



LUND UNIVERSITY
School of Economics and Management

Department of Business Administration

FEKH89

Bachelor Thesis in Corporate Finance

Autumn 2020

Is China crossing the line?

A research on the value creation of Chinese cross-border acquisitions

Authors:

Eriksson, Martin

Helin, Victoria

Serenhov, Alice

Supervisor:

Gårdängen, Maria

Abstract

Title	Is China crossing the line?
Seminar date	2021-01-14
Course	Business Administration: Bachelor Degree Project in Financial Management Undergraduate Level, 15 credits
Authors	Eriksson Martin, Helin Victoria and Serenhov Alice
Advisor	Gårdängen, Maria
Key words	Cumulative Abnormal Return, Cross-border M&A, Trading Halt, Trading Suspension, Short-Term Shareholder Wealth, China
Purpose	To examine if Chinese acquirers create short-term shareholder wealth through cross-border acquisitions, measured by fluctuations of the stock price of the acquiring firm. Additionally, to investigate if industrial, institutional and cultural independent variables affect the cumulative abnormal returns.
Methodology	The study is quantitative with a deductive approach and based on the traditional event study methodology. Furthermore, cross-sectional regression models are used to analyze and determine the relationship between the cumulative abnormal return and the independent variables.
Theoretical perspectives	The theoretical frameworks used in this study are the Efficient Market Hypothesis, the Signaling Theory, the Theory of Competitive Advantages, The Resource based view, the Synergy Hypothesis, the OLI-Framework and the The CAGE Distance Framework.
Empirical foundation	The results are based on data of Chinese cross-border M&A deals between 2010-2018. The data is collected from the databases Zephyr, Datastream, Thomson Reuters Eikon and Bloomberg.
Conclusion	Chinese acquirers create short-term shareholder wealth through cross-border acquisition. When studying the independent variables, trading halts are significantly affecting the short-term generated wealth for shareholders. Manufacturing and cultural distance are the only variables that significantly explain the movement of short-term shareholder wealth. The variables market size, industry relatedness, relative deal size, nor institutional distance affect short-term shareholder wealth.

Acknowledgements

We hope that You will find this research interesting and informative. It has been a pleasure to learn more about Chinese acquisitions and the Chinese stock market. The subject broadened our general knowledge within the cross-border M&A field. We want to thank our supervisor Maria Gårdängen for her help, guidance and genuine interest for our research project. We also want to thank Anamaria Cociorva for her advice and support in statistics and econometrics. Last but not least, we want to thank LINC - Lund University Finance Society, for providing us with an around-the-clock working space.



Martin Eriksson



Victoria Helin



Alice Serenhov

Lund, 2021-01-12

List of Abbreviations

CAR	Cumulative Abnormal Return
CBM&A	Cross-border M&A
FDI	Foreign Direct Investment
ODI	Outward Direct Investment
M&A	Mergers and Acquisition
WGI	World Governance Indicators

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1. Introduction

The introduction chapter presents the background and problem discussion of the study. Additionally, it presents the research questions, purpose, scope and limitations, target group and the outline of the study.

1.1. Background

For the past decades, China has developed from a poverty-stricken country to the largest emerging economy in the world (Piketty, Yang & Zucman, 2019). The internationalization of Chinese enterprises is gaining notable attention as Chinese enterprises continue to seek more opportunities to expand globally (Deng, 2012). In 2018, a trade war between the USA and China began and created headlines all around the world (Kwan, 2019). The trade war affected both the countries' economies as well as the people working and living there (Kwan, 2019). One of the reasons as to why the trade war escalated were Chinese *mergers and acquisitions* [M&As] in the USA (Kwan, 2019).

An acquisition is when one company, the acquirer, purchases another company, the target firm (Berk & DeMarzo, 2020; Gaughan, 2018). By acquiring more than 50% of the stocks, the acquiring company becomes the controlling shareholder and therefore in control of the target firm (Healy, Palepu & Rubak, 1992). The reasons to engage in M&As are mainly based on three incentives: financial, strategic and managerial motives (Letaifa, 2017). Other motives include achieving diverseness, market influence, enhanced management and tax benefits (DePamphilis, 2008).

In a globalized world, one way for companies to continue to grow and increase their market share is to engage in *cross-border M&As* [CBM&A], defined as when a domestic firm engages in M&A activity with companies in other countries (Gaughan, 2007). CBM&As have resulted in product diversification, intensified economic development as well as greater company integrations across the globe (Di Giovanni, 2005). Emerging multinational enterprises have increased their CBM&A activity heavily, especially Chinese firms (Sun, Peng, Ren & Yan, 2012). In 2016, Chinese CBM&A even exceeded the value of the transactions made by firms from the USA (Junzhi, Chakrabarti, de Moraes, Gomes & Skvortsova, 2020).

1.2. Problem Discussion

The increase of Chinese CBM&As, and especially the underlying motives behind them, are very debated upon in many developed countries (Ewing, 2020; Kwan, 2019). With China's highly influential state ownership and obscurity regarding corporate ownership, especially under the leadership of the Chinese Communist Party, it is questionable if national strategic motives are part of Chinese CBM&A transactions (Gordon & Milhaupt, 2019). For instance, the Chinese government initiated a strategy called "Go Global" in 2000 to encourage Chinese firms to invest abroad (Bellabona & Spigarelli, 2007). With this strategy, an abundance of regulations and laws were passed in China to both stimulate and monitor M&A activity (Luo, Xue & Han, 2010). For instance, China's state-owned enterprises [SOE] receive assistance when acquiring enterprises within state controlled industries and additional benefits from the government, ranging from beneficial bank credits to government subsidies (Zhou, Guo, Hua & Doukas, 2012). According to Kwan (2019), the USA is very sceptical of China's industrial policy "Made in China 2025". The industrial policy, created in 2015, describes how the manufacturing industry should develop and also in which industries Chinese companies should invest (Kwan, 2019). One might ask if China is crossing the line in terms of promoting their CBM&As too far to reach their government goals.

