portfolios to news as well as often underreacting to the news. Overconfidence relates to investors continuing on dubious paths of investment because of inflated thoughts of their own abilities to pick stocks, attributing unfavorable outcomes to exogenous factors or just plain bad luck (Brealey et al, 2014, p. 333).

Another branch within this area of research is known as the herd instinct. It entails a mentality where investors show lacking abilities when it comes to evaluating the opportunities an investment can represent and investors do not follow their own individual investment decisions (Shiller, 2000, p. 135). Individuals tend to gravitate blindly towards the decision of others on the sole basis that the majority is investing in a given stock (Brunnermeier, 2001, p. 147). The behavior can be viewed as rational should the strategy lead to increased payoff, often denominated payoff externalities (Brunnermeier, 2001, p. 147). Another path the herd instinct can manifest itself as, is informational externality, where an investor allows other’s views and values to overshadow their own in relation to investments (Brunnermeier, 2001, p. 148). However, it can also be connected to humans naturally wanting to belong to a community, a culture and socioeconomic norms. Rational investors can engage in irrational behavior by allowing their decisions to be guided by factors such as judgment by others and envy of other’s economic success (Shiller, 2000, p. 151). The gravitation towards copying others’ investment strategies can start and accelerate because of perceived historic trends or profits without solid evidence to back it up, thus allowing for this behavior to become a factor in events such a sell-offs and even stock market crashes (Brunnermeier, 2001, p.166, 190).

3.7 Theoretical framework

The presented theories all play an important role in the process of creating hypotheses and the work that follows, and the framework is presented in figure 2. The efficient market hypothesis is a relevant variable that needs to be discussed and assumptions within the theory are required to be made for the event study in chapter four to be performed. The abnormal return that might arise in the target stock prices in connection with SWF announcing their intent to purchase shares also plays a big part in the execution of an event study. In addition, it will function as the main variable in attempting to explain the results of the event study through a regression analysis. Behavioral finance is often utilized to explain how humans are not 100% rational at all times. In connection with this study, the theory becomes relevant when reshaping the results of the study into an investment strategy that has its basis in this theory. The authors aim to mold the mentality of following the large masses into a similar behavioral pattern, but one that is rational and profitable.

These theories support and enable the event study in chapter four to be performed. They also create a solid basis for the study’s hypotheses to be built upon. The research question and the purpose of the study, together with the theoretical framework, lead to the definition of two sets of hypotheses. They will revolve around whether an announcement of an intent to purchase stocks by a Sovereign Wealth Fund have an effect on the behavior.
on target’s stock price. Where the stock price is a proxy for the return of a stock. They will also examine this relationship in connection with the behavior of index.

Figure 2 - Summary of the theoretical framework
IV Method

The empirical method builds on the previous theoretical chapter to convey the operationalization of the study. It selects the statistical methods as well as some assumptions and predetermined aspects that are needed in order to perform the parametric tests of an event study and create a testable model. The assumptions mainly concern efficient markets and abnormal returns.

4.1 The concept of an Event Study

An event study is a research method that aims to predict financial gains and losses stemming from events such as announcements or news. It is a technique within empirical financial research that allows a researcher to detect behavioral changes in the market or in the value of a firm’s stock (Bodie et al., 2014, p.359). It has become a well-known and accepted method in which to measure the effects of specific events (Bodie et al., 2014, p.361). Examples of the usefulness of this approach is calculating the behavioral change in a stock’s price in connection with dividends or as in this study, examining the behavior of stock prices connected to a publicized announcement of an intent to purchase by a SWF. These areas of use might come across as uncomplicated, but every day the price of stocks adjusts according to a vast amount of economic news (Bodie et al., 2014, p.359). To single out a single variable, stemming from a specified event, that affects stock prices is a more advanced task than what it might appear at first glance.

Campbell et al. (1997, p. 151) presents the process of conducting an event study, and the two first steps are to define the event and clarify the criteria. Thus, in the onset of an event study, the event of interest is defined and in this study the event will be announcements made by SWFs. This study has a limited amount of available observations, and so instead of selecting criteria to limit the companies that will be included in the sample, all available observations that fits the objective of the study will be included in the dataset. From the collected data, only the observations that concern purchase of stocks that are publicly listed are of interest. Thus, observations concerning deals such as real estate and fixed income are eliminated.

The return that is most likely to have taken place should a specified event not have taken place is called the predicted return (Bodie et al., 2014, p.359). The discrepancy between the predicted return and the actual return is known as the abnormal return (Bodie et al., 2014, p.359; Campbell et al., 1997, p.151). The mathematical approach to this will be presented in section 4.4.1. As given in section 3.4.1, there are several approaches to the calculation of the predicted return and this study will make use of two approaches. The constant mean return model is the first method (Campbell et al., 1997, p.151). The return during the estimation window, which is a 100-day period preceding the event, is used as a basis for calculating the predicted return which then allows for an estimation of the abnormal return (see figure 3). The second method entails making use of index during the 3-day event window as the predicted return in the process towards arriving at an abnormal return that can be utilized in following steps in the event study (Armitage, 1995, p. 31).
When mapping the abnormal return resulting from a given event on a single or a group of stocks, the time in which the information is publicized is of interest (Bodie et al., 2014, p.360). For the purpose of this study, the announcement of an intent to purchase shares is the point in time that will be studied. The announcement date is placed as day two of three days in the event window shown in Figure 3, the event window often being illustrated as $[-1, +1]$. By doing so, the authors hope to capture the change in the stock prices behavior that occurs in connection with the event.

Leakages are a threat to the credibility of the results of an event study (Bodie et al., 2014, p.360). Should information pertaining to a specific event be released before the announcement date, even to a small group of people, the effect of the event could become dragged out and the results of the event study would prove to be a poor indicator of the actual effect (Bodie et al., 2014, p.360). Existing literature points to the cumulative abnormal return (CAR) being able to help counteract leakages producing a bias in the results. CAR is the sum of all abnormal returns within the event window in question (Campbell et al., 1997, p. 160), and captures the total behavior of the stocks as a result of the new publicized information (Bodie et al., 2014, p.360).

With the abnormal return computed, a structure for the statistical tests needs to be established (Campbell et al., 1997, p.151). At this point in time, the null hypotheses are yet to be determined, as these are the premises that are to be tested. The degree and statistical significance is examined in connection with the predicted levels of return to evaluate the possible effect of the announcement (Bodie et al., 2014, p.360). The empirical results will hopefully lead to an increased understanding of the events effects on the price of stocks, valuable interpretations and conclusions (Campbell et al., 1997, p.151). Additional analysis and statistical tests, such as regression analysis, might aid in explaining the results of the event study.

4.2 Efficient Markets

As mentioned in section 3.3, the hypothesis consists of three different forms: weak, semi-strong and strong. The differences in the notion lie in the term of available information, where it ranges from only historical information being incorporated into the prices to no possibilities of superior information (Bodie et al., 2014, p. 353).

A weak form of efficient markets entails that historical data and volumes does not have an effect on stock prices, entailing that the prices will follow a random walk (Bodie et al., 2014, p. 350; Campbell et al., 1997, p. 22)). If this form of market efficiency occurs, it is impossible to predict tomorrow's stock price, which also makes it impossible to study the effect of a new announcement in a 3-day window. In fully efficient financial markets, all available information is incorporated into the price (Bodie et al., 2014, p. 354). This includes news and facts as well as inside information. As a result, no one has more or less
information than other market players, which leads to the elimination of advantages. A fully efficient financial market would imply that an announcement by a SWF would result in no behavioral change in targets stock prices, as the information within an announcement would already be mirrored in the price of a given stock.

As a result of this, weak and strong form of market efficiency can not be present if it is possible to detect a behavioral change in stock prices in connection with announcements. This implies that an assumption of a semi-strong form of efficient market becomes the only viable option. The assumption of a semi-strong market does not only rely on the fact that the other two have been eliminated due to inconveniences, but also that this form is the most suitable. The standard event study entails the assumption that the market efficiency is semi-strong (Event study metrics, n.a). Stock prices reflect all publicly available information and when new information is revealed, the effect will immediately be incorporated in the price (Newman et al., 1992, p. 740). This is crucial to an event study as well as this study, given that the main purpose is to examine the short-term effect of an announcement of a purchase. Taking these arguments into consideration, the authors assume the existence of a semi-strong efficient market in order to conduct the event study.

4.3 Hypotheses

The intent behind this study is to examine the relationship between the announcement date of SWFs intent to purchase stocks and the behavior of the stock prices. In order to examine this potential connection, two different hypotheses become relevant. These two hypotheses will test the actual return in relation to the predicted return based on a 100-days estimation window and against the index of the domestic markets on which each target is listed in the event window. The outcome of these tests might be able to find a potential abnormal return and indicate whether it is possible to mold these results into a profitable investment strategy.

As stated in section 4.2, the authors assume the existence of a semi-strong efficient market. As such, all public information should immediately be incorporated into security prices when available. This assumption allows the authors to create hypotheses consisting of a 3-day event-window, without the need to incorporate a time lag from the announcement date. The event window of this study will be set at [-1, +1] in an attempt to minimize unknown variables affecting the potential return. The authors only have knowledge of the announcement date, and not what the time of day at which the announcements were publicized. Allowing the event-window to start the day before the event end the day after, allows for the inclusion of the behavior of targets’ stock prices, no matter what time on the event day the announcement takes place.

Hypothesis 1:
In the first hypothesis, the predicted return is given by K, and it represents the average 3-day return in the 100-day estimation period, as presented in section 4.1. R2 represents the actual 3-day return surrounding the announcement date. In describing the hypotheses, the stock price is a proxy for the return of a stock. Thus, Hypothesis 1 is as follows:
H0: An announcement of an intent to purchase stocks by a Sovereign Wealth Fund does not have an effect on the behavior on target’s stock price.

\[ R_2 - K_1 = 0 \]

H1: An announcement of an intent to purchase stocks by a Sovereign Wealth Fund does have an effect on the behavior on target’s stock price.

\[ R_2 - K_1 \neq 0 \]

Hypothesis 2:
When creating the second hypothesis, the return given by market index represents the predicted return in order to see whether there exists an abnormal return in relation to the actual return in the 3-day window. This index-based variable is represented by \( I_2 \) and again, the stock price is a proxy for the return of a stock. The second hypothesis will accordingly show the potential abnormal return in comparison with the market, and follow as:

H0: An announcement of an intent to purchase stocks by a Sovereign Wealth Fund does not have an effect on the behavior on target’s stock price in relation to index.

\[ R_2 - I_2 = 0 \]

H1: An announcement of an intent to purchase stocks by a Sovereign Wealth Fund does have an effect on the behavior on target’s stock price in relation to index.

\[ R_2 - I_2 \neq 0 \]

4.4 Executing an Event study

4.4.1 Abnormal return

Section 4.1 presented the process of an event study. By following this outline, the first step in the practical process is to estimate the abnormal return. The following calculations will be performed with both the predicted return stemming from the estimation period and from the return on index during the event window.

In the Constant Mean Return Model below, the ex post expected return is represented by \( E(R_i) \), the predicted ex post return is represented by \( K_i \) and \( AR_i \) stands for abnormal return. The basis of the presented formulas follow the approach given by Brown & Warner (1980, p. 207) and Campbell et al. (1997, p.154; 160).

\[ E(\bar{R}) = K_i + AR_i \]
The model entails that the ex post return equals the ex-ante return, which leads to the assumption that the abnormal return must be equal to zero.

\[ E(AR_i) = 0 \]

The predicted ex post return stemming from the constant mean return model is in this study calculated through the following equation where \( \mu \) is the 3 day return and \( M \) represent the amount of 3 day periods in the 100-day estimation window.

\[ K_i = \frac{\Sigma \mu_i}{M} \]

The predicted ex post return stemming from the index model is simply the return on index during the event window. It is represented by the letter I.

Abnormal return is the discrepancy between the actual return, \( R_i \), and the predicted return based on the estimation window. The predicted return is represented by \( K_i \) and I in the two different approaches.

\[ AR_i = R_i - K_i \]
\[ AR_i = R_i - I \]

### 4.4.2 Tests

Research within areas similar to that of this study are for the most part based on two types of tests; parametric and nonparametric tests. Even though these tests have individual useful characteristics, previous studies have shown that the tests benefit from being utilized in connection with each other and not in isolation. An example of this is the recommendation made by Campbell and Wasley (1992, p. 91) to include nonparametric tests in order to control and check the robustness of the conclusions derived from parametric tests. Even though a combination of the tests is recommended, section 5.1 will look more closely at the dataset and its distribution to secure it being handled in a correct manner.

Parametric tests concerning abnormal performance in event windows are according to Bartholdy (2007, p. 232) based on standard t-tests of the difference between two means. For results based on this method to be reliable, the variables need to be normally distributed. When they are, the results of the parametric test are presumed to be strong. This gives that the normality of the variables should be examined for the parametric test statistic to be effective. Three parametric tests that are widely used are the 1-sample t-test, 2-sample t-test and the paired t-test, which will be elaborated upon in the following section (Runkel, 2013).

Nonparametric tests are, however, not based upon the assumption of normality and bases its calculations on the median of the dataset instead of its mean (Corrado & Zivney, 1992, p.468). In dealing with this statistical test, the assumption that the observations are independent is the important one. Some of the most common nonparametric tests are the Wilcoxon test (Wilcoxon, 1945, p. 82) and the more recent sign test by Corrado and Zivney (1992, p. 465). The operationalization of the nonparametric tests is described in section 4.4.2.2.
4.4.2.1 Parametric Tests

There exist several parametric tests, but this study will highlight the three most common tests in order to single out which fits the purpose of this study the best. Their nature and characteristics are quite similar, as the following paragraphs will show.

The 1-sample t-test is utilized to determine whether a sample originates from a population that exhibits a specific mean (Runkel, 2013). This mean is often the subject of speculation and is hypothesized upon, entailing that it is not always a known value. In connection with this study, the mean is represented by the hypothesized value of 0 for the abnormal return.

The t-value is obtained by making use of the following formula which can be explained by separating the factors into two different components; the signal and the noise. The numerator of the formula is the signal which is calculated by subtracting the value that represent the null hypothesis from the samples mean \( \bar{x} \). With increasing discrepancies between these two factors, the strength of the signal increases. The noise is another name for the denominator, which is estimated by dividing the standard deviation by the square root of the number of observations within the sample (Runkel, 2013).

\[
t = \frac{\bar{x} - \mu}{s/\sqrt{n}}
\]

The t-value can also be referred to as the signal-to-noise ratio where both factors are in corresponding units stemming from data provided by the study’s sample. This ratio allows for dissimilarities between the signal and the noise to be detected and, in turn, analyzed. The t-values can be interpreted in connection with the standard errors of the sample (Runkel, 2013). The standard error is a measure that quantifies the precision of the mean. It computes the likely difference between the sample mean and the true mean of the population, and presents it in the same units as the dataset (Runkel, 2013). A t-value of for example 2 indicates a difference of 2 times the size of the standard error.