Chinese enterprises are also being challenged in that they overpay during acquisitions, especially for enterprises in developed economies (The Economist, 2017). In 2020, the European Commission announced a proposal stating that companies need to be transparent regarding support received from their state or government to conduct M&As within the European Union (European Commission, 2020; Ewing, 2020). According to Ewing (2020), the proposal is clearly aimed at China to ensure that Chinese firms can not use financial support from their government to outbid European firms. European countries, such as Germany, Poland, Austria and the Czech Republic, have already begun to pass policies and laws against certain CBM&As as protective measures (Ewing, 2020).

There are different ways to measure how the market value M&As. Previous research show that there is a positive significant effect on the *cumulative abnormal return* [CAR] when an acquisition is announced by a Chinese acquiring firm (Chi, Sun & Young, 2011; Lin, Li, Wan & Wei, 2020; Song, Tippett & Vivian, 2017; Tao, Liu, Gao & Xia, 2017), see Table 1 or Appendix 1.1. This indicates that investors on the Chinese stock market view an acquisition

as something that creates value for the firm and hence buying the stock, making it more valuable. The opinion of previous scholars regarding the value creation of M&As conducted by emerging economies are, in general, divided. Aybar and Ficici (2009) came to the conclusion that CBM&As lead to value destruction for emerging markets. In contrast, Bhagat, Malhotra & Zhu (2011) found that the market response for acquirers from emerging countries was positive. However, out of all the studies focusing on China, listed in Appendix 1.1, the most recent time that has been studied was in 2012 by Tao et al. (2017). It is therefore of great interest to research whether a more recent time period shows the same results as before, or more likely, something different since many years has passed. Do investors still seem to portray CBM&As as something that creates value for Chinese firms?

Earlier research concerning CAR of Chinese acquiring firms does not mention nor take *trading halt* into account, see Appendix 1.1. Trading halt, or trading suspension, is when a stock cannot be bought or sold for several hours, days, and sometimes even months (Xu, Zhang & Liu, 2014; He, Gan, Wang & Chong, 2019). During that time, many different events can take place and therefore potentially affect the movement of the stock price. Hence, the important component trading halt has not been researched in this context before. This opens up new opportunities to further explore the potential effects of trading halts in this study. The trading halts can be initiated either voluntarily or mandatory, and the authors He et al. (2019) found that trading halts overall resulted in negative abnormal returns. Additionally, they mentioned that the finance research concerning the effects of trading halt in emerging markets is barely explored.

CBM&As challenges are different from domestic M&As, such as divergent economies, and institutional, governance-related and cultural settings, for both the acquiring and the target firm (Nivorozhkin, 2020). However, CBM&As also show great upsides in regards to product and industry diversification, economies of scale and utilization of comparative advantages outside of one's own country. Due to the lack of recent research on short-term Chinese cross-border acquisition performance and the phenomena of trading halt, this research aims to give transparency in a nuanced light in regards to the effect on CAR.

Research Questions

- 1. Do Chinese acquirers create short-term shareholder wealth through cross-border acquisitions, measured through fluctuations of the stock price?*
- 2. If short-term shareholder wealth is created, what variables significantly affect the generated wealth?*

1.3. Purpose

The main purpose of this research is to examine if Chinese acquirers do create short-term shareholder wealth through cross-border acquisitions, measured through fluctuations of the stock price. Additionally, the second purpose is to investigate if the researched independent variables affect the short-term shareholder wealth and if any difference can be observed when dividing the observations based on trading halt.

1.4. Scope and Limitations

This thesis focuses on Chinese cross-border acquisitions between 01/01/2010 - 31/12/2018 for publicly traded firms on the Shanghai and Shenzhen stock exchange only. In addition, the thesis is limited by the acquisitions deals that can be collected from the database Zephyr by Bureau van Dijk as well as the stock data available in Thomson Reuters DataStream. Lastly, the thesis does not include nor research any financial ratios or measures.

1.5. Target Group

The thesis is of interest for investors that would like to learn more about Chinese cross-border acquisitions, and more specifically, how industrial, institutional and cultural aspects may affect their short-term stock performance. The findings of this study might also be compelling for other emerging economies since the research is focusing on China during a time in which the country promoted foreign direct investments through laws and regulations. Additionally, authors who have conducted research on Chinese cross-border acquisitions or trading halt may also find it interesting to read an up to date study with new added perspectives.

2. Motivations and Effects of M&A

This chapter presents theories about the motivations for engaging in M&A as well as frameworks to analyze the obtained results. The theories and the frameworks constitute the basis for the hypothesis formation in chapter 3.

2.1. The Stock Market Dynamics

2.1.1. The Efficient Market Hypothesis

Fama (1970) defines efficient markets as where prices provide correct indications for capital allocation and reflect all the available information. He further divides them into three different forms of efficiency. Firstly, he defines the weak form that only takes the information obtained from historical prices into account which means that it is not possible for investors to predict future changes in the stock price. Secondly, he defines the semi-strong form as when both historical and publicly available information is accounted for, which means that the price changes immediately as a response to new available information. Thirdly, he defines the strong form that takes all the pre-mentioned information into account, but also the private information which means that inside information is also reflected in the stocks' prices.

Fama (1970) makes the assumption that the stock price reflects all the available information, if the following criteria are being met: "(i) there are no transaction costs in trading securities, (ii) all public information is freely available to all market participants, and (iii) all agree on the implications of current information for the current price and distributions of future prices of each security" (Fama, 1970, p. 387).

2.1.2. Signaling Theory

Marketing signaling is when two parties engage in a type of information exchange where there is asymmetric information and it cannot be communicated directly (Kreps & Sobel, 1994). This means that one party knows something that the other party does not know (Kreps & Sobel, 1994). The theory describes how one party signals the information, which cannot be directly communicated, through an action or signal so that the unknowing party now has the information (Kreps & Sobel, 1994). This theory can be used in many different aspects. For example, Spence (1973) suggested that an employee signals his or her ability to work to a potential employer through her or his education.

2.2. Motivations for M&A

2.2.1. *The Theory of Competitive Advantages and The Resource Based View*

While managers can acquire with the intention of gaining growth and power, the resources do also play a big part in M&A decision-making. Ricardo (1819) states that the divergence among factor endowments and relative prices make enterprises engage in international trade. This theory is called the theory of competitive advantages, and is considered to be a powerful theory in economics. According to the resource-based view suggested by Barney (1991), competence and resources is controlling the competitive advantage of a company. If a company from an emerging market does not possess such key resources, it can conduct CBM&As to increase them (Gubbi, Aulakh, Ray, Sarkar & Chittoor, 2010).

2.2.2. *The Synergy Hypothesis*

Synergies within M&A are defined as the integrated value of company assets, so that the summed value of the assets are greater than the sum of the target and acquiring company individually (Ghosh Ray & Ghosh Ray, 2014). The value exceeding the normal value of the profit is per definition synergy, one of the predominant powers for CBM&A to take place and it is further supposed to enhance the value for the shareholders (Ghosh Ray & Ghosh Ray, 2014). The synergies can be divided into operating synergies and financial synergies:

- *Operating synergies* are based on the assumption that economies of scale are possible and are further defined as “increasing efficiencies with corresponding decrease in average cost of production due to spreading of fixed costs over more number of goods or services produced” (Ghosh Ray & Ghosh Ray, 2014, p.126). More specifically, economies of scale can include the sharing of distribution, production sites and marketing, making the fixed costs significantly lower as it spreads out over more units (Ghosh Ray & Ghosh Ray, 2014).
- *Financial synergies* address the availability, cost and risk associated with financial means (Ghosh Ray & Ghosh Ray, 2014). In addition, it is based on the idea that some industries and firms have lower growth opportunities, but more stable cash flows, while others have massive growth opportunities, but lack internal funds (Ghosh Ray & Ghosh Ray, 2014). By combining two firms with those characteristics, financial synergy is likely to happen since access to funds are combined with greater

investment opportunities (Ghosh Ray & Ghosh Ray, 2014). By contrast, if they were by themselves, one would have great internal funds but no opportunity to invest in high yielding projects while the other would have great investment opportunities but limiting internal funds to capitalize on them.

2.3. Institutional and Cultural factors in M&A

2.3.1. OLI-Framework

Dunning (1980; 1988; 2000) presents the OLI-framework, also commonly known as the eclectic paradigm, and explains why enterprises choose to make international entry decisions. The OLI-framework demonstrates a connection between the institutional quality of a firm and the decision making of M&As the firm is conducting. The framework further explains that countries might have a hard time to conduct CBM&As due to institutional distance, and that institutional differences between countries can affect the acquirer and its decision making (Dunning, 1980). Institutional distance involves cultural, political, geographical and economical distance and is affected by three different OLI-factors which are the main reasons why firms engage in multinational activities. A firm that has all of the three factors are considered competitive in the space of conducting international investments:

- *Ownership Advantages*: A firm is more probable to partake in a *foreign direct investment* [FDI] if they have more competitive advantages than their competitors.
- *Location Specific Advantages*: When taking part in FDIs, a firm needs to incorporate the ownership advantages with the targets geographical location advantages, which can include anything from assets access to cheap production equipment.
- *Internationalization*: The company-specific advantages that a firm possesses can either be made international through FDIs or licensed to other companies, and the choice is based on the institutional quality of the acquiring firm.

2.3.2. *The CAGE Distance Framework*

The CAGE framework developed by Ghemawat (2007) covers four aspects of distance between countries:

- *Cultural Distance* focuses on the interaction between humans. Greater cultural distance can be the result of different languages, ethnicity or religion. Different values, norms and dispositions can also increase cultural distance.
- *Administrative Distance* includes lack of colonial ties, common currency and shared regional trading block. Political hostility can also boost administrative distance.
- *Geographic Distance* is not only focusing on physical distance, but also if the countries are neighbours, their disease environments as well as differences in time-zones and climates.
- *Economic Distance* concerns rich-poor differences, economic size and low per-capita income. Other differences are quality or cost of financial resources, natural resources, human resources, infrastructure and information, which also affects the economic distance.

The use of the CAGE framework can be motivated by many aspects (Ghemawat, 2007), but in this research, two of the motives especially stands out. First, CAGE makes differences between countries apparent. Second, the framework makes it possible to understand the liability or disadvantages of foreignness. Some cultural disadvantages can include local biases in demand where local goods and services are more sought after in comparison to foreign products (Ghemawat, 2007). Administrative disadvantages can be present when other countries' governments discriminate against a country's products or firms (Ghemawat, 2007). Geographic distance disadvantages include for example, higher transporting costs or lack of infrastructure for communication (Ghemawat, 2007). Economic distance on the other hand, includes cost disadvantages of labor, managers, or restructuring (Ghemawat, 2007).