A paired t-test is conducted in a similar manner as the 1-sample t-test. The difference lies in the numerator. Where the 1-sample t-test compares the mean of a sample to the value presented in a null hypothesis, the paired test compares the difference between paired observations before dividing it by an identical denominator as in the case of the 1-sample t-test (Rice, 2007, 452; Runkel, 2013). The pairs can for example stem from values collected from dates preceding and succeeding a given event. This test in reality saves the researcher the step of having to calculate the difference, and only requires that the pairs of observations make sense. The following formula depicts the paired t-test where the t-value is obtained by dividing \( \bar{d} \) with the denominator consisting of the standard deviation divided by the square root of the number of observations.

\[
t = \frac{\bar{d}}{s/\sqrt{n}}
\]

The 2-sample t-test can also be seen as a variation of the 1-sample t-test. The difference mainly consists of this model comparing the mean of two separate groups to obtain a t-
value, where the 1-sample t-test compares the mean of one sample’s mean to the relevant null hypothesis. A trait that distinguishes this test from the presented paired t-test is the fact that the 2-sample t-test requires independent groups for each sample, while the paired t-test compares paired observations that in some way are connected to each other.

The following formula illustrates the procedure that is the 2-sample t-test. The numerator consists of subtracting the mean of one sample, \( \bar{x}_2 \), from the mean of another sample, \( \bar{x}_1 \). This gives that this model’s default null hypothesis is that the two samples are equal (Rice, 2007, p. 424). When the difference between the two means grow, so does the strength of the numerator, which functions as the signal in the same way as the denominator in the first presented test (Runkel, 2013). The sum is divided by the noise to obtain the t-value. The noise is the denominator and when performing a 2-sample t-test, the researchers can choose to assume that the variability of the two samples are equal, or not equal. Both choices lead to the same idea as with the 1-sample t-test, the signal is compared to the noise to see to what extent it stands out (Runkel, 2013).

\[
t = \frac{(\bar{x}_1 - \bar{x}_2)}{s}
\]

The 2-sample t-test is an interesting model which can yield useful results in a large range of studies. However, it does not fit with the objectives the researchers are hoping to fulfill with this study. Because of this, the 2-sample t-test will not be utilized in the process of this study. The 1-sample t-test fits both the purpose of this study, the need for testing of the presented hypotheses, and the dataset that has been collected and the calculations that has been made. Another possibility could be to make use of the paired t-test, but given that the difference between the predicted and the actual return, the abnormal return, had already been calculated at the point in time when the authors reached this part of the study, the 1-sample t-test became the natural choice.

### 4.4.2.2 Nonparametric Tests

In addition to parametric tests, event studies often make use of nonparametric tests. These are not as inflexible as the parametric tests when it comes to the assumption of normal distribution of the returns. In cases where the dataset suffers from skewness and/or excess kurtosis, researchers would benefit from make use of nonparametric tests to examine the significance of events on the stocks in question. A reason for this being that nonparametric tests are built on the median of the dataset (Corrado & Zivney, 1992, p.468), and not the mean as is the case with parametric tests who is sensitive towards datasets without a normal distribution.

Frank Wilcoxon developed the first nonparametric test in 1945 (Box et al. 2012, 158; Wilcoxon, 1945, p.80). In this period, advanced programs to facilitate calculations were not available, and much time was spent on calculations in order to ensure a normally distributed dataset. To solve this time-consuming problem, Wilcoxon created a test which would take into account that a dataset was not normally distributed but would still give significant results, the Wilcoxon t-test (Box et al. 2012, 158). The test is based upon three assumptions. Like the parametric ones, the first assumption is about autocorrelation (Box et al. 2012, 159). A chosen dataset cannot have observations that tend to correlate with each other in a specific pattern. This can be a problem in observations taken in series or
places, which often can be dependently distributed. To bypass this problem, Wilcoxon’s test also assumes a randomly selected sample, which is the second assumption. The test is utilized to compare two relative samples from the same population (Wilcoxon, 1945, p.80). These pairs can be created by unpaired experiments or paired comparisons, where this study will make use of paired comparisons created by the difference between the actual return and the predicted return (Wilcoxon, 1945, p.80). The null hypothesis of this test is that both samples encompass the same distribution. This enables the third assumption where the data is to be measured on an ordinal scale. Paired observations entail that the observations are reshaped into numerical series, starting from 1 and increasing, and is important to facilitate the execution of the test’s first step (Wilcoxon, 1945, p.80).

Wilcoxon’s test is conducted on a three-level basis, and the first step is to rank all measurement results in order (Box et al. 2012, 158). If observations with equal value occur, they should be ranked according to the average of their place in the ordinal scale. i.e 4...5...6...7,5...7,5...9,5...9,5...11. The sum of this ranking is calculated, creating the variable w, before the significance level can be found. It can be obtained through a special chart, a program or through calculations before locating the significance level in a normal distribution chart (Box et al. 2012, 158). When n is large, the distribution of will be approximately normally distributed under the null hypothesis, thus allowing for the use of the following formula:

\[ z_{\text{Wilcoxon}} = \frac{w - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} \]

In the formula, n represents the number of observations and w is the test statistic which is calculated by summating the rankings of the ordinal scale. This formula gives the value of \( z_{\text{wilcoxon}} \), which is used in a normal distribution chart to find the significance level.

In the same manner as the Wilcoxon test, a sign test refers to event studies with dataset that is not normally distributed. The test is used when comparing observations before and after an event, resulting in pairs of observations with the ability to reveal a potential change. As for other nonparametric test, the sign test makes use of assumptions, or conditions, to arrive at a result with a high significance level (Corrado & Zivney. 1992. p. 465). However, sign tests only require two conditions to be fulfilled; the sample must be randomly selected and observations must be comparable, entailing that they are dependent (Corrado & Zivney. 1992. p .466). A sign test is often used in addition to a parametric t-test and a nonparametric signed-rank test, as it will be in this study, by the fact that the results of the test are comparable and can strengthen each other (Corrado & Zivney. 1992. p .466).

The sign test is, as the name entails, based on the sign of the abnormal return. The null hypothesis entails that obtaining a positive or negative abnormal return is equally as likely, giving the idea that the abnormal return within the event window is zero. The mathematical approach is presented in the following formula where \( G_i \) represents the signs and S(G) entails the standard deviation that represents the total period (Corrado & Zivney, 1992, p.468). The test statistic is obtained by recording the sign of the N differences, which is done by subtracting the hypothesized median from the value of each
observation in the sample. As the null hypothesis is zero, observations of small numbers of either positive or negative values can result in the null hypothesis being rejected (Corrado & Zivney, 1992, p.468).

\[
t = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} \frac{G_i}{S(G)}
\]

Having separated the observations into two classifications, according to them stemming from a period before or after an event takes place, allows for comparisons or hypotheses to be created. These can be expressed as \( x > y \), \( x = y \) and \( x < y \). As such, a potential change should become visible in the results of this test, and enable interpretations.

A weak point of the sign test is that the probability of a negative value is equal to that of finding a positive value, regardless of possible symmetries in the initial distribution and that it does not consider the size of the positive and negative values. Corrado and Zivney (1992, p. 476) points to the fact that this might lead to misspecifications. However, when comparing nonparametric test to parametric t-tests, the findings is that the sign test is superiorly specified in relation to the parametric t-test and is able to detect small values of abnormal return (Corrado & Zivney, 1992, p. 476). As the nonparametric tests appear suitable for testing for the abnormal return, a parametric test will be combined with the execution of two nonparametric tests in this study.

4.5 Regression analysis

In attempting to explain the result from the event study, a regression analysis is performed. This section will briefly present the assumptions for a multiple regression. The method allows for a ceteris paribus analysis of a number of independent variables, attempting to describe a dependent variable. In this study, the dependent variable will be the cumulative abnormal return and the independent variables will consist of a number of characteristics pertaining to the transactions.

The Gauss-Markov assumptions as presented by Wooldridge (2013, p. 83-87) line out the assumptions for a multiple regression and list them as five important points. The first assumption sets the basic requirement of a multiple regression analysis. The model must be linear in its parametrics (Wooldridge, 2013, p. 83). These parameters are the coefficients set in connection to the independent variables, and is often denominated by \( \beta \) (Wooldridge, 2013, p. 83). This assumption allows for the execution of a linear regression. Even though the coefficients must be linear in nature, the dependent and independent variables are not obligated to meet the same requirement. The second assumption specifies random sampling (Wooldridge, 2013, p. 84), entailing that the values of an independent variable should not be correlated. The third is the requirement of no perfect collinearity (Wooldridge, 2013, p. 84). The content of this assumption is that the model should not suffer from multicollinearity (Wooldridge, 2013, p. 84). This does not exclude variables that are correlated, only that an independent variable should not have a perfect linear relationship with another. The fourth assumption is for zero conditional means (Wooldridge, 2013, p. 86), which entails that the expected value of the errors must be zero for all values of the independent variable (Wooldridge, 2013, p. 87). The fifth and final assumption concerns homoskedasticity and states that the error term
is to be equal for all combinations of the independent variable. The opposite, heteroskedasticity, is problematic as it might overestimate the strength of relationships (Wooldridge, 2013, p. 87).

Although 5% alpha appears to be the norm in many areas of research, the authors have also become aware that significant results seem difficult to achieve in economic studies. Because of a goal not to disregard a potential existing relationship, the authors will be utilizing a 10% significance level in deeming the strength of the findings throughout this study. An alpha of $\leq 0.10$ increases the models’ exposure to errors, indicates that one in ten times, an outlier will be found. This entails the risk of a type 1 error, entailing rejecting a hypothesis that should not have been rejected, increases. Type 2 errors involves hypotheses not being rejected when they should have been.

These assumptions will be elaborated upon in connection with the analysis of the results in chapter 6.

4.5.1 The Regression Model

This section will present and discuss the variables which are to be included in the regression analysis of this study.

It is unnecessary to include independent variables that do not serve a purpose in a regression analysis. Williams (1959, p. 23) encourages to only include independent variables that are deemed likely to function as a contributitional variable and increase the effectiveness of the final formula. Another useful instruction in preparation for a regression analysis is not to include a large number of independent variables. This is because three or four carefully selected variables will for the most part generate a satisfactory relationship and many variables can make implementation of the resulting prediction more challenging (Williams, 1959, p. 23).

The dependent variable of the multiple regression analysis is the cumulative abnormal return (CAR). The goal is to predict impact from the following independent variables on CAR. The authors have honed in on four variables in order to obtain the satisfactory relationship that Williams (1959, p.23) talks about.

1) **Stake bought** specifies the percentage size of the stake acquired by a Sovereign Wealth Fund. This variable might be either positively or negatively correlated with CAR. SWFs are viewed as profit oriented funds, but as mentioned in section 3.5.1, they are also known to invest according to a selection of nonfinancial social objectives that indirectly leads to a positive change in the firm’s value, instead of solely investing in stocks to obtain a maximum return (Dewenter et al., 2010, p. 257). This focus sets this classification of funds apart from more normal funds, and could possibly have a negative correlation with CAR. On the other hand, existing literature indicates that SWFs tend to purchase a considerable share in target firms. This could signal that the SWF in question have conducted a screening of a target firms that indicates expectations of future value being created in the company. This could indicate that a positive correlation exists between CAR and this independent variable. Even as the funds are known to place investments, in part, according to nonfinancial social objectives, their main goal is still one of financial returns. The expected correlation between this variable and
CAR is thus a positive one. Information pertaining to this variable was collected from the database available on the Sovereign Wealth Center’s webpages.

2) *Deal size* is the second independent variable that has been chosen. To make this variable comparable, all deal size is measured in USD. This information was collected from the database available on the Sovereign Wealth Center’s webpage and the expected correlation between this variable and CAR is a positive one.

3) *Continent*. Which continent the target’s stocks are traded in is the third independent variable that is to be used in the multiple regression model. This is a multiple dummy variable and each transaction will accordingly adopt a number depending on which continent holds its market of origin. By taking advantage of Stata, each market will serve as its own variable, taking the value of 1 when it is relevant to an investment and 0 when one of the other 5 markets are relevant. Information concerning the markets has been collected from Datastream.

4) *Time of announcement*. This variable will function as a dummy variable. To make use of this variable, the authors have distinguished between announcements up until the completion date and announcements on and after the time of completion. Should the announcement take place before the completion date, the dummy variable will take the value of 0. Variables representing announcements on and after the completion date will take on the value of 1. This information was collected from the database available on the Sovereign Wealth Center’s webpages.

The final model is the ensuing multiple regression model, where the objective is to explain the cumulative abnormal return CAR\(_i\) as a function of *Stake bought*, *Deal size*, *Continent* and *Time of announcement*. CAR\(_i\) functions as the dependable variable, \(\alpha\) functions as the function’s constant, \(\beta\) is the independent variable and \(\delta\) denominates the dummy variables. \(\varepsilon\) represents the error term.

\[
\text{CAR}_i = \alpha_i + \beta \ast \text{Stake bought} + \delta_1 \ast \text{Deal size} + \delta_2 \ast \text{Continent} + \delta_3 \ast \text{Time of announcement} + \varepsilon_i
\]

4.6 Data selection

4.6.1 Collection of data

An online database made available by the Sovereign Wealth Center made the collection of a substantial dataset possible (Sovereign Wealth Center, n.a). The authors were able to collect data by plotting the information pertaining to each transaction, including relevant bi-information, one by one into Excel. As mentioned in section 2.10.2, this dataset is not a complete collection of all transactions made by Sovereign Wealth Funds. As the authors aim to prevent this from causing possible errors in the study’s result, they have chosen to add all available observations concerning transactions and their announcement date to the dataset, collected from Datastream. The collected data includes the target, its country of origin and the market in which the target is listed, the deal size and the percentage stake bought as well as both the announcement date and transaction date.
When proceeding with the collection of data concerning stock prices in order to enable the execution of the study, the authors made use of Datastream. Here, stock prices in the 100-day estimation window, the 3-day event window and the movements of indices in the domestic markets were collected in US dollars. At the end, a thorough collection of data resulted in an extensive dataset.

According to the Sovereign Wealth Fund Institute, as of February 2017, there existed 73 Sovereign Wealth Funds worldwide (Swfi, 2017). The median of the values of the funds is $13.4 Billion and the average value is $101.5 Billion. These numbers point to a skewness among the size of the funds and indicates that their values are not normally distributed. By inspecting the values of the funds, it became evident that a smaller number of funds holds the dominant part of the total value. Previous research has shown that large and influential investors’ actions have an effect on stock prices (Sias et al., 2001, p. 26). As a goal of this study is to look for a similar relationship in relation to SWFs, the authors are interested in studying the part of the population that represents the majority of the total values. Instead of performing a simple random selection or taking a systematic sample, the authors have chosen segment the population of SWFs into quartiles and focus on first quartile. This allows for the study to cover 100 % of the population of this study, entailing applying a census method to the research. This first quartile is the largest 25 % of the SWFs, and gives that the 18 largest funds will be included in this study (Swfi, 2017). The total value placed in the world’s SWFs as of February 2017 is $7 409.74 Billion and the top 25 % funds represents 89.10 % of this value (Swfi, 2017). This allows the authors to compare the funds included in the study to the large and influential funds that studies like as Sias et al. (2001) have discussed.