3. Empirical Research and Hypothesis Formulation

This chapter gives profound information on previous empirical studies and their findings on institutional distance, cultural distance and political distance. The variables competitive industry, industry relatedness and relative deal size will be examined correspondingly.

3.1. Market response to acquisitions by Chinese acquirers

The Chinese stock markets in Shanghai and Shenzhen opened 1990 as an attempt to moderately privatize the Chinese SOEs (Carpenter & Whitelaw, 2017). The Chinese Securities Regulatory Commission proposed the Split-Share Structure Reform in 2005, where non tradable shares listed by public firms got transformed into tradable shares, which symbolized a very crucial part in the development of the Chinese capital markets. Additionally, 80% of the enterprises in China have controlling shareholders and 77% classify the government as the majority stakeholder (Liao, Liu & Wang, 2011). Most of the shares traded on the stock market in China, specifically Shanghai and Shenzhen, are only allowed to be traded by domestic investors (Tao et al., 2017). There is quite a large number of investors called noise traders, defined as traders that might be responding more positively to information regarding cross-border acquisition because of their relative experience and lack of information regarding the matter (Tao et al., 2017). Additionally, there is also a Good-News-Chasing behavior that can be seen on the mainland stock markets of Shanghai and Shenzhen (Tao et al., 2017).

Table 1: Previous research focusing on Chinese acquisitions and the CAR

<i>Authors and Publication</i>	<i>Time period and Amount of deals</i>	<i>Significance</i>	<i>Publication</i>
<i>Chi, J., Sun, Q. & Young, M. (2011)</i>	<i>•1998-2003 •1148 deals</i>	<i><u>CAR:</u> [-2,2]**, [-1,1]***, [-2,0]***, [-1,0]***</i>	<i>Emerging Markets Review (article citation: 100 Google Scholar)</i>
<i>Li, J., Li, P., & Wang, B. (2016)</i>	<i>•2000-2011 •367 deals</i>	<i><u>CAR:</u> [-1,1]***, [-2,2]***, [-5,5]***</i>	<i>International Business Review</i>

Lin, X., Li, Y., Wan, X., & Wei, J. (2020)	•2010-2015 •472 deals	CAR: [-1,0]***, [-0,1]**, [-1,1]***, [-2,2]***, [-5,5]	Chinese Management Studies
Song, X., Tippett, M., & Vivian, A. (2017).	•1990-2008 •279 deals	CAR: [0]*, [9]***, [10]*	Research in International Business and Finance (article citation: 8 Google Scholar)
Tao, F., Liu, X., Gao, L. & Xia, E. (2017)	•2000–2012 •165 deals	CAR: [-1,0]***, [-0,1]**, [-1,1]***, [-2,2], [-5,5]	International Business Review (article citation: 83 Google Scholar)

Previously conducted research on Chinese acquisitions and their effect on the stock market in China. Significance level: *** = 1%, ** = 5%, * = 10%.

When acquisition by a Chinese firm is announced it can be seen as a signal to the market, based on signaling theory. The signaling theory has been used in other studies to describe the effect of acquisitions on the market in China (Lin, Li, Wan, & Wei, 2020; Tao et al., 2017). These signals point this out since Chinese involvement in cross-border acquisitions is quite new, and it might result in the market perceiving the announcement news as something positive (Tao et al. 2017). The authors further mention that the Chinese government's political and financial support, through different laws created for the Go Abroad Policy, might also be interpreted as a positive signal of CBM&As and thus resulting in a positive market reaction (also supported by: Lin et al., 2020). One can assume that the acquisition might lead to better competitive advantages and also through the resource-based view, make the acquiring company process new resources. Because of this, the acquisition might also signal better future performance. In the end, it comes down to how the market perceives the acquisition.

H1: Chinese acquiring firms show a significantly positive cumulative abnormal return around the announcement day of cross-border acquisitions.

3.2. The effect of Trading Halt

For both the Shanghai and Shenzhen stock exchange, there are four reasons that allow companies to use trading halts (He et al., 2019). Firstly, when the company believes that price sensitive information may be hard to keep confidential prior to announcement. Secondly, when the company interacts in an offer negotiation, asset restructuring or M&A. Thirdly, when there is an uncommon situation during a shareholder meeting. Lastly, when the company believes that the trading halt is necessary to keep the trading volume of the stock stable. Mandatory trading halts can be put into effect by the China Securities Regulatory Commission, which can suspend the stock from trading on the grounds of price manipulation, fraud, information leakage and other negative actions (He et al., 2019). According to He et al. (2019), there is a decline of trading halts between 2006 and 2016. They also concluded that the reasons behind the trading halts are quite similar on the Shanghai and Shenzhen stock exchange. During the time-period of their research, there were a lot less mandatory halts in relation to voluntary trading halts (He et al., 2019). They also found in their research that even before the trading halt had begun, the stock prices adjusted to the upcoming suspension which indicated that information about the halt was already public. The authors Xu, Zhang & Liu (2014) noticed that the effect of trading halts are mostly affected by negative news. However, as mentioned in chapter 3.1 the announcement could be seen as a positive signal, and the trading halt might result in more investors gaining knowledge about the acquisition over time, thus creating a greater response when the stock opens for trading again.

Since no other research concerning acquisitions made by Chinese firms is describing how they take trading halts into account, it is not possible to base the hypothesis development on earlier research. Even though most trading halts in the previous years seem to be voluntary, it can be expected that most trading halts are signaling something negative, since most of the trading suspensions are in fact indicating negative news about the company. In addition, there is also uncertainty about what would happen during the trading halt, since some of them can last for weeks and even months. Other events like earnings announcements and new product launches, which might not directly be the reason for the trading halt, can also happen during the suspension and thus affect the results when the stock starts trading. Earlier research made by He et al. (2019) showed an overall negative abnormal return created by the trading halt.

With trading halt lasting over multiple weeks or months, it is hard to know how the stock price will move when the stock is open for trading again, even if an acquisition announcement has been made during the suspension period. In addition, the lacking research has not reached a consensus on the topic, which leads to the following hypothesis for this study.

H2: Trading halt will significantly affect short-term shareholder wealth positively when Chinese acquiring firms announce cross-border acquisitions.

3.3. Market Size

The market size of the host country is proven to significantly affect the Chinese FDI's positively (Buckley, Clegg, Cross, Liu, Voss & Zheng, 2010). Research from Feenstra & Wei (2010) also showed that the target country's real GDP affected the number of FDI's as well as the stocks in China, but that the result had a negative impact and was not significant when the effect of tax havens were present. Cheung & Qian (2009) measured the market-seeking motives with three variables, showing that GDP is significant and affecting Chinese outward direct investments negatively when targeting developing countries, but that the results are positive and significant when targeting developed countries. Given the results of GDP significantly affecting Chinese FDI's positively, it is interesting to research whether the market size of the target country in Chinese cross-border acquisitions is showing a similar effect.

H3: Market size significantly affects short-term shareholder wealth positively when Chinese acquiring firms announce cross-border acquisitions.

3.4. Competitive industry

As M&A is one of the main ways for companies to expand globally, it is also viewed as an important tool for growing the market share within industries. According to Grave, Vardiabasis & Yavas (2012), M&A activities are from the very beginning about increasing size, and by that enhance productivity. According to Sun et al. (2012), China has a comparative advantage in manufacturing industries. Nicholson & Salaber (2013) found that Chinese shareholders gain more short-term wealth from cross-border M&As conducted within the manufacturing industry. However, it is worth noticing that Chinese enterprises are

increasing their investment activities within research and development in industrialized countries (Deng, 2007) and Chinese firms are more often conducting CBM&A in order to take advantage of advanced technologies (Wang, Charifzadeh & Herberger, 2020; Blau, 2017). Therefore, it is interesting to research whether Chinese acquirers still gain abnormal returns when acquiring companies in the manufacturing industry.

H4: Shareholders of Chinese acquiring firms experience significantly more favorable cumulative abnormal returns when the target firm's primary industry is manufacturing.

3.5. Industry Relatedness

The chance of a cross-border acquisition to occur is more likely when industry relatedness is present (Lim & Lee, 2016) which is a measure of familiarity between the acquiring and the target firm. Bhabra & Huang (2013) demonstrated through their research that it is important for Chinese acquirers to continue to increase their market share, and that most of the M&A transactions occur when the acquiring and the target firm are within the same industry. In addition, previous studies have found industry relatedness to be positively correlated with CAR (Akbulut & Matsusaka, 2010; Slangen, 2006; Zhang, Lyles & Wu, 2020) and therefore arriving at the conclusion that the market is reacting positively to an acquisition announcement. Furthermore, Bhabra & Huang (2013) studied Chinese M&As between 1997-2007 and showed that industry relatedness would positively affect the short-term CAR. On the contrary, the research of Nicholson & Salaber (2013) found that industry relatedness affected the CAR of Chinese acquiring firms negatively in the short-term during the years of 2000-2010. Since the results are mixed, there is room for more research on how industry relatedness is affecting Chinese bidders in recent times.

H5: Shareholders of Chinese acquiring firms experience significantly more favorable cumulative abnormal returns when the target firm operates within the same industry.

3.6. Relative Deal Size

The influence the size of the deal value has on the stock price is debatable among researchers. Mulherin & Boone (2000) explained that a large deal can affect the stock price negatively, as it would take longer time to complete the acquisition as opposed to a smaller deal. Alexandridis, Fuller, Terhaar & Travlos (2013) found that large deals, compared to small deals, destroy more shareholder value partly due to their inherent complexity, which is similar to the research made by Mulherin & Boone (2000). Moreover, Moeller, Schlingemann & Stulz (2004) found that smaller acquirers experienced an increased 1.59 percentage points in their abnormal return compared to larger acquirers. On the contrary, the larger the acquisition, the greater the chance of achieving economies of scale, for instance in management and production (Aybar & Ficici, 2009). Martynova & Renneboog (2008) researched how relative deal size affected CAR through corporate regulations in CBM&As and found no significant impact. Additionally, a large and successful acquisition could increase the combined value of the two companies that is greater than the sum of each company alone (Lamacchia, 1997). Other research by Dell'Acqua, Etro, Piva & Teti (2018) found that BRICS¹ countries and their relative deal size significantly affected CAR in the short-term. Similarly, Bhagat, Malhotra & Zhu (2011) found a positive relationship with the variable and the returns of the acquiring company in emerging economies. While many studies have been conducted where the relative deal size is analyzed, not much research has been done regarding deals from China. Due to the lack of previous research of the effect on Chinese bidders specifically, as well as the lack of consensus on the potential impact of relative deal size, it is interesting to research whether the relative deal value has any effect on the stock price and thus the shareholder wealth of Chinese acquiring firms.