When pondering what timeframe to make use of, the authors considered different approaches. One option would be to let the timeframe start at a point in time where the values of the Sovereign Wealth Funds started accelerating, which would be around 2007 (Clark et al. 2015). Another possibility was to let the timeframe consist of the last five years, from 2012 and up until today. This is a period when the value within the funds have been more stable (Clark et al. 2015) and the financial environment is similar to today’s climate. The stabilization in the total value of the world’s Sovereign Wealth Funds is in part a result of the drop in oil prices since the fall of 2014 and the following decline in deposits to the funds (Nasdaq, n.a). As a goal within this study is to create an investment strategy aimed at retail investors, the latest option emerged as the most relevant, and the timeframe was set to include announcements of transactions ranging from the beginning of 2012 until the end of 2016.

After the data had been collected and sorted based on transaction targets, the dataset included 1 272 observations. This study will only make use of announcements of buying-transactions involving publicly listed common stocks from the beginning of 2012 until the end of 2016. After filtering the data according to the criteria of this study, 347 observations remained. The authors have chosen to look at the complete dataset in order to reach the highest possible level of credibility in the results.

An important assumption for this study to be practicable is the assumption of independence. Even though the presented data have been collected from the same databases, they are singular events, independent of each other. The authors thus view this assumption to be fulfilled.
4.6.2 Data validity

The data has been collected from trusted databases such as Datastream and a database available on the Sovereign Wealth Center’s webpage (Sovereign Wealth Center, n.a). The latest is a reliable source and Datastream is a well-known tool in studies of economic markets. There still exists a risk that the data might contain some inaccurate information. To facilitate an uncomplicated first inspection to prevent this, the data will be normalized. This will be done by allowing the first day of each 100-day estimation period, respectively the value of index on the first day of the event-window, to represent 100%. This allows the authors to obtain abnormal returns of a comparable nature. As the data is a collection of stock prices of different proportions, the process of normalization is a very effective and straightforward way to obtain an accurate estimation of the statistics (Taneichi et al, 2002, 164). In calculations concerning the hypotheses, the first day of both the estimation period and the 3-day return on the market index will be utilized as a point of reference, where it represents 100%. This gives that differences between the actual return and the points of reference will become visible and easily comparable.

Before conducting the first inspection of the data, it is normalized to facilitate the process. In the process of conducting a visual inspection of the data in order to single out potential outliers, the authors have not come across any obvious outliers. This does not, however, eliminate the risk for outliers but large scale outliers would have been detected through this inspection. In total, the authors judge the dataset to be of an adequately precise nature to perform statistical tests and result in reliable conclusions.

4.7 Ethical & Social Considerations

This study will not sort transactions based on or consider where, on a geographical level, they are made. Neither what type of industry the investments are active within. In connection with the type of industry, this has to an extent been taken care of by the Sovereign Wealth Funds themselves. Several funds conduct their investments with ethical issues in mind. For example, Norway made investment choices with a list of Environmental, Social and Governance considerations, called ESG, in mind (Teitelbaum, 2015). In 2014, the GPFG cut their ties to 49 companies based on the ESG, and this list of considerations helped bring the total number of divested investment up to 114 in just a 3-year period (Teitelbaum, 2015).

The ESG is basically a list of varying criteria, ranging the level of consideration target companies show towards violations of human rights and to levels of environmental damage. This list allows the GPFG to invest in companies which fits with an increased, and still increasing, ethical standard (Teitelbaum, 2015).

GPFG, the Norwegian SWF, is not the only nation that is committing to a more ethical approach to investing. Another example is the Kuwait Investment Authority, which is also one of the top five SWF (Swfi, 2017). They declare that “KIA does not invest in sectors where gaming or alcohol-related activities constitute the main source of business” (Kuwait Investment Authority, n.a). Qatar Investment Authority is another example of a SWF taking a stand and has announced that they make investments based on environmental considerations, even though this statement may be a bit vague in comparison to the two previously mentioned funds.
The consensus of this is that even though this study does not take the ethical and social aspects into account in relation to which data is included into the dataset, this section is indirectly included, by a number of the funds themselves, when they choose where to place their investments.

In both the collection process as well as the process of handling the data, the authors have not allowed their own opinions and feelings to affect what observations are included in the dataset. This is evident in the fact that every data point that could be collected and that supports the purpose of the study is included in the dataset. The only exception to this is firms that has been acquired by others since the announcement date, where stock prices prior to the acquisition is no longer available. In the process of handling the data and subjecting it to several statistical tests and procedures, the authors have remained impartial and refrained from altering the data to increase its suitability to the process.
V Results

This is one of the key chapters in the study and is where the outcome of the stated hypothesis, and in turn, the research question is presented. The chapter also presents the data collection process as well as discusses the collected dataset. The results from statistical tests which has been performed on two sets of data concerning abnormal return, where the difference stems from different approaches to calculating the predicted return, is also presented. Results of both approaches and of the regression analyses will be mentioned in the following chapter.

5.1 Description of the dataset

5.1.1 The variables

This section will provide the reader with an overall understanding of the dataset which this study is performed upon. Figure 4 depicts the collected observations, categorized according to the continent of the target of each announcement. Asia is the predominant continent with 39% of the total observations, followed by North America and Europe who represents 23% and 25% of the dataset. The second pie chart depicts the number of announcements that preceded the completion date of the investments and the number of announcements that took place on or after the completion date. The majority of the announcements occurred on or after the completion date of the corresponding investment. The information in both these pie charts will be brought forward in the work with this study, in the form of dummy variables, as the authors see these variables as having a plausible impact on the behavior of stock prices.

Figure 4 - Geographic composition of SWF's investments and the date of the announcements in relation to completion date.

Figure 5 illustrates the distribution of the observations in relation to the percentage size of each announced transaction. 64% of the observations are announcements of an intent to purchase 0-5% of target companies, making this the bar in the graph which holds the majority of the observations in this category. This is an interesting variable that will be included in the coming statistical tests. Because a large part of the observations is in one
end of the spectrum depicted in figure 5, the authors have chosen to keep the data in its raw form instead of creating a set of multiple dummy variables that would take on quite unbalanced sizes.

Figure 5 - The magnitude of the stake of target companies bought by SWFs.

Figure 6 shows the distribution of the size of the announcements, in US dollars. As in the previous case, a large part of the observations is gathered in the lower brackets of the chart. A total of 54% of the announcements are of intents to purchase stocks that take on a value below 100 million dollars. When looking closer at this bracket, 36% are announcements connected to transactions that take on values beneath 50 million dollars. The deal size might be a variable that holds important information of CAR, which leads to it being included in the coming regression analyses. Similar to the previous variable, the observations are not evenly distributed through the chart in figure 6, and so the authors have chosen to keep the data in its raw form instead of creating a set of multiple dummy variables that would take on quite uneven sizes.

Figure 6 - The magnitude of SWFs deal sizes.
5.1.2 The distribution

In the process of selecting tests and methods that are suitable for the dataset and planned conduction of tests in this study, the distribution of the data plays a vital role.

This study makes use of two ways of calculating the abnormal return and the results of both are visible in figure 7. The top chart to the left depicts the abnormal return that stems from a calculation where the average return in a 100-day estimation period is used as the predicted return. The bottom chart to the left depicts the abnormal returns residuals from the same dataset. The abnormal return illustrated in the top right chart stems from a calculation where the return on index in the event window is utilized as the predicted return. The bottom right chart depicts the abnormal returns residuals stemming from the same dataset.

The authors started the examination of the dataset with a visual inspection of the abnormal return and the residuals. Figure 7 depicts the distributions. It looks as though the data fits with the idea that 68.2% of the observations should fall within one standard deviation and 95.4% should fall within two standard deviations from the mean (Mathplanet, n.a). The verdict is that the collected data concerning the residuals and the abnormal return is normally distributed. When looking at the histograms critically, the tails might be somewhat thick and the charts to the right looks as though it might suffer from some kurtosis, but none of these aspects appears to be of a degree that requires the hypothesis of a normal distribution to be rejected.

Figure 7 - Histograms depicting the distribution of the abnormal return and the residuals of the abnormal return.
The illustrations in figure 8 are sensitive towards non-normality near the tails and shows that the residuals fall close to the predicted line, but not directly on it. This shape indicate that some skewness might exist in the dataset. Also, when studying the observations in the dataset, it becomes clear that 176 of the observations exceed zero and 165 of the observations falls below zero. When taking this difference of barely 6.7%, and figure 7 and 8 into consideration, the authors deem that the dataset can still be categorized and studied as if normally distributed.

A visual examination provides a good basis for statements regarding the distribution of the dataset. However, the authors chose to also conduct statistical tests to ensure that the data takes on the distribution that was concluded upon in the visual inspection. Both the Shapiro-Wilk test and the Shapiro-Francia tests were conducted on the dataset (see A1 and A2). However, statistical normality-tests become increasingly sensitive when large number of observations are included and the results of both tests become powerful to the point that their recommendation to reject the null hypothesis of normal distribution becomes unreliable (Runkel, 2012).

Should weight be given to the statistical tests for normality, it would indicate that only nonparametric test should be utilized in the event study, presented in chapter 5. As the visual inspection and the normality-tests contradict each other, the Central Limit Theorem (CLT) becomes relevant. The theorem states that given a large enough size, the sampling distribution of any sample will be normal (Davidson, 1994, p.364). According to CLT, no matter the shape of the distribution of a population, the distribution of a sample converges towards normality as the sample size increases (Davidson, 1994, p.364). The 347 observations in the sample of this study appears to be a large enough sample to lead to unreliable results in statistical normality tests, but the size allows the authors to assume normal distribution according to CLT and the visual examination. Reconnecting to the parametric and nonparametric tests in section 4.4.2, this would allow for the authors to only make use of parametric tests. However, as the nonparametric tests appear to be stronger in detecting small changes in abnormal return (Corrado & Zivney, 1992, p. 476). This study will combine a parametric test with nonparametric tests in an attempt to strengthen the results of the study (Campbell & Wasley, 1992, p. 91).
5.1.3 Correlation

The potential correlation between the variables need to be identified previously to the execution of the regression analyses. The possible span of correlation is -1 to +1 and table 1 shows the correlation between the variables of this study. The table below shows that most of the combinations experiences a correlation relatively close to zero. To some degree, there is some noticeable negative correlation between a couple of the multiple dummy variables representing the different continents, but there does not appear to be any correlation that might affect the results of this study in a negative manner. The nonlinear relationships have also been visually examined without any visible problems.

<table>
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<th>A1Index</th>
<th>A2Index</th>
<th>A3Index</th>
<th>A4Index</th>
<th>A5Index</th>
<th>A6Index</th>
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</tr>
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<td>0.0345</td>
<td>0.0763</td>
<td>-0.0297</td>
</tr>
</tbody>
</table>

Table 1 - Correlation matrix over the variables in the two datasets.

The autocorrelation has also been explored by ways of the Durbin’s alternative test in Stata. All these test yields the same results. The null hypothesis of serial correlation can not be rejected which entails that there is no autocorrelation present. The printouts of these tests can be found in the appendix (A10-A13).

5.2 Event study

In acquiring the dataset in which this study is based upon, the values of stocks and of indices were of various proportions. To correct for this diversity, the observations were normalized. This was done by allowing the first day of each 100-day estimation period to represent 100 % to arrive at abnormal returns of a comparable nature. The dataset with this approximation of the predicted return will be referred to as dataset 1. Regarding the second approach of this study, the value of index on the first day in the event-window represents 100 % to achieve abnormal returns of a comparable nature. The abnormal returns acquired from this approach will be referred to as dataset 2.

<table>
<thead>
<tr>
<th>Abnormal Return, dataset 1</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std.Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>347</td>
<td>-17,1626</td>
<td>21,2497</td>
<td>0,40020</td>
<td>4,9450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Abnormal Return, dataset 2</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std.Dev</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>347</td>
<td>-18,7168</td>
<td>21,4883</td>
<td>0,499813</td>
<td>4,77034</td>
</tr>
</tbody>
</table>

Table 2 - Differences between abnormal return in the two datasets.

43
The statistics provided in table 2 allow for the calculation of the coefficient of variation. The coefficients of variation for dataset 1 and 2 are respectively 12,36 % and 9,54 % and entail looking at the ratio of standard deviation to the mean.

5.2.1 Results of test statistics

Section 4.4.2 clarified the differences between parametric and nonparametric tests, as well as the reasoning behind the inclusion of each test into the study. Below, the result from a one-sample parametric t-test and two nonparametric tests, the Wilcoxon signed-rank test and the Sign test, for both datasets are presented. As mentioned in section 4.5, the authors will utilize a 10 % significance level in deeming the strength of the findings throughout this study. An alpha of \( \leq 0,10 \) increases the models’ exposure to errors, but at the same time it increases the likelihood of identify possible relationships.

The results of the one-sample parametric t-test on dataset 1 is presented in table 2. When applying a 10 % significance level (\( \alpha = 0,10 \)), the null hypothesis of abnormal return being equal to zero can not be rejected in favor of the alternative hypothesis where abnormal return is different from zero. The same test in addition allows for testing of alternative hypotheses, and given that dataset 1 has a normal distribution, the one-sample t-test discloses that abnormal return, with a 10 % significance level, is larger than zero.

<table>
<thead>
<tr>
<th>Ha &lt; 0</th>
<th>Ha ≠ 0</th>
<th>Ha &gt; 0</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,9337</td>
<td>0,1326</td>
<td>0,0663</td>
<td>1,5076</td>
</tr>
</tbody>
</table>

Table 3 - Results from the parametric test on dataset 1.

Although the authors view both datasets as normally distributed, the visual inspection gives that some skewness might exist in the observations, which could have an effect on the results in the parametric test. Combined with Corrado & Zivney (1992, p.476) showing that nonparametric tests are better equipped than parametric tests to identify small changes in abnormal return, two nonparametric tests are conducted.

In testing whether the abnormal return is separated from zero, the nonparametric Wilcoxon signed-rank test in table 4 yields similar results as the parametric test above. The null hypothesis of abnormal return being equal to zero can not be rejected. A sign test is also conducted, allowing for a more detailed view into the data. Of the three alternative hypotheses of the sign test shown in table 4, the strongest results belong to the proposition that the abnormal return is larger than zero. Still, the result is not sufficiently strong to draw a conclusion on a 10 % significance level, similar to the parametric test above.

<table>
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<th>Ha &lt; 0</th>
<th>Ha ≠ 0</th>
<th>Ha &gt; 0</th>
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<tbody>
<tr>
<td>Wilcoxon signed-rank test</td>
<td></td>
<td>0,2137</td>
<td></td>
</tr>
<tr>
<td>Sign test</td>
<td>0,7421</td>
<td>0,5882</td>
<td>0,2941</td>
</tr>
</tbody>
</table>

Table 4 - Results from the nonparametric tests on dataset 1.
Dataset 2 will be tested in a similar manner as dataset 1 in a pursuit to differentiate between them and single out the dataset which is best suited to build the basis for the final model, and the intended investment strategy. Table 5 shows the results of a one-sample parametric t-test performed on dataset 2. When applying a 10 % significance level, the null hypothesis of abnormal return being equal to zero is rejected. This implies that the abnormal return is significantly different from zero. The parametric test also shows the results of two other alternative hypotheses, where one indicates that abnormal return is larger than zero. The null hypothesis can, in this case, be rejected with a 5 % significance level.

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>One-sample t-test</td>
<td>0,9741</td>
<td>0,0518</td>
<td>0,0259</td>
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</table>

*Table 5 - Results from the parametric test on dataset 2.*

Two nonparametric tests were also performed on dataset 2. The Wilcoxon signed-rank test in Table 6 rejects the null hypothesis, similar to the parametric test, with a 10 % significance level. The sign test in Table 6 does not yield the same significant results. It does, however, indicate that the alternative hypothesis of abnormal return not being equal to zero, and even more so, abnormal return exceeding zero, is more likely than abnormal return falling below zero. In such, it supports the results of the Wilcoxon signed-rank test.

<table>
<thead>
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<td>Sign test</td>
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</table>

*Table 6 - Results from the nonparametric tests on dataset 2.*

5.3 Regression analysis

The following section of chapter five will present the results from regression analyses conducted on the two datasets. These regressions will be estimated by means of Ordinary Least Squares and based upon the variables presented in section 4.5.1, and the following model which was presented alongside them:

\[
\text{CAR}_i = \alpha_i + \beta \ast \text{Stake bought} + \delta_1 \ast \text{Deal size} + \delta_2 \ast \text{Continent} + \delta_3 \ast \text{Time of announcement} + \varepsilon_i
\]

As mentioned in section 4.5.1, an adaptation of the data is the sectioning of the markets of the target companies according to their geographical location. In the context of the regression analysis, the dataset has been separated into the six dummy variables according to their respective continent, presented in Table 7 and 8 below.
The variables in the presented datasets appear to be reasonable without any obvious outliers that could indicate that the data is flawed. When comparing the total values of all continents in the two datasets, dataset 2 has a slightly larger variance, but at the same time dataset 2, in table 8, also displays a larger mean and a smaller standard deviation than dataset 1 in table 7. Dataset 1 has a mean of abnormal return of 0.40 % and dataset 2 shows a mean of 0.50 %.

The announcements connected to the variables Asia and South-America show the two largest spans between min and max. Asia displays the largest variance but South-Africa exhibits the largest standard deviations of 5.66 and 6.48 in the respective datasets, and stands out with the largest mean of the variables, in both datasets. Africa is the only variable which shows a negative mean of -0.71 and -1.18, in the datasets, shown in tables 7 and 8. At the same time, this is also the variable with the noticeably smallest amount of observations, leading the ability of the variable to represent a continent to become limited. The dataset in which this study is conducted on is a collection of all the available data, so omitting the wish for a larger and more extensive dataset, overall there does not appear to exist any outliers that need to be corrected for.
5.3.1 Heteroskedasticity

Before proceeding with the analyses, the tests concerning homo- and heteroskedasticity in the two datasets will be presented, as this plays a role in the implementation of the regression analysis. Throughout the execution of the regression analyses, the utilized significance level is 10 %, as in the case with the event study above. The reasoning behind the significance level is presented in section 5.2.1. In the execution of the tests concerning heteroskedasticity, the significance level of 5 % will be utilized to minimize the possibility for the occurrence of type 1 errors. The existence of heteroskedasticity affects how a regression analysis is performed, and so the authors see a need for a higher degree of confidence level in these tests.

One of the Gauss-Markov assumptions as presented by Wooldridge (2013, p.83-87) and mentioned in relation to this paper in section 4.5, states that the existence of heteroskedasticity in a dataset might lead to overestimation of the strength of relationships. The Breusch-Pagan test for heteroskedasticity yielded the results presented in table 9 concerning dataset 1. The result of 0.7503 gives that the null hypothesis of constant variance, homoskedasticity, can not be rejected at a 5 % significance level.

<table>
<thead>
<tr>
<th>Breusch-Pagan / Cook-Weisberg test for heteroskedasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ho: Constant variance</td>
</tr>
<tr>
<td>Variables: fitted values of AB</td>
</tr>
<tr>
<td>chi2(1) = 0.10</td>
</tr>
<tr>
<td>Prob &gt; chi2 = 0.7503</td>
</tr>
</tbody>
</table>

Table 9 - Testing dataset 1 for homoskedasticity.

The White test is also conducted to strengthen the result of the Breusch-Pagan test. The findings are shown in table 10 and supports the previous results in that the null hypothesis of homoskedasticity can not be rejected at a 5 % significance level. The test also analyses the existence of skewness and kurtosis in dataset 1, where the p-value of 0.6763 indicates that the null hypothesis of no skewness can not be rejected and the p-value of 0.0072 gives that the null hypothesis of no kurtosis can be rejected when using a significance level of 5 %. This entails that the concern regarding skewness in the visual inspection performed in connection with figure 8 was unwarranted. At the same time, some kurtosis might exist in dataset 1 but the visual inspection shows its modest size.
Table 10 - Testing dataset 1 for homoskedasticity, skewness and kurtosis.

The plotting of the residuals allows for another visual inspection of dataset 1, which results in the same conclusion as the Breusch-Pagan test and the White test. The residuals shown in figure 9 do not appear to indicate that the variance of the errors differs along the observations. The totality of the tests and the visual inspection entail that the dataset does not suffer from heteroskedasticity and this fact will be incorporated into the execution of the regression analysis in section 5.3.

When addressing the question of homo- versus heteroskedasticity in dataset 2, the approach is the same as with dataset 1, entailing that the Breusch-Pagan test was utilized again. The results of the test are presented in table 11. The yielded result of 0.0001 gives that the null hypothesis is to be rejected at a very high level of significance (greater than 5 %), indicating that dataset 2 suffers from heteroskedasticity.
Table 11 - Testing dataset 2 for homoskedasticity.

\[ \text{chi2(1)} = 15.89 \]
\[ \text{Prob > chi2} = 0.0001 \]

In an attempt to verify the results of the Breusch-Pagan test, a White test was conducted. Table 12 shows the statistic of 0.0255 which supports that the null hypothesis of homoskedasticity should be rejected at a 5% significance level. When looking at the results pertaining to skewness and kurtosis for dataset 2, the p-value of 0.8200 indicates that the null hypothesis of no skewness can not be rejected and the p-value of 0.0017 entails that the null hypothesis of no kurtosis can be rejected at the 5% significance level. Similar to the case with dataset 1, the concern regarding skewness in the dataset is not an issue. The test indicates kurtosis in the dataset, but paired with the visual inspection, it does not appear to be of an extent that needs to be corrected for.

\[ \text{chi2(28)} = 44.37 \]
\[ \text{Prob > chi2} = 0.0255 \]

Cameron & Trivedi's decomposition of IM-test

<table>
<thead>
<tr>
<th>Source</th>
<th>chi2</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heteroskedasticity</td>
<td>44.37</td>
<td>28</td>
<td>0.0255</td>
</tr>
<tr>
<td>Skewness</td>
<td>4.39</td>
<td>8</td>
<td>0.8200</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>9.87</td>
<td>1</td>
<td>0.0017</td>
</tr>
<tr>
<td>Total</td>
<td>58.63</td>
<td>37</td>
<td>0.0133</td>
</tr>
</tbody>
</table>

Table 12 - Testing dataset 2 for homoskedasticity, skewness and kurtosis.

When plotting the residuals in figure 10, the results of the conducted tests seems to be confirmed. A visual inspection shows that the variance appears to differ alongside the observations. This violates the Gauss-Markov assumptions concerning the requirement for homoskedasticity and needs to be corrected for. This will be done in connection with the execution of the regression analyses in section 5.3.3 and 5.3.5 by applying the robustness-tool within Stata.
5.3.2 Regression analysis, Abnormal Return

This section presents a regression analysis of abnormal return when dataset 1 is utilized. The predicted return stems from the return seen in a 100-day estimation window preceding the announcement. The variable representing the continent of South America is exempted from the regression analysis.

![Figure 10 - Plotting the residuals for dataset 2 to enable visual inspection.](image)

<table>
<thead>
<tr>
<th>Linear regression</th>
<th>Number of obs = 344</th>
</tr>
</thead>
<tbody>
<tr>
<td>F( 8, 335) = 0.90</td>
<td>Prob &gt; F = 0.5159</td>
</tr>
<tr>
<td>R-squared = 0.0133</td>
<td>Root MSE = 4.9229</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Robust HC2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AIC</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>DealsizeUSD-a</td>
<td>.0002338</td>
</tr>
<tr>
<td>DummyDate</td>
<td>-0.891851</td>
</tr>
<tr>
<td>Stakebought</td>
<td>0.0186713</td>
</tr>
<tr>
<td>dummyContin-1</td>
<td>-2.04032</td>
</tr>
<tr>
<td>dummyContin-2</td>
<td>-1.047555</td>
</tr>
<tr>
<td>dummyContin-3</td>
<td>-1.461539</td>
</tr>
<tr>
<td>dummyContin-4</td>
<td>-1.226049</td>
</tr>
<tr>
<td>dummyContin-5</td>
<td>-0.6093551</td>
</tr>
<tr>
<td>_cons</td>
<td>1.806597</td>
</tr>
</tbody>
</table>

*Table 13 - Regression analysis, abnormal return.*
It can be seen in table 13 that none of the variables are significant when considering a 10% significance level. The variable *Dummy date* and the model’s intercept are, however, quite close to being significant at the mentioned significance level. The rest of the variables in the model are not significant in its current composition. The f-statistic of 0.5159 implies that the null hypothesis of no abnormal return should not be rejected. The variables and their effect on CAR will be touched upon in the following text.

*Dummy date* has a negative impact on CAR of -0.892 percentage points entailing a negative impact on CAR when the announcement of a purchase is made on or after the completion date. When an announcement is made previously to the completion date, this variable takes on the value of zero. *Dummy date* is close to being significant at a 10% significance level.

*Deal size* has a small positive impact of 0.000234 on CAR and in connection with announcements of large purchases, the effect will increase alongside the value in million dollars. This meets the expectations of this variable presented in section 4.5.1. However, according to this model, the variable is highly insignificant.

*Stake bought* is positively correlated with CAR. A one percent increase in the announced stake entails a positive effect on CAR of 0.019 percentage points. The effect will thus increase alongside the percentage size of the purchase that is announced. This falls in line with the expectations of this variable presented in section 4.5.1. However, this result is uncertain as the variable is insignificant.

*Continent 1 - Continent 6* are multiple dummy variables that all have a negative impact on CAR, ranging from -0.609 to -2.040 when South America is exempted from the regression analysis. They are, however, insignificant and *Continent 6* is highly insignificant.

*The intercept* of the model of 1.807 is almost significant at a 10% significance level, similarly to *Dummy date*. This indicates a positive CAR when excluding the effect of the other variables.

### 5.3.3 Regression analysis, Abnormal Return (Index)

This section presents a regression analysis of abnormal return where the return on index during the event window is utilized as the predicted return. The variable representing the continent of Asia is exempt from the regression analysis.
It can be seen in table 14 that when considering a 10% significance level, only the Intercept and Continent 1, which represents Africa, fall within the 10% significance level. The variable Dummy date is close to being significant at a 10% significance level. The f-statistic of 0.3844 implies that the null hypothesis of no abnormal return should not be rejected. The remaining variables are not significant in the current composition of the model.

Dummy date has a negative impact of -0.872 percentage points on CAR, which gives that the variable has a negative effect on CAR when the announcement is made on or after the completion date. Should the announcement precede the completion date, this variable takes on the value of zero. Dummy date is close to being significant at a 10% significance level.

Deal size yields a modest positive impact of 0.000089 on CAR and thus meets the expectations of this variable presented in section 4.5.1. When the announcement in question entails a large purchase, the effect will increase alongside the amount. An increase of one million dollars entails an increase on CAR of 0.000089 percentage points. However, in the model’s current composition, this variable is highly insignificant.

Stake bought is positively correlated with CAR. The effect will increase parallel to the percentage magnitude of the announced purchase, and gives that a one percent increase in the announced stake entails a positive effect on CAR of 0.035 percentage points. This falls in line with the expectations of this variable presented in section 4.5.1 but according to this model, the variable is insignificant.
**Continent 1 - Continent 6** are multiple dummy variables which impact on CAR range from 0.796 to -1.850 when Asia is exempted from the regression analysis. In the current composition of this model, all except **Continent 1** is insignificant, and the variables **Continent 3** and **Continent 5** are highly insignificant.

The intercept of 1.00048 is significant at a 10 % significance level, indicating a positive CAR when the other variables are not allowed to affect the result.

5.3.4 Regression analysis, Reduced model (Abnormal Return)

As most of the variables in the initial regression analysis proved to be insignificant, the authors chose to conduct a backwards elimination, eliminating insignificant variables one-by-one to reach a more useful model. In this process, the authors have stepwise eliminated the most insignificant variables. The result of this process is presented in table 15.

```
<table>
<thead>
<tr>
<th>Linear regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of obs = 344</td>
</tr>
<tr>
<td>F( 2, 341) = 1.37</td>
</tr>
<tr>
<td>Prob &gt; F = 0.2567</td>
</tr>
<tr>
<td>R-squared = 0.0077</td>
</tr>
<tr>
<td>Root MSE = 4.8933</td>
</tr>
</tbody>
</table>
```

<table>
<thead>
<tr>
<th>Robust HC2</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Coef.</td>
<td>Std. Err.</td>
<td>t</td>
<td>P&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DummyDate</td>
<td>-.7679577</td>
<td>.5311346</td>
<td>-1.45</td>
<td>0.149</td>
</tr>
<tr>
<td>Stakebought</td>
<td>.0228628</td>
<td>.0270647</td>
<td>0.84</td>
<td>0.399</td>
</tr>
<tr>
<td>_cons</td>
<td>.8004017</td>
<td>.4258431</td>
<td>1.88</td>
<td>0.061</td>
</tr>
</tbody>
</table>

**Table 15 - Reduced regression analysis, abnormal return.**

Table 15 shows that except the Intercept, only **Dummy date** is close to being significant at a 10 % significance level. **Stake bought** is still somewhat off the mark, but is kept in the model as an exclusion of the variable would cause a negative effect on the remaining model. The F-test has decreased from 0.5159 to 0.2560, increasing the significance level of which the null hypothesis of no abnormal return, can be rejected. However, it still implies that the null hypothesis of no abnormal return should not be rejected. The variables included in the reduced regression analysis all effects CAR in the same direction as in the first regression, however their magnitudes have been adjusted. This might stem from a change in the model’s collinearity because of the elimination of several variables from the model.