H6: Relative deal size significantly affects shareholders' cumulative abnormal returns in Chinese cross-border acquisitions.

3.7. Institutional Distance

The regulations concerning a country's capital market and the quality of it has been proven to be very important when it comes to strengthening the stock market, as well as playing a big part in organizational decisions (DiMaggio and Powell, 1983). In order to create a profound basis, the institutional and regulatory systems need to be strong. Meyer, Ding, Li & Zhang

¹ Brazil, Russia, India, China and South Africa

(2014) stated that high degrees of regulation pressure is appealing for acquisitions, since the authorities in the acquiring country often dictate high levels of control in ownership structure and taxes. Not to mention that the institutional framework is utmost crucial to establish M&As between acquiring and target countries.

Dikova, Sahib & van Witteloostuijn (2010) define institutional distance as the degree of deviation in institutional environments between the acquiring country's enterprise and the target country's enterprise, and point out that institutional development of the acquiring company can increase the probability of conducting an acquisition in that country. However, specifically for China, Zhou et al. (2012) arrived at the conclusion that Chinese acquisitions often occur with countries of deficient institutional background. Chen & Young (2009) found support that the Chinese government is advocating for M&A deals although it would not be creating shareholder value. Regarding political stability, fragile institutional laws are often preventing foreign entities from investing in the local economy (Collins, Holcomb, Certo, Hitt & Lester, 2009).

Following a CBM&A, the possibility of the acquiring company achieving profits can differ, as the formal institutional distance can vary between targets and acquirers. Tao et al. (2017) analyzed how institutional distance between China and its target country affected the long term profitability of the acquiring firm, and arrived at the conclusion that return on assets and return on equity were positively affected by formal institutional distance. Otto, Sampaio & Silva (2020) showed that institutional status of the target country is significantly affecting the CAR of the acquiring firm across companies from 14 countries, where higher returns were gained from conducting CBM&As in countries with lower institutional development. Previous studies have therefore arrived at the conclusion that Chinese CBM&As are affected by institutional development in China in relation to the level of institutional development of the target country. Therefore, it is interesting to research if the institutional distance between the target country and China is significantly affecting CAR for Chinese bidders.

H7: Institutional distance between the target country and China has a significant effect on cumulative abnormal return of Chinese acquiring firms.

3.8. Cultural Distance

The cost and difficulty of CBM&As are affected by both country and firm-specific benefits and disadvantages (Nicholson & Salaber, 2013). Kirkman, Lowe, and Gibson (2006) concluded in their research, regarding Hofstede's and other cultural distance frameworks, that Hofstede is the most influential framework, and according to the Social Science Citations Index, the model is also the most cited cultural classification system. However, they also explained that Hofstede's model has been criticized. First, they mentioned that Hofstede's model reduces culture into five dimensions and therefore not capturing the entire culture. Moreover, the authors brought attention to the fact that Hofstede fails to capture how the culture changes over time. Lastly, one critical view, according to the authors, is the fact that the model does not account for cultural heterogeneity within the countries.

According to Ghemawat (2007), who created the CAGE framework, different values, norms and dispositions are reasons behind a further cultural distance. To dimensionalize the cultural distance, Hofstede's model can be used and has been used by many authors researching CBM&As (Chakrabarti, Gupta-Mukherjee & Jayaraman, 2008; Nicholson & Salaber, 2013). Hofstede (1994; 2011) divided culture five in different dimensions:

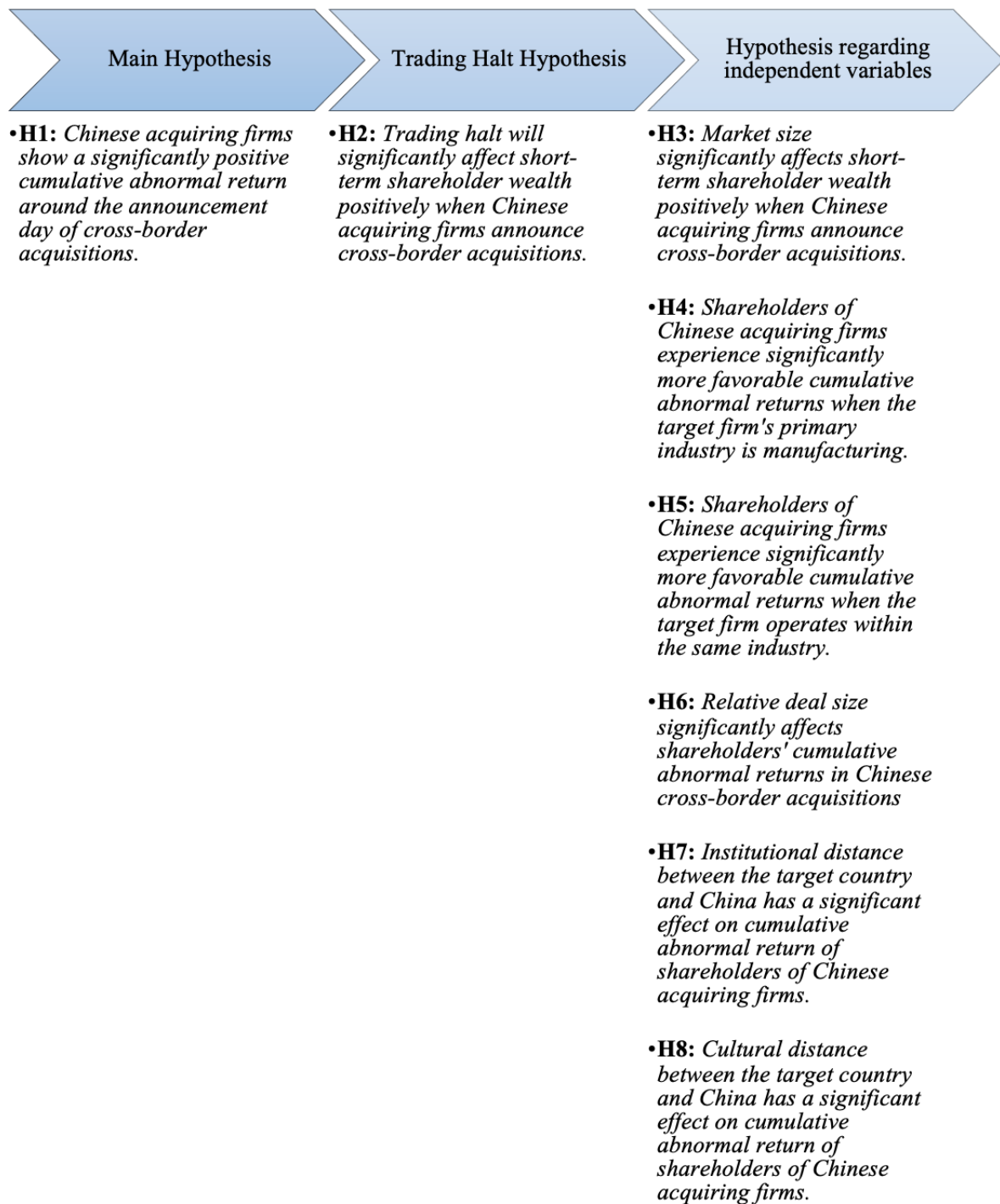
- *Power Distance* captures how power distribution is accepted and expected to be divided within organizations and institutions, but from the less powerful members' view, so that it also represents inequality (1994; 2011).
- *Uncertainty Avoidance* reflects a society's acceptance for ambiguity and is not the same thing as risk avoidance, Hofstede (2011) clarifies. In short, it captures whether individuals within a culture are comfortable or not in situations that are not structured (Hofstede, 2011).
- *Individualism versus Collectivism* illustrates if individuals within one culture are more or less integrated into groups. In workplaces where more individual culture tasks prevails, relationships and people are seen as resources while in a collective culture the opposite is true (Hofstede, 1997).

- *Masculinity versus Femininity* explains that on the femininity side, men and women tend to share more values, while on the masculinity side, there is a larger focus on assertiveness and competitiveness. On the masculine side, few women are elected to political positions (Hofstede, 2011). In the workplace with a more prominent feminine culture, assertiveness is ridiculed, individuals undersell themselves and people tend to rely more on intuition with a higher priority for life quality than an ambitious career (Hofstede, 1994).
- *Long Term versus Short Term Orientation* shows how individuals within different cultures are more or less focused on what is now or what is to come (Hofstede's, 1994; 2011).

According to Nicholson and Salaber (2013), Chinese multinational enterprises lack cross-cultural knowledge, fluent communications skills, management experience abroad, and fluency in English which lead to greater cultural distances. The examples brought up by Nicholson and Salaber (2013) are also examples that lead to greater distance between countries according to the CAGE framework (Ghemawat, 2007). In the study by Chakrabarti, Gupta-Mukherjee, and Jayaraman (2008), based on Hofstede's model where CAR was also used, they conclude that CBM&As with smaller cultural distance are significantly more valued on the stock market and thus showing a greater significant abnormal return. Li, Li, & Wang (2016) also showed through their research on cultural distance, that cultural distance, combining all dimensions, significantly affects CAR of the acquiring Chinese firms, see Appendix 1.1. However, their study focused on an earlier time period than the one researched in this study.

H8. Cultural distance between the target country and China has a significant effect on cumulative abnormal return of shareholders of Chinese acquiring firms.

Figure 1: Summary of the hypothesis



4. Methodology

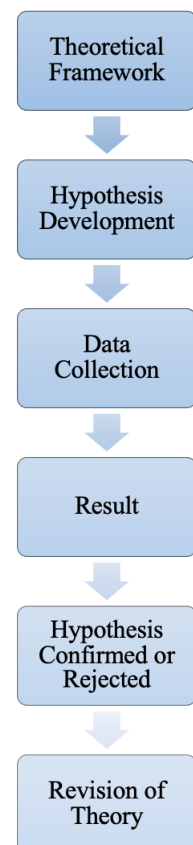
This chapter explains the overall methodology, including the data collection process, the models as well as the assumptions that underlie the study. Additionally, it gives clear arguments as to why certain models have been chosen but also their potential shortcomings. The regression model is further explained as well as different statistical tests. Lastly, a critical discussion on the overall methodology presented.

4.1. Research Approach

There are two common approaches when conducting business research, a deductive and an inductive approach. While a deductive research method uses existing theory to form hypotheses, guide the data collection and present the findings and finally accept or reject the hypothesis, an inductive approach reverses the order, where the findings or observations are gathered first and later generalized into new theories (Bell, Bryman & Harley, 2019). This study is built on relevant financial research which substantiates the hypothesis development and will at last be applied to the findings of the study where the hypotheses are either accepted or rejected. Hence, a deductive research approach has been adopted, see Figure 2. However, since the deductive method is not a linear or completely sequential approach (Bell, Bryman & Harley, 2019), some instance of the inductive method has been applied to this study. For example, the hypothesis and theories have in retrospect been slightly modified to fit the data that was collected for this study.