**Dummy date** is close to being significant at a 10 % significance level. It entails a negative impact of -0.768 on CAR which will come into effect when an announcement of a purchase is publicized on or after the completion date. This is a decrease from -0.892,
which was the anticipated effect in the first regression analysis. As this is a dummy variable, it takes on the value of zero should an announcement be made previously to the completion date.

*Stake bought* entails a positive correlation with CAR. A one percent increase of the stake of an announcement to purchase shares made by a SWF leads to an increase of 0.023 percentage points on CAR. This variable is insignificant, however it is significant to a greater degree than in the original regression.

The intercept of the reduced regression holds a lower value than in the first regression. A decrease from 1.807 to 0.800 of the expected abnormal return which results from an announcement of an intent to purchase shares can be seen. This variable is significant at a 10% significance level.

The final model from dataset 1 is as follows:

\[
CAR(AB)_t = 0.800 + 0.023 \times Stake bought - 0.768 \times Time of announcement
\]

5.3.5 Regression analysis, Reduced model (Abnormal Return, Index)

As in the case with dataset 1, most of the variables were insignificant in the original regression analysis on dataset 2. To improve the model, a backwards elimination was conducted and a similar reduced model as in the case with dataset 1 was reached. The reduced model is presented in table 16.

<table>
<thead>
<tr>
<th>Linear regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of obs -</td>
</tr>
<tr>
<td>F( 2, 341) =</td>
</tr>
<tr>
<td>Prob &gt; F</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>Root MSE</td>
</tr>
</tbody>
</table>

| | Robust HC3 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| ABIIndex | Coef. | Std. Err. | t | P>|t| |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| DummyDate | -0.8611906 | 0.5617206 | -1.53 | 0.126 | -1.96608 | 0.2436988 |
| Stakebought | 0.0371439 | 0.036061 | 1.03 | 0.304 | -0.0338254 | 0.1081131 |
| _cons | 0.9311786 | 0.4850459 | 1.92 | 0.056 | -0.0228801 | 1.865237 |

*Table 16 - Reduced regression analysis, abnormal return (index).*

Table 16 gives the reduced model, where the F-test statistic has decreased from 0.3844 to 0.1638 from the first regression analysis, increasing the level of significance of which the null hypothesis of abnormal return being equal to zero can be rejected. The statistic still implies that the null hypothesis of no abnormal return should not be rejected, however it
is a noticeable improvement which now puts the model quite close to the significance level of 10 %. The impact of the final variables on CAR all hold the same sign as in the original regression, however, their weight has been altered. A change in the collinearity of the model might be a reason behind this change. When studying the variables, only the Intercept is significant at a 10 % significance level, while Dummy date is quite close to the limit of the 10 % significance level and Stake bought is still off target.

*Dummy date* is quite close to being significant at a 10 % significance level. When an announcement of a purchase is made on or after the completion date, the variable will have an impact of -0,861 on CAR. A slight decrease from the effect found in the first regression analysis on the abnormal return based on index (0,872). When an announcement of an intent to purchase is publicized in advance of the completion date, this variable takes on the value of zero.

*Stake bought* have a positive effect on CAR. A one percent increase of the stake presented in an announcement to purchase shares, made by a SWF, leads to an increase of 0,037 percentage points on CAR. This is a slight increase from the first regression presented in section 5.3.3. This variable is still insignificant, however it is significant to a greater degree than in the original regression.

*The intercept* of the reduced regression gives a slightly lower value of the intercept than what was obtained through the first regression. A decrease from 1,001 to 0,931 gives the new expected abnormal return which is thought to result from an announcement of a SWFs intent to purchase shares. This variable is significant at a 10 % significance level and almost significant at a 5 % significance level.

The final model from dataset 1 is as follows:

\[
CAR(AB)_t = 0,931 + 0,037 \times Stake \ bought - 0,861 \times Time \ of \ announcement
\]
VI Analysis

This chapter will present an analysis of the findings in chapter 5. They will also be evaluated in regard to the theoretical framework of the study.

6.1 Event study

The theoretical framework of this study allows for an event study to be conducted in an attempt to predict opportunities for financial gains which might arise as a result of specific and easily identifiable events. In the context of this study, the event is an announcement of an intent to purchase shares, made by a SWF. Shares is a type of financial investment known as equities, alongside fixed income and derivatives (Bodie et al., 2014, p. 3). It represents a percentage ownership in the real assets of a firm which are traded on financial markets around the world. The values of these shares are constantly revised because of new information coming to light and how it is interpreted. The interpretation might be different depending on the source of the information as well as its contents.

SWFs are funds which, alongside funds overall, function as a pooling of assets where a fund manager advises the financial activities in order to obtain the highest possible return at an accepted level of risk (Hudson, 2014, p. 3). Previous studies have found that decisions made by large institutional investors have an effect on the behavior of their targets’ stock prices (Sias et al., 2001, p. 26). SWF are not included in studies as the one conducted by Sias et al (2001, p. 26). Still, the fund classification of SWFs is interesting because in addition to being profit oriented, they are state-owned entities who function with an unusually long time horizon and considers nonfinancial social objectives in their investments (Ervin, 2008, p. 21.; Dewenter et al., 2010, p. 257). The existing literature on SWFs is limited and even though previous studies by Dewenter et al. (2010, p. 265) and Kotter and Lel (2011 p. 361) have found a relationship between abnormal return and the financial activities of SWFs, the authors conduct this study to examine SWFs impact on the behavior of target’s stock prices in today’s economic climate. They will also attempt to create an investment strategy, based on the theoretical framework, aimed at retail investors and expand on the existing literature.

The approach of an event study allows the authors to detect behavioral changes in a market or in the value of the stocks of a company and a semi-strong market efficiency is associated with the standard approach to an event study (Event study metrics, n.a). Market efficiency is a vital aspect of the theoretical framework of this study and is a theory concerning an optimally functioning financial market where all available information is immediately being incorporated into the prices (Wärneryd, 2001, p. 18; Newman et al., 1992, p. 739). This is connected to the efficient market hypothesis and out of its three components (Brealey et al., 2014, p. 324), neither the weak nor the strong branch supports the objectives of the event study which the authors aim to conduct. The weak form of efficient markets entails that prices follow a random walk, as historical data and volumes have no effect on stock prices (Bodie et al., 2014, p. 350; Campbell et al., 1997, p. 22)). As the price of sequential days is unrelated (Newman et al., 1992, p. 739), it becomes impossible to predict tomorrow’s stock price and sequentially this also makes it impossible to study the effect of a new announcement. Fully efficient markets do also not support the objectives of the event study at hand. It entails the incorporation of all existing information into the price (Bodie et al., 2014, p. 354). A situation where everyone has
access to all existing information, both published and private, eliminates all conceivable advantages and announcements by SWFs, or any other market player, would already be mirrored in the price of a given stock before they are publicized.

In the attempt to find and analyze an abnormal return in the form of a behavioral change in stock prices connected to announcements, a semi-strong market efficiency should be present. This is the case as the two other options are deemed inappropriate in addition to the standard event study entailing the assumption that the market efficiency is semi-strong (Event study metrics, n.a). The semi-strong efficiency reflects all publicly available information and the effect stemming from the publishing of new information will immediately be incorporated in the price (Newman et al., 1992, p. 740). This is the feature that allows for the execution of this [-1, +1] event study as the objective and main purpose is to examine the short-term effect of an announcement of a purchase of stocks made by SWFs. Efficient market is thus represented in the theoretical framework by the branch known as semi-strong efficient market.

6.1.1 Analysis of the datasets

In the two datasets on which the study is based upon, the abnormal return is the differentiating variable. According to Campbell et al. (1997, p. 151), the normal return is defined as the anticipated return should the event in question not take place, and McWilliams & Siegel (1997, p. 628) clarifies that the abnormal return is the actual return minus the normal return. The predicted return represents the normal return in this study, and must be estimated to calculate the abnormal return (Brown & Warner, 1980, p. 207). The authors honed in on the constant mean return model and the index model as the two most fitting approaches to the predicted return, which has been presented as viable options by Campbell et al. (1997, p.151), Brown & Warner (1980, p. 207) and Armitage (1995, p. 31). A 100-day estimation window respectively the behavior of index in the event window, functioned as the basis of the two models. The reason behind choosing these two approaches to represent the abnormal return in the theoretical framework, is that they are straightforward and their results are equally as reliable as more advanced methods (Campbell et al., 1997, p. 154).

Table 2 in section 5.2 allows for a comparison of the two datasets. The comparison reveals that dataset 2 has both a higher mean and variance but a smaller standard deviation than dataset 1. As the events themselves and the data pertaining to the announcements are equal for both sets, the difference stems from the two opposing methods of calculating the predicted return. Both datasets have a positive mean, indicating an expected abnormal return in the event window of 0,40 % and 0,50 %. As mentioned in section 4.1, leakages present a threat to this study. Should information pertaining to the announcement in question have been released before the announcement date, even to a small number of people, the findings of 0,4 % and 0,5 % abnormal return might not reflect the entirety of the announcements effect. A part of the abnormal return could have taken place before the 3-day event window utilized in this study. Still, this is an initial result which seems promising in the pursuit of the investment strategy presented in the study’s purpose. However, having data which are normally distributed entails that 38,2 % falls within ± 0,5 standard deviation and 68,2 % falls within ± 1 standard deviation from the mean (Mathplanet, n.a). The standard deviations of 4,95 and 5,77 create a complication in trying to draw conclusions directly from the statistics in table 2. Further tests are required to reach any reliable results. At the same time, this indicates a behavioral change in the
In analyzing the aspect of the theoretical framework pertaining to abnormal return, a higher mean of abnormal returns can be seen in dataset 2, where the calculations are based on index. This might indicate that the use of an estimation window and historical data for an individual company allows for calculations of predicted return which are more accurate in relation to the actual return than when index is utilized in the same calculations. The difference could also stem from outside factors which might affect the indices of markets positively or negatively which, in turn, might lead to biased predicted returns.

The standard deviation, shown in table 2, should be interpreted in relation to the mean of the same sample of abnormal returns. The different coefficients of variation belonging to the two datasets are 12.36% and 9.54%. This indicates that dataset 1 has a higher variability in relation to the mean of the sample than dataset 2. The two measurements may not be highly dissimilar, but dataset 2 does have a better risk-return tradeoff, which should indicate a more favorable investment. This implies that dataset 2 might be the superior basis for an investment strategy.

6.1.2 Parametric tests

In order to conduct the event study, the authors deem the distribution of both datasets as normally distributed, both because of a visual inspection in section 5.1.2 and by abiding by the Central Limit Theorem. No skewness paired with a minimal degree of kurtosis do exist within both datasets, as found in section 5.3.1, and this could influence results in the parametric tests. Still, the authors consider the dataset to be normally distributed, which gives weight to the results of this test. The parametric test is based on the mean and basically performs t-test on the difference between two means (Bartholdy, 2007, p. 232). After having conducted the parametric test on both datasets with the help of Stata, the test statistics allowed for the null hypotheses to be rejected in favor of the alternative hypotheses. The null hypotheses being that abnormal return is equal to zero and the alternative hypotheses representing positive abnormal return in both cases. When it came to the alternative hypothesis that the abnormal return was simply different than zero, only dataset 2 allowed for the null hypotheses to be rejected with a 10% significance level. The t-values tells the same story, with dataset 1 and 2 providing the t-statistics 1.5076 and 1.9517. It indicates a statistically significant effect created by an underlying, repeatable cause, rather than random chance. The second statistic represents dataset 2, which provides stronger evidence against the null hypothesis than that of dataset 1. Connecting this back to the theoretical framework, the rejection of the null hypotheses allows for conclusions to be drawn regarding the presence of a positive abnormal return. The announcements in question appears to have an impact on the targets’ stock prices, possibly stemming from SWFs investing according to strong investment strategies. A possibility is that the resulting abnormal return stems from some investors already interpreting SWFs financial actions as positive indications of the targets’ value.

Despite deeming the datasets as normally distributed, the little degree of kurtosis that exists in the datasets could have an effect on the results of the parametric test. By adding nonparametric tests to the testing procedure, the results from the parametric test might be
verified or contradicted, either result would be interesting. A difference between the two types of tests is that the nonparametric tests are based on the median of the datasets and not their mean (Corrado & Zivney, 1992, p.468). Another reason to make use of the nonparametric tests is that they have a stronger ability to detect small changes in abnormal return (Corrado & Zivney, 1992, p. 476) and can function as a quality control for the robustness of the conclusions derived from parametric tests Campbell and Wasley (1992, p. 91). This led the authors to include two nonparametric tests in the event study.

6.1.3 Nonparametric tests

The nonparametric tests are not based on the assumption of normality. Instead, the independence of the observations becomes a key feature (Wilcoxon, 1945, p. 82) alongside being based on the median of the datasets and not their mean (Corrado & Zivney, 1992, p.468). The results of these tests are presented in section 5.1.1 and yielded results similar to that of the parametric tests. Similar results support the authors claim that the dataset is normally distributed and strengthen the findings in the parametric tests (Campbell and Wasley (1992, p. 91).

In relation to dataset 1, neither the Wilcoxon signed rank test nor the Sign test allows for the null hypothesis to be rejected at a 10 % significance level. Still, when interpreting the results, it appears a positive abnormal return is the most likely of the three alternative hypotheses. This corresponds with the stronger results of the parametric test, which allowed for the rejection of the null hypothesis in favor of the alternative hypothesis of a positive abnormal return.

When analyzing the results of the nonparametric tests conducted on dataset 2, a stronger similar relationship with the parametric approach is revealed. The Wilcoxon signed rank test complements the parametric one-sample t-test test in allowing for the null hypothesis to be rejected with a 10 % significance level. The Sign test does, however, not yield the same results. Of the three null hypotheses that are being tested, a positive abnormal return is the most likely of the three alternative hypotheses but none of the results are significant at a 10 % significance level. The different results might be contributed to the fact that both the nonparametric tests examine the hypotheses around the median, but only the Wilcoxon test takes the magnitude of the observations into account. The sign test focus solely on the sign preceding each observation of abnormal return which is a more uncomplicated and basic approach. When determining which results should be brought forward and given credence to, the more comprehensive nonparametric Wilcoxon test, in symbiosis with the parametric test, allows for the rejection of the null hypothesis and indicated that the abnormal return is not only different from zero, it is also positive.

6.1.4 Summary of event study

The results which have been found with a 10 % significance level, but there still needs to exist an understanding that the results are not facts. As the tests within an event study are based on probabilities, there is always a chance that the conclusion being drawn is an incorrect one. Two different types of errors might occur: type 1 and type 2. In relation to this study, the authors have rejected several null hypotheses. As the tests are based on probabilities, null hypotheses might have been rejected in situations where it should not have been, entailing a type 1 error. Another possibility is that null hypotheses have not been rejected in tests where the result should have been significant enough to reject them,
an error known as type 2. The likelihood for type 1 and type 2 errors is connected to the fact that the authors have worked with a single sample of 347 observations. It has thus, not been possible to test a number of samples from a larger dataset to verify the obtained results.

The analysis gives that according to the parametric test, there exists a positive short run abnormal return which is significant at a 10 \% alpha level for both datasets in an [-1, +1] event window around the announcement date of a SWFs intent to purchase shares. The nonparametric Wilcoxon test supports the same claim for dataset 2 with the same significance level. The totality of the findings corresponds to existing empirical literature in finding a positive short term abnormal return. Dewenter et al. (2010, p. 265) and Kotter and Lel (2011 p. 361) conducted studies on SWFs on data from the 90s and early 2000s and their results supports that of the parametric and nonparametric tests, especially in regard to dataset 2. This might be an indication that SWFs financial activities has had an effect on the behavior of targets’ stock price for quite some time and through different financial environments. There is a possibility that these findings might already be known and exploited in some circles, but that it is not public knowledge. Another factor that might affect the profitability of the possible investment strategy, is transaction costs. However, this falls outside of the research area of this study.

These findings could be reached by assuming a semi-strong efficient market which allowed for the conduction of the event study (Event study metrics, n.a). At the same time, the results themselves indicates that this study have indirectly tested the efficiency of the markets. That a positive abnormal return is found with a high degree of confidence shows that the announcements come as a surprise on the market each time. This is aligned with the existence of a semi-strong market efficiency as neither a weak nor a strong efficiency would yield the same results.

By ways of the event study, the investment strategy mentioned as one of the purposes of the study could be created. The idea behind this strategy is connected to behavioral finance which was introduced as a part of the theoretical framework of the study. According to Brealey et al (2014, p. 333), this is a physiologically based theory. A well-known area within behavioral finance called the “herd instinct”. Brunnermeier (2001, p. 147) and Shiller (2000, p. 135) describes this phenomena as the tendency amongst individuals to blindly gravitate towards the investment decision of others, solely based on the indications that the majority is investing in a given stock. Herding is often viewed as a negative and irrational behavior, but should the herd have the right leader, the theory might be able to function as a support for rational behavior (Brunnermeier, 2001, p. 147). By exploiting the herd behavior and allowing SWFs, who are major market players, to function as leaders of the herd, the findings of abnormal return in connection with SWFs announcements might be exploited. A profitable investment strategy taking advantage of positive abnormal returns and a “follow the leader”-approach appears to be viable. It entails following SWFs announcements instead of making investments based on the dominating currents of the markets. The prospect theory states that investors are prone to place more weight on negative financial outcome then on positive financial outcomes of an equivalent size (Brealey et al, 2014, p. 333). As it can be challenging for retail investors to obtain profitable investments, an altered “herd instinct” as the one presented above, hold the potential to decrease the experienced reactions to negative outcomes due to a higher frequency of profitable investments are made.
6.2 Regression analysis

This section will consist of an analysis of the results from the regression analyses conducted in chapter 5. The models have all been predicted by the use of OLS and have been conducted on two datasets where the difference is the approach to calculating the abnormal return, which is a cornerstone of the theoretical framework. This return has been estimated through the constant mean return model and the index model as they represent two straightforward approaches to reliable results which compares to those of more advanced models (Campbell et al., 1997, p. 154). An estimation window of 100 days and the behavior of index functioned as the basis of the calculations in the two models. For the models to be credible, the datasets must fulfil the five assumptions presented in section 4.5. These assumptions will be commented on below, before the results of the regressions are analyzed.

6.2.1 Five assumptions

1) *The residuals should be normally distributed*

The Central Limit Theorem states that given a large enough size, the sampling distribution of any sample will be normally distributed. Theoretically, this entails that the distribution of both datasets residuals should be normal in nature given the large sample size of 347 observations. A visual inspection of the residuals yielded the same conclusion; the residuals are normally distributed. The execution of two statistical tests, however, resulted in the opposite result. As discussed in section 5.1.2, the sensitivity of these tests increases as the amount of included observations rises. With a large number of observations, the tests become powerful to the point that they falsely reject the null hypothesis of normal distribution (Runkel, 2012). Summarizing these findings and facts, the consensus is that the first assumption for OLS is fulfilled.

2) *Independent variables should not be correlated*

A correlation matrix, presented in table 1, allowed for an examination of the dependent variables in the two datasets in relation to the independent variables. Amongst the independent variables, the largest finding of correlation exists between a couple of the multiple dummy variables, a correlation of about -0.45. As these represent the continent of the announcement in question, two of these variables will never be included in the model at the same time. There is thus, not a need for the exclusion or rearranging of the multiple dummy variables.

Autocorrelation is mostly relevant in studies of time series data, and this is not a relevant player in this study. At the same time, the authors aim to fulfil the assumptions of OLS and by constructing a time series in Stata, tests were conducted to verify that this would not affect the results of this study negatively. Every test concluded that neither of the datasets included in this study suffered from autocorrelation (see A10-13).

3) *The residuals should not suffer from multicollinearity*

The correlation between the two dependent variables AB (dataset 1) and ABindex (dataset 2) stands out which could indicate multicollinearity, as they are expected to have overlapping areas of explanation. However, according to Wooldridge (2013, p. 84), assumptions concerning no perfect multicollinearity only refers to
the independent variables. This leads to the high degree of correlation between the dependent variables not being an issue regarding the execution of this study, as they will not be included in the same regression analyses.

4) **The expected value of the residuals should be zero**
Previous inspections of the dataset in chapter 4 and depicted in figure 6 and 7, has touched upon the fulfillment of this assumption. It is one of the basis for the completion of a regression analysis, and all indications leads the authors to deem that this assumption holds true.

5) **The residuals should not be heteroskedastic**
Section 5.3.1 examines the null hypothesis of homoskedasticity in relation to both datasets. The statistics indicates that dataset 1 has no issues concerning heteroskedasticity, while the null hypothesis of homoskedasticity is rejected when the tests are conducted on dataset 2. A 5 % significance level has been utilized in the testing for heteroskedasticity as the authors aimed to avoid type 1 errors with an increased confidence level.

A visual inspection of the plotting of the residuals in figure 9 and 10 leads to the same conclusion as it is visually apparent that the variance differs alongside the observations of dataset 2. The reasons behind the heteroskedasticity is, however, unclear. It might occur as a result of some outliers in the dataset but when inspecting the dataset in section 5.1, there did not appear to exist any momentous outliers who could be thought to cause this effect. Another possible reason for the heteroskedasticity is the kurtosis in the dataset which was detected in the White test in section 5.3.1.

6.2.2 Summary of the regression analyses

It is difficult to pinpoint the origin of the heteroskedasticity in dataset 2, but its existence raises the need for it to be corrected for. If no action is taken, it might lead to overestimations of the strength of relationships when conducting the OLS. Inflated measurements of significance could yield both misleading models, conclusions of decreased credibility and misguided proposals for future research.

In the process of creating the two first regression analyses, abnormal return plays the role of the dependent variable. The authors discussed which continents abnormal return that could be suitable for filling the function as the basis for the multiple dummy variable and tested different approaches. In these two initial models, South America respectively Asia became the variables to fill that role. Asia is the dummy variable with the largest amount of observation and by holding the largest amount of markets, it stood out as a possible basis, which it was utilized as in the OLS modelling conducted on dataset 2. In the model based on dataset 1, South America was excluded after different approaches were attempted. This is the variable with the highest standard deviation and the highest mean of the multiple dummy variables that represents the different continents included in the study.

In the development of the reduced models, as presented in section 5.3.4 and 5.3.5, a backwards elimination was utilized. Backwards elimination entailed discarding insignificant variables one-by-one, in an attempt to reach a more useful model. It is difficult to correctly determine the likely impact different variables might have on CAR
and the significance levels of other variables. Therefore, the backwards elimination was guided by the significance levels of the variables. As it turned out, the same independent variables of Stake bought and Dummy date were the last ones standing in both reduced models. Although most of the variables were eliminated in an attempt to obtain a model significant at a high alpha level, the final product did not turn out to be significant to the 10% level of which this study has utilized. In comparing the results of this study to that of earlier research, it is noteworthy that the results support each other but both Dewenter et al. (2010, p. 265) and Kotter and Lel (2011, p. 361) found relationships with a greater confidence level in studies with similar topics. These previous event studies were performed in the 90s and the early 2000s and might indicate that the financial environment has evolved, or that this study failed to incorporate some important variable.

One of the reasons behind conducting regression analyses on the datasets were an attempt to explain the positive expected abnormal return which were found in the event studies. After the reduction, the two models were:

\[ CAR(AB)_i = \alpha_i + \beta \times \text{Stake bought} + \delta \times \text{Time of announcement} + \varepsilon_i \]

and

\[ CAR(AB\text{index})_i = \alpha_i + \beta \times \text{Stake bought} + \delta \times \text{Time of announcement} + \varepsilon_i \]

Of these two reduced regression analyses, the model based on dataset 2 gives the highest confidence levels when it comes to the individual variables in the model. The final configuration of the regression analyses becomes the following:

\[ CAR(AB\text{index})_i = 0,931 + 0,037 \times \text{Stake bought} - 0,861 \times \text{Time of announcement} \]

Stake bought might be one of the two final variables as it is a key feature of every investment. A larger stake in a target company could entail a SWF has identified undervalued stocks, leading to a positive behavioral change in CAR. Time of the announcement could also be important. The negative effect associated with announcements made after the completion date could stem from a positive effect at the time of completion already having been exploited or that the investments pertaining to nonfinancial social objectives (Dewenter et al., 2010, p. 257), more often than others, are announced after the fact. The intercept is the variable with the highest significance level in the final model. This indicates that the announcements in question generate the creation of abnormal return which the variables in the model can be utilized to enhance, but it is an interesting find which might function as the base for an investment strategy on its own as well as together with stake bought and the time of the announcement.

6.3 Ethical and social consideration

As mentioned in section 2.9, ethical and social considerations play a significant role from start to finish when conducting a study. This section will address to what extent the ethical principles have been followed and whether the findings might lead to social or ethical effects. In the work with this study, the authors have attempted to follow existing ethical guidelines. They have followed the guidance of the Thesis Manual of USBE (2017) and the standards that are set by Umeå School of Business and Economics throughout this
Examples of this conduct is to thoroughly record every reference used and to construct the study according to a structure that is logical and that follows the main theme. In addition, the authors have abided by and incorporated the principles set out by the European Code of Conduct for Research Integrity into their work (European Science Foundation, 2011, p. 5).

Both the topic and the research question stemmed from interests of the authors’ which preceded the study. As the research has advanced, they have received guidance in the form of comments and a supportive interlocutor in the supervisor. Because of this, the study as a whole is a product by the authors. In addition, the authors have pursued the creation of a fully transparent study, unaffiliated with any impact from external institutes, investors or other stakeholders that may have an interest regarding the outcome.

During the collection and handling of data, the authors focused on fulfilling the principles set by the European Code of Conduct for Research Integrity (European Science Foundation, 2011, p. 5). Specifically, the principles concerning objectivity, accessibility and reliability have been at the forefront when handling the gathered material. The data has been collected through a trustworthy online database as well as through Datastream, where the latest was made available by Umeå University Library. The same principles were in focus when conducting the tests and regression analyses in Stata, and the observations in the datasets have not been altered by the authors. The totality of the gathered data is public and secondary data, leading to the collection process not being considered unethical. Being public data, no vulnerability of shareholders has been brought to light. The collection, processing and testing of the data includes a large number of steps, and the possibility for errors does exist. Should any error have been made, they are due to human error and have not been conducted intentionally. The large dataset entails, however, that the existence of potential human error should not have any significant effect on the final results and conclusions, ensuring the credibility of the results.

The results from this research should not entail any large ethical or societal effects. However, should the investment strategy resulting from this study become well known and utilized, Sovereign Wealth Funds might experience an increased abnormal return following announcements. Another outcome, should the strategy become recognized, is that the SWFs themselves plan their announcement to maximize their return, possibly at the expense of retail investors following the investment strategy.

In total, however, the authors find it difficult to pinpoint any probable ethical effects or influences on society stemming from this study. Should such an effect take place, it is expected to be minimal. Looking back at the process of conducting this study, the authors argue that it has been performed according to ethical and social considerations. The produced answer to the research question as well as the conclusion overall represents new knowledge, but is not expected to cause any ethical or social effects.
VII Conclusion

In this chapter the results and analysis will be summarized in order to reach a conclusion. The answers to the research question and recommendations stemming from the completion of the study will be included here. This chapter will thus function as a summation of the entire work. Also, suggestions to further research question will we presented. Some of these suggestions are already stated in the study’s delimitations and some are not mentioned earlier in the study. The last sections will deal with the quality and truthfulness of the study. The validity and reliability of the study is evaluated and discussed.

7.1 General conclusion

What is the short-term effect of the announcement of a Sovereign Wealth Fund’s investment on the stock price behavior of the target firm? That is the question this study sets out to examine. The data surrounding the announcement day of investments of publicly traded equities, allowed for an analysis of whether it causes an abnormal return. These publicly traded equities are a kind of financial investment which is traded on financial markets and represents a stake in a company’s real assets (Bodie et al., 2014, p. 3). The value of the equities is altering in nature and shifts as new information is publicized and depending on how it is interpreted. In addition, the study aimed to detect what factors influence the potential abnormal return.

Previous research has found that financial decisions made by investment funds have an effect on the targets’ stock prices and can be a cause of abnormal return (Sias et al., 2001, p. 26). Sovereign Wealth Funds represents a classification of their own under the investment fund umbrella and are not included in studies as the one conducted by Sias et al (2001, p. 26). They are large state-owned entities, of, mainly the 21th century, who stands out from other funds with an eye-catching long-term philosophy (Ervin, 2008, p. 21). Their investments are, similarly to other funds, made in the pursuit of a prosperous return but in addition to this, SWF also aims to support a number of nonfinancial social objectives through their investments (Dewenter et al., 2010, p. 257).

A sample of 347 observations of announcements made in the time span between 2012 and 2016 made out the dataset of this study. These observations show that the largest portion of the investments are made in Asia, followed by North America and Europe and the majority of the announcements are made on or after the completion date. Even though SWF are prone to investing in large shares in target firms, most investments represents deals up to 5 %. There is no clear correlation between the purchased share and the dollar amount, but the majority of the investments are also represented by investments in the lower bracket, as shown in figure 5 in chapter 4. A dominant part of the announcements concerns deals of 0-100 million dollars while the largest investment in the dataset is one of over 3 000 million dollars.

The execution of the study entailed conducting two event studies. In doing so, the authors assume the existence of a semi-strong efficient market, and the results of the study falls in line with this assumption as the existence of an effect corresponding to the time of the announcements is found with a high degree of certainty. Neither the weak nor strong branches of the efficient market hypothesis supports the intentions this study aims to
fulfill by way of the event study. The weak form entails that the prices are unrelated between days, making it impossible to predict future stock prices and, in turn, impossible to study the effect over the 3-day event window of this study (Newman et al., 1992, p. 739; Campbell et al., 1997, p. 22). Strong efficiency is also inappropriate when conducting the intended event study as it entails that all existing information is already incorporated into the price, which eliminates a possible effect from any announcement (Bodie et al., 2014, p. 354). Working from a theory of a semi-strong efficient market gives that the publishing of new information will immediately be incorporated in the price (Newman et al., 1992, p. 740), thus allowing execution of an event study focused on the short-term effect of new information made public by SWFs.

The first event study included a dataset where the predicted return was based on a 100-day estimation period preceding the 3-day event-window, which was the focus of the study. The second event study was performed on a dataset where the movements of the index connected to the investment in question during the 3-day event-window acted as the predicted return. These observations represented the return, should the event, in the form of an announcement by a SWF, not take place (Campbell et al., 1997, p. 151). The values were then utilized in the estimation of the abnormal return, which is the actual return decreased by the predicted return (Brown & Warner, 1980, p. 207; McWilliams & Siegel, 1997, p. 628). These approaches are known as the constant mean return model and the index model and allow for an uncomplicated but still reliable estimate of the abnormal return (Campbell et al., 1997, p. 154).

In concluding the results of both parametric tests in the event study, positive short term cumulative abnormal return, CAR, was found in the behavior of target share prices in connection with a SWFs announcement. These results were significant at 10 % alpha, more accurately at a 6 % and 3 % significance level. The non-parametric tests supported these results, however a significant result of a 10 % significance level was only found when testing the second dataset.

The positive expected abnormal return ranges from 0,40 % when using an estimation period to predict the market movements of stocks to 0,50 % when setting the actual return in relation to the movements of index in the event window. The parametric and nonparametric tests indicate that the expected short term abnormal return of 0,50 % is the more statistically likely outcome of the two event studies. This indicates that a short-term investment strategy for retail investors entailing placing investments in firms who appear in SWFs announcements, is a profitable investment strategy.

An additional purpose of the study was to perform a regression analysis in an attempt to explain the expected short term abnormal return. The undertaking started with regression analyses on both datasets, including several variables thought to have an effect. Here, the intercept in the regression performed on the dataset 2 was significant on a 10 % alpha level and the regression analysis on dataset 1 yielded no significant results. This led to the initiation of a backwards elimination which would result in a reduced regression analyses. The final model, with the highest degree of confidence, stemmed from the regression performed on dataset 2.

The attempt to explain the expected short term abnormal return which was proven with a 10 % significance level in the event study, resulted in a reduced model which can indicate the effect of two variables on CAR. It was based on dataset 2. A significantly ensured
intercept of 0,931 accompanies the variable Stake bought which is positively correlated to CAR. An increase of one percent in the announced stake leads to an increase of 0,037 percentage points on CAR. The dummy variable Dummy date gives that when an announcement is made on or after the completion data, the variable will have an impact of -0,861 on CAR. This final variable is close to being significant at 10 % alpha level and might increase the success rate of the strategy.

\[
\text{CAR(AB}_{\text{index}}) = 0,9312 + 0,0371 \cdot \text{Stake bought} - 0,8612 \cdot \text{Time of announcement}
\]

The process of gathering and molding the findings of the study into a functioning investment strategy builds on the “herd instinct”, which is a branch within behavioral finance (Brunnermeier, 2001, p. 147; Brealey et al 2014, p. 333). The theory traditionally entails individuals blindly gravitating towards the investment decision of others, as a response to the financial decisions of the majority (Brealey et al 2014, p. 333; Shiller, 2000, p. 135). This behavior is interesting but also irrational, and through the realization of this study, the authors aims to mold the actions often associated with this branch of behavioral finance into rational behavior. By exploiting individuals’ inclination for herd behavior and following SWFs, as opposed to simply following the dominating currents of the markets, this study’s findings of abnormal return might be utilized. A profitable investment strategy with positive abnormal returns and a “follow the leader”-approach, entailing following SWFs which are large market players, appears to be viable.

**So, what is the short-term effect of an announcement of a Sovereign Wealth Fund’s investment on the stock price behavior of the target firm?**

There exists a positive short term abnormal return which arises because of SWFs publicizing an announcement containing an intent to purchase shares in a named target company. It is possible for retail investors to make use of this as an investment strategy, expecting a return exceeding index with 0,50 %, given by the data in the event study. By allowing the date of the announcement in relation to the completion date to play a role in the strategy, retail investors might affect their return. Investments where the announcements happen on or after the completion date is associated with a negative effect on CAR. By only including investments where the announcement takes place before the completion date, this negative effect can be eliminated. Also, the announcement of a larger stake seems to have a positive effect on the expected abnormal return, and should be kept in mind. In conclusion, an uncomplicated investment strategy has been produced, but additional data and other variables might increase its abilities. At the same time, the intercept on its own is found to be both positive and significant at a significance level close to 5 %. This gives that the investment strategy, even in its simplest form where one imitates SWFs investments without paying attention to connected variables, can be a profitable approach for investors. The short-term effect if an announcement of a SWFs investment on the stock price behavior of the target firm is positive.

7.2 Theoretical and practical contribution

As mentioned in the beginning of the study, Sovereign Wealth Funds is still relatively new and unexplored area of investment funds. Due to this, the authors have been able to create a theoretical contribution to this field, unrelated to the outcome of the study. More knowledge has been provided, not just concerning the funds, the definition and their
functionality, but the differences between SWFs and what can be denominated as normal funds. By studying the dataset, variables such as the location of purchases in terms of country and market, companies and industries has been systematized and can facilitate future research. This study has also contributed to the development of the theories which have been utilized in the theoretical framework. By yielding significant and interesting results, the framework has proven to be a correct and effective approach to studies within this field of research.

By collecting and analyzing a large number of observations, this study adds complexity of Sovereign Wealth Funds and expands on the five criteria set out by Miracky and Chin (Monitor Group & Feem, 2009). This study has for example uncovered that 64% of the observations are announcements of modest purchases between 0 - 5% of the target company, 69% of the announcements takes place on or after the completion date and the funds financial activities creates abnormal return. This new contribution to the existing theoretical knowledge might amongst others start a discussion regarding the notion that SWF often makes purchases of large shares in target companies.

The study represents a practical contribution as it has found a positive short term abnormal return in an event-window surrounding an announcement of an intent to purchase shares by SWF. This can be utilized by retail investors in the form of an investment strategy as well as by SWFs in how to best time their purchases and the announcements of them. The strategy is improved upon by allowing the results from the reduced regression to broaden the model. Retail investors might use a “follow the leader”-approach to gain from the discovered abnormal return. For SWFs, this practical knowledge indicates that avoiding completing a transaction within the event-window would be prudent, because of the positive abnormal return caused by the announcement.

In chapter one, the authors presented their intention to create an investment strategy for retail investors. An intention which has been fulfilled. The strategy itself is presented in the last paragraph of section 7.2. A more comprehensive dataset, which could have been gathered by making use of pricy databases, might have resulted in an investment strategy where the explaining variables were determined with a higher significance level. Even so, the authors view the practical contribution of this study, in regard to both the creation of an investment study and the fulfillment of the research gap presented in section 1.2, as accomplished.

7.3 Limitations and future research

Considering that Sovereign Wealth Funds have not been extensively studied, there is a need for future research to map out their role in the financial world. As highlighted in this study, even though there are similarities between normal funds and SWFs, there are differences concerning the financial behavior of SWFs and other investment funds. SWFs pursue longer-term investments and many seeks to support several nonfinancial social objectives through their investment decisions in addition to trying to obtain a prosperous return (Ervin, 2008, p. 21; Dewenter et al., 2010, p. 257). Even though the goal of financial gain is the same, their values might lead to different investment and different returns. This would be an interesting base for future researchers to build upon.
A limitation of this study deals with the funds’ role as an investor, which future research might be able to help clarify. Knowledge of whether the SWFs take on the role of a passive investor or choose a more active role in their target companies would increase the understanding of this classification of funds. As many the world’s SWFs have increased substantially in size since the early 2000s, they have become large market players. SWFs are state-owned entities and with the influence gained from being large market players, they have the capacity to control small economies or even small stock markets to a large extent (Swfi, n.a). The SWFs are state owned, but most of them are not state governed, and their investments are not intended to be conducted on a political basis. However, in conjunction with the question of what role the funds play in their target companies, it would still be interesting to study whether politics in the SWFs’ country of origin might play a role in its activities and investment choices. These questions are not included in this study due to the significant difficulty in gathering reliable information pertaining to these questions.

Interviewing fund managers to map out to what extent ethics actually is included in SWFs’ investment strategy would also be an interesting area for future research. Even just a view into the SWFs investment strategy overall would allow for interesting analyzes and possibly the development of additional profitable investment strategies aimed at, for example, retail investors. As of today, the funds themselves choose whether to divulge information pertaining to the ethical aspect of their activity, and only a few publicize information on how this is incorporated into their daily dealings.

It can be argued that a larger amount of observations might have resulted in more significant results. Some of the variables included in the regression analysis are somewhat weak when it comes to the amount of data that was available to the authors. This is a limitation of the study, one that could be mended by gaining access to a number of quite pricy databases. There did not appear to be any large issues concerning the dataset during the study, but a more extensive number of observations would still allow for a more thorough mapping of the short-term behavior of SWFs targets stock prices.

A final suggestion towards future research is to undertake a study concerning the long-term effect of the Sovereign Wealth Fund’s investments on the behavior of the target firms’ stock prices. The implications of SWFs financial activities would allow for an opportunity to unearth effects on companies from having SWFs as an investor. It would also be interesting to see an analysis of the long-term effect given different stakes of ownership. Overall, as this is a “modern phenomenon” upon which limited research has been conducted, it is of interest to increase the overall level of knowledge by mapping out SWFs, their dealings and characteristics. The authors look forward to following the development within this field.

7.4 Quality criteria

This study has been conducted by ways of a deductive and quantitative research method, where the data consists of secondary data that has been collected and compiled by the authors to allow for a variety of testing to be conducted. This process has been conducted according to the Thesis Manual of USBE (2017) as well as the European Code of Conduct for Research Integrity (European Science Foundation, 2011, p. 5). Still, the quality criteria are an important aspect of the process of conducting a study. Three essential
aspects of the evaluation of the presented research is validity, reliability and replicability (Bryman & Bell, 2015, p. 49). These aspects will be commented on below in connection with the produced work.

7.4.1 Validity

*Internal validity* refers to whether conclusions regarding causal relationships are valid for the studied population (Stock & Watson, 2015, p. 362). Internal validity often plays an important role in quantitative studies in the pursuit of fulfilling the objective which often consists of finding causal relationships (Johnson & Christensen, 2012, p. 268). It also concerns the dataset and its level of suitability and explanatory capacity towards the subject of the study (David & Sutton, 2011, p. 20). In relation to this study, the question becomes whether the discovered abnormal return is factual and if it can be attributed to the variables included in the study and explored through the regression analysis. The authors choice to implement a 10% significance level might affect the strength of the findings, and in turn, the study’s internal validity, as a higher significance level increases the risk of type 1 errors. Regarding the dataset, the authors view is as suitable and as having the complexity needed to explain the abnormal return. As previously mentioned, however, by collecting data via pricy databases, a more extensive dataset might have been gathered in addition to this eliminating the risk of some human error.

*External validity* entails that the inferences and conclusions can be generalized across populations, settings and times (Stock & Watson, 2015, p. 362). The event study confirmed the existence of an abnormal return within the population, and explaining factors for the abnormal return were pinpointed through regression analyses. As in the case of internal validity, the implementation of a 10% significance level might influence the strength of the findings and its generalizability, as a higher significance level increases the risk of type 1 errors. Additionally, this study has only collected data and conducted tests on the top 25% of the world Sovereign Wealth Funds. The portfolios of the remaining 75% are less valuable than those included in this study. The smaller value might entail a different abnormal return and other explaining variables than the ones found through this research. At the same time, several of these less valuable funds are increasing in value, which could create the basis for similar relationships as found in this study. Generalizing the findings to other classifications of funds or other large investors should not be an issue. Even though SWFs directs some of their attention towards nonfinancial social objectives through their investments, the main focus, as other classifications of funds, is placed on pursuing a prosperous return.

Previous studies have touched upon similar areas of study and have been able to pinpoint an abnormal return as a result of SWFs financial activities. This increases the degree of external validity of this study, as the findings are supported by historical data from the 90s and early 2000s which have been tested through the previous studies. In order to claim a stronger external validity based on similar previous studies, the preconditions for the studies needs to be compared (Stock & Watson, 2015, p. 388). When examining the similarities, both the population and setting is similar, however aspects concerning time is different (Stock & Watson, 2015, p. 388). The timeframe, the period during which the study has been conducted as well at the point in time is different, but in total, the authors view is that they fulfil the requirements for functioning as a support and increasing the external validity of this study.
Exempt the awareness of the mentioned arguments, the authors do not have any reason to doubt the validity of this study.

7.4.2 Reliability

The reliability of the study depends on whether the manner in which the data has been collected and the performed statistical procedures have been executed to a satisfactory level. The satisfactory level entails that similar findings would be produced, should the study be repeated by a different researcher or at a different time (Saunders et al., 2012, p. 192; Johnson & Christensen, 2012, p. 138). To ensure reliability, it is necessary to be transparent and report each step of the work leading up to both results, analysis and the conclusion. (Saunders et al., 2012, p. 192-193). There are several threats to reliability, but as this study collects secondary data instead of performing interviews or making use of questionnaires, some of these threats becomes less relevant. Possible errors in the databases from which the authors have collected the data, could be classified at a participant error. However, the utilized databases come across as trustworthy and the authors do not have any reason to doubt the quality of the collected observations.

Researcher error could have occurred because of human error during the data collection, the statistical tests or in interpreting the results. Preventively, the authors have invested a lot of energy in maintaining a high quality in each step throughout the study and have worked together in all manners concerning the dataset. It is, however, not possible to completely elude errors, even within natural sciences (David & Sutton, 2011, p. 267). The accuracy of a dataset can differ alongside the skillset of the researcher and the decimals of each observation, resulting in human errors which might jeopardize the reliability and the replicability of a study (David & Sutton, 2011, p. 268). It is the belief of the authors that should errors have occurred, they are few and far between and should not have any significant effect on the final results and conclusions, ensuring the reliability of the study.

The risk of researcher bias is minimized by this study making use of a secondary dataset and statistical tests instead of obtaining information from a number of respondents. The authors have not manipulated the dataset in any aspect in order to allow their own subjective views or dispositions to become visible in the results of the study. This is shown by documenting each step and procedure of the study as well as producing a Do-file which depicts the commands that has been utilized during the statistical testing.

The authors view the reliability of this study to be of a high quality. The provided information and presented approach allows for future studies to replicate and build on the findings resulting from this research.
Reference list


Appendix 1 – Do-file

import excel "C:\Users\rosj0017\Desktop\Det vi verkligen behöver till stata (på riktigt)\detviverkligenbehövetillstata.xlsx", sheet(“Sheet1”) firstrow
drop Parententityname
drop Target CountryofTarget
drop Market
drop AnnouncedDate CompletedDate AcquisitionTechnique
drop N Stakeownedaftertransaction Targettype

*Summary statistics.
sum

*Tabulate dummy variable continent.
tabulate Vrldsdel, generate(dummyVrldsdel)

*One samle mean-comparison test. Parametric test Abnormal return. (95%)
ttest AB == 0

*One samle mean-comparison test. Parametric test Abnormal return. (90%)
ttest AB == 0, level(90)

*One samle mean-comparison test. Parametric test Abnormal return based on Index. (95%)
ttest ABIndex == 0

*One samle mean-comparison test. Parametric test Abnormal return based on Index. (90%)
ttest ABIndex == 0, level(90)

*Sign test. Non-parametric test Abnormal return.
signtest AB = 0

*Sign test. Non-parametric test Abnormal return based on Index.
signtest ABIndex = 0

*Sign-rank test. Non-parametric test Abnormal return.
signrank AB = 0

*Sign-rank test. Non-parametric test Abnormal return based on Index.
signrank ABIndex = 0

*Run OLS regression, Abnormal return. South America excluded.
regress AB DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel2 dummyVrldsdel3 dummyVrldsdel4 dummyVrldsdel5

*Run OLS regression, Abnormal return, North America excluded.
regress AB DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel2 dummyVrldsdel3 dummyVrldsdel14 dummyVrldsdel16

*Test for Heteroskedasticity
estat hettest

*Plotting residuals.
rvfplot

*Test for Heteroskedasticity, skeweness and kurtosis.
estat imtest, white histogram AB, percent qnorm AB

*run OLS regression, Abnormal return based on Index. South America excluded.
regress ABIndex DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel2 dummyVrldsdel13 dummyVrldsdel14 dummyVrldsdel15

*run OLS regression, Abnormal return based on Index. Asia excluded.
regress ABIndex DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel16 dummyVrldsdel13 dummyVrldsdel14 dummyVrldsdel15

*Test for Heteroskedasticity
estat hettest

*Plotting residuals.
rvfplot

*Test for Heteroskedasticity, skeweness and kurtosis.
estat imtest, white
histogram ABIndex, percent
qnorm ABIndex
*Testing for normality.
swwilk AB ABIndex DealsizeUSDmillions Stakebought dummyVrldsdel1 dummyVrldsdel2
dummyVrldsdel3 dummyVrldsdel4 dummyVrldsdel5 dummyVrldsdel6
*Testing for normality.
sfrancia AB ABIndex DealsizeUSDmillions Stakebought dummyVrldsdel1 dummyVrldsdel2
dummyVrldsdel3 dummyVrldsdel4 dummyVrldsdel5 dummyVrldsdel6
*Run OLS regression, Abnormal return, North America excluded.
regress ABIndex Stakebought DummyDate
*Run OLS regression, Abnormal return, North America excluded.
regress ABIndex Stakebought DummyDate
. predict ABhat
(option xb assumed; fitted values)
(3 missing values generated)
. predict error2, resid
(3 missing values generated)
. histogram error2, bin(18) percent
(bin=18, start=-18.29406, width=2.2018554)
. predict ABIndexhat
(option xb assumed; fitted values)
(3 missing values generated)
. predict error2ABIndex, resid
(3 missing values generated)
. histogram error2ABIndex, bin(18) percent
(bin=18, start=-18.29406, width=2.2018554)
gen time=_n
. tsset time
    time variable:  time, 1 to 347
    delta:  1 unit
*Run OLS regression, Abnormal return, South America excluded.
* regress AB DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel2
dummyVrldsdel3 dummyVrldsdel4 dummyVrldsdel5
. estat durbina
*Run OLS regression, Abnormal return, North America excluded.
regress ABIndex DealsizeUSDmillions Stakebought DummyDate dummyVrldsdel1 dummyVrldsdel2
dummyVrldsdel3 dummyVrldsdel4 dummyVrldsdel5 dummyVrldsdel6
. estat durbina
*Run OLS regression, Abnormal return, reduced.
regress AB Stakebought DummyDate
. estat durbina
*Run OLS regression, Abnormal return, reduced.
regress ABIndex Stakebought DummyDate
. estat durbina
Appendix 2

A1:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>347</td>
<td>0.400201</td>
<td>4.94499</td>
<td>-17.16255</td>
<td>21.24965</td>
</tr>
<tr>
<td>ABIIndex</td>
<td>347</td>
<td>0.4996125</td>
<td>4.770337</td>
<td>-18.71681</td>
<td>21.48828</td>
</tr>
<tr>
<td>Continent</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DealsizeUS-s</td>
<td>347</td>
<td>205.493</td>
<td>347.251</td>
<td>.54</td>
<td>3153.558</td>
</tr>
<tr>
<td>DummyDate</td>
<td>347</td>
<td>0.6916427</td>
<td>0.4624819</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Stakebought</td>
<td>344</td>
<td>5.261366</td>
<td>8.474222</td>
<td>.01</td>
<td>87</td>
</tr>
</tbody>
</table>

A2:

Shapiro-Wilk W test for normal data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>W</th>
<th>V</th>
<th>z</th>
<th>Prob&gt;z</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>347</td>
<td>0.95124</td>
<td>11.822</td>
<td>5.838</td>
<td>0.00000</td>
</tr>
<tr>
<td>ABIIndex</td>
<td>347</td>
<td>0.91635</td>
<td>20.282</td>
<td>7.114</td>
<td>0.00000</td>
</tr>
<tr>
<td>Stakebought</td>
<td>344</td>
<td>0.55038</td>
<td>108.179</td>
<td>11.066</td>
<td>0.00000</td>
</tr>
<tr>
<td>DealsizeUS-s</td>
<td>347</td>
<td>0.56289</td>
<td>105.986</td>
<td>11.023</td>
<td>0.00000</td>
</tr>
<tr>
<td>dummyConti-1</td>
<td>347</td>
<td>0.56484</td>
<td>105.514</td>
<td>11.012</td>
<td>0.00000</td>
</tr>
<tr>
<td>dummyConti-2</td>
<td>347</td>
<td>0.99757</td>
<td>0.590</td>
<td>-1.249</td>
<td>0.89418</td>
</tr>
<tr>
<td>dummyConti-3</td>
<td>347</td>
<td>0.88449</td>
<td>28.007</td>
<td>7.877</td>
<td>0.00000</td>
</tr>
<tr>
<td>dummyConti-4</td>
<td>347</td>
<td>0.98851</td>
<td>2.786</td>
<td>2.422</td>
<td>0.00772</td>
</tr>
<tr>
<td>dummyConti-5</td>
<td>347</td>
<td>0.98657</td>
<td>3.256</td>
<td>2.790</td>
<td>0.00264</td>
</tr>
<tr>
<td>dummyConti-6</td>
<td>347</td>
<td>0.92754</td>
<td>17.569</td>
<td>6.775</td>
<td>0.00000</td>
</tr>
</tbody>
</table>

A3:
A4:
One-sample t test

| Variable    | Obs | W'   | V'   | z     | Prob>|z |
|-------------|-----|------|------|-------|-----|
| AB          | 347 | 0.94802 | 13.618 | 5.596 | 0.00001 |
| ABIndex     | 347 | 0.91255 | 22.909 | 6.710 | 0.00001 |
| DealsizeUS-s| 347 | 0.55814 | 115.754 | 10.182 | 0.00001 |
| Stakebought | 344 | 0.54508 | 118.275 | 10.222 | 0.00001 |
| dummyVrlds-1| 347 | 1.00000 | 0.000 | -63.818 | 1.00000 |
| dummyVrlds-2| 347 | 1.00000 | 0.000 | -63.818 | 1.00000 |
| dummyVrlds-3| 347 | 1.00000 | 0.000 | -61.134 | 1.00000 |
| dummyVrlds-4| 347 | 1.00000 | 0.000 | -63.818 | 1.00000 |
| dummyVrlds-5| 347 | 1.00000 | 0.000 | -63.818 | 1.00000 |
| dummyVrlds-6| 347 | 1.00000 | 0.000 | -63.818 | 1.00000 |

A5:
One-sample t test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>Std. Dev.</th>
<th>[90% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>347</td>
<td>0.400201</td>
<td>0.265461</td>
<td>4.94499</td>
<td>-0.121913, 0.9223212</td>
</tr>
</tbody>
</table>

mean = mean(AB)  

\[ t = 1.5076 \]

degrees of freedom = 346

Ha: mean < 0  
Ha: mean ≠ 0  
Ha: mean > 0

\[ Pr(T < t) = 0.9337 \]  
\[ Pr(|T| > |t|) = 0.1326 \]  
\[ Pr(T > t) = 0.0663 \]
A6:

Wilcoxon signed-rank test

<table>
<thead>
<tr>
<th>sign</th>
<th>obs</th>
<th>sum ranks</th>
<th>expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>positive</td>
<td>176</td>
<td>32504</td>
<td>30178.5</td>
</tr>
<tr>
<td>negative</td>
<td>165</td>
<td>27853</td>
<td>30178.5</td>
</tr>
<tr>
<td>zero</td>
<td>6</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>all</td>
<td>347</td>
<td>60378</td>
<td>60378</td>
</tr>
</tbody>
</table>

unadjusted variance 3496892.50

adjustment for ties -5.50

adjustment for zeros -22.75

adjusted variance 3496864.25

Ho: AB = 0

z = 1.244

Prob > |z| = 0.2137

A6:

Sign test

<table>
<thead>
<tr>
<th>sign</th>
<th>observed</th>
<th>expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>positive</td>
<td>176</td>
<td>170.5</td>
</tr>
<tr>
<td>negative</td>
<td>165</td>
<td>170.5</td>
</tr>
<tr>
<td>zero</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>all</td>
<td>347</td>
<td>349</td>
</tr>
</tbody>
</table>

One-sided tests:

Ho: median of AB = 0 vs.

Ha: median of AB > 0

Pr(positive >= 176) =

\[ \text{B(n = 341, x >= 176, p = 0.5)} = 0.2941 \]

Ho: median of AB = 0 vs.

Ha: median of AB < 0

Pr(negative >= 165) =

\[ \text{B(n = 341, x >= 165, p = 0.5)} = 0.7059 \]

Two-sided test:

Ho: median of AB = 0 vs.

Ha: median of AB != 0

Pr(positive > 176 or negative > 176) =

\[ \text{min}(0.2941, 2 \times 0.5) = 0.5882 \]
A7:

One-sample t test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>Std. Dev.</th>
<th>95% Conf. Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABIIndex</td>
<td>347</td>
<td>0.4998125</td>
<td>0.2560851</td>
<td>4.770337</td>
<td>-0.303867 to 1.003492</td>
</tr>
</tbody>
</table>

mean = mean(AIIndex)  

Ho: mean = 0  
degrees of freedom = 346

Ha: mean < 0  
Ha: mean ≠ 0  
Ha: mean > 0

Pr(T < t) = 0.9741  
Pr(|T| > |t|) = 0.0518  
Pr(T > t) = 0.0259

A8:

Wilcoxon signed-rank test

<table>
<thead>
<tr>
<th>sign</th>
<th>obs</th>
<th>sum ranks</th>
<th>expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>positive</td>
<td>163</td>
<td>33288</td>
<td>30189</td>
</tr>
<tr>
<td>negative</td>
<td>164</td>
<td>26990</td>
<td>30189</td>
</tr>
<tr>
<td>zero</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

all | 347 | 60370 | 60370 |

unadjusted variance 3496892.50
adjustment for ties -5.50
adjustment for zeros 0.00
adjusted variance 3496887.00

Ho: ABIIndex = 0

z = 1.711  
Prob > |z| = 0.0871
A9:

Sign test

\[
\begin{array}{ccc}
\text{sign} & \text{observed} & \text{expected} \\
\hline
\text{positive} & 183 & 173.5 \\
\text{negative} & 164 & 173.5 \\
\text{zero} & 0 & 0 \\
\hline
\text{all} & 347 & 347 \\
\end{array}
\]

One-sided tests:

\( H_0: \) median of \( AB_{\text{Index}} = 0 \) vs.
\[
H_1: \text{median of } AB_{\text{Index}} > 0
\]

\[
\Pr(\text{positive} \geq 183) = \text{Binomial}(n = 347, x \geq 183, p = 0.5) = 0.5670
\]

\( H_0: \) median of \( AB_{\text{Index}} = 0 \) vs.
\[
H_1: \text{median of } AB_{\text{Index}} < 0
\]

\[
\Pr(\text{negative} \geq 164) = \text{Binomial}(n = 347, x \geq 164, p = 0.5) = 0.8585
\]

Two-sided test:

\( H_0: \) median of \( AB_{\text{Index}} = 0 \) vs.
\[
H_1: \text{median of } AB_{\text{Index}} \neq 0
\]

\[
\Pr(\text{positive} \geq 183 \text{ or negative} \geq 183) = \min(1, 2*\text{Binomial}(n = 347, x \geq 183, p = 0.5)) = 0.3339
\]

A10: Performed on AB, after reg 1

Number of gaps in sample: 3

Durbin's alternative test for autocorrelation

\[
\begin{array}{ccc}
\text{lags} & \text{chi2} & df & \text{Prob} > \text{chi2} \\
\hline
1 & 0.261 & 1 & 0.6094 \\
\hline
\end{array}
\]

H0: no serial correlation

A11: Performed on ABIndex, after reg 1

Number of gaps in sample: 3

Durbin's alternative test for autocorrelation

\[
\begin{array}{ccc}
\text{lags} & \text{chi2} & df & \text{Prob} > \text{chi2} \\
\hline
1 & 0.251 & 1 & 0.6162 \\
\hline
\end{array}
\]

H0: no serial correlation
A12: Performed on AB, after reg 2

<table>
<thead>
<tr>
<th>lags(p)</th>
<th>chi2</th>
<th>df</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.425</td>
<td>1</td>
<td>0.5143</td>
</tr>
</tbody>
</table>

H0: no serial correlation

A13: Performed on AB, after reg 2

<table>
<thead>
<tr>
<th>lags(p)</th>
<th>chi2</th>
<th>df</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.412</td>
<td>1</td>
<td>0.5209</td>
</tr>
</tbody>
</table>

H0: no serial correlation