Another aspect of business research is to consider whether it will be qualitative or quantitative. According to Bell, Bryman and Harley (2019), quantitative research involves a quantitative orientation in regards to both the collection and the analysis of the data. Furthermore, it usually uses a deductive approach, a scientific model and views reality in an objective manner (Bell, Bryman & Harley, 2019). On the other hand, a qualitative strategy would to a much greater extent try to explain theory in a subjective and non objective manner (Bell, Bryman & Harley, 2019). Since this study aims to research the statistical significance, if any, of certain hypotheses as well as to explain an objective truth, a quantitative approach is the most suitable option and has therefore also been chosen.

Figure 2. The deductive research approach



Source: Adapted from (Bell, Bryman & Harley, 2019).

4.2. Event Study Overview

The purpose when constructing an event study is to measure the impact of a certain event happening, for instance how earnings announcements, IPO's or M&A announcements affect a firm's value (MacKinlay, 1997). Furthermore, the method assumes that capital markets are efficient² or else any abnormal effects of the researched event would not be possible to capture nor measure. Brown and Warner (1980) further described an event study as “a direct test of market efficiency” (p.205). Hence, the lower the efficiency of the market, the less relevant the event study becomes.

MacKinlay (1997) continued to explain that the first steps of conducting an event study is to define the event, the event window, and finally the estimation window. The event is the specific event of interest, the event window is the period in which the stock prices are observed and lastly the estimation window fills the function as the benchmark or proxy for the event window³ (MacKinaly, 1997). To measure the effects of the event, the observed stock prices during the event window will for each day be subtracted by the normal return calculated from the estimation. The sum of the difference is the CAR which later will be tested in the regression model as the dependent variable.

The event study methodology has been used extensively, not only finance research, but also in other academic fields such as economics and law (MacKinlay, 1997). More specifically, the method has been used by Fama, Fisher, Jensen & Roll (1969), who studied whether new information regarding stock splits were reflected in the stocks' prices and Ball & Brown (1968) who researched how net income information and the timing of the same is affecting securities prices. More recent studies like (Liu, Li, Yang & Li, 2019; Lin, Li, Wan & Wei, 2020) have also used the event study method. This shows that the methodology has been widely accepted in finance research and used continuously for over 50 years.

² The definition of efficient capital markets can be found in section “3.1.1. *The Efficient Market Hypothesis*”.

³ The benchmark or proxy is also known as the normal or expected return.

4.3. Event Study Details

4.3.1. *The Market Model*

In traditional event studies, there are usually two different models used for calculating the normal returns, the constant mean model and the market model (MacKinlay, 1997). While the constant mean model builds on the assumption that the return of any given security is perpetual over time, the market model takes a different approach and assumes a linear relation between the return of the market and the return security (MacKinlay, 1997). This means that the market model, in comparison to the constant mean model, accounts for the market fluctuations that happen during the same period as the defined event itself (Brown & Warner, 1980)

In the study “Measuring Security Price Performance”, Brown & Warner (1980) compared multiple event methodologies, specifically regarding the estimation of normal return. Not only did they conclude that “beyond a simple, one-factor market model, there is no evidence that more complicated methodologies convey any benefit” but also that the more complicated models can potentially make the study worse off (p.249). In addition, Dyckman, Philbrick & Stephan (1984) found that the market model significantly outperformed both the simple mean adjusted model as well as the more complex market-adjusted return model at the 5% significance level. For those reasons, the market model has been determined to be the safest and best model for the event methodology.

The equation below shows the mathematical equation for the market model where R_{it} and R_{mt} are the return for stock (i) and market (m) for time period (t), respectively. The alpha (α) and beta (β) are two variables in the model which determine the linear relation between the return of the stock (i) and the market (m) (MacKinlay, 1997). The last parameter of the model is the error term ϵ of stock (i) which is not related to the market and should therefore under the assumption of the model be set to zero (Corrado, 2011).

Equation 1: The Market Model

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

Source: MacKinlay, 1997

See Appendix 2.6 for variable explanation.

4.3.2. *Market Index*

When using the market model, a market index or proxy for the market return should be included to calculate the expected return⁴ (MacKinlay, 1997). Since this study focuses on China, both the Shenzhen Stock Exchange Composite Index and Shanghai Stock Exchange Composite Index will be used as the market return. The reason is simply because there are enterprises in the data sample that are listed on either of the stock markets and to capture a representative index, both have been used. This is in line with previous studies such as Nicholson & Salaber (2013) and Wang, Charifzadeh & Herberger (2020) who also used these indices as benchmarks.

4.3.3. *Event Day*

The acquisition announcement date has been defined as the event of this study, which is the only reasonable event when studying the short-term wealth effects on shareholders (the market) after an acquisition announcement.

4.3.4. *Event Window*

When defining the event window, it is important to consider the assumptions that underlie the event study methodology. The most important, is the assumption that capital markets are efficient (MacKinaly, 1997). Furthermore, Nicholson & Salaber (2013) argued for the fact that due to insider trading and suboptimal regulatory environments, emerging markets are not as efficient as developed markets. Additionally, Cajueiro & Tabak (2004) found similar supporting evidence showing that Asian equity markets were less efficient to that of Latin America and other developed markets. However, more recent research does not support the same view since Griffin, Kelly & Nardari (2010) found that short-term reversal, port-earnings drift strategies and return momentum did not significantly differ between developed and emerging markets. Moreover, they concluded that both emerging and developed markets experience similar autocorrelation in firm returns. In other words, they were more or less indifferent.

Due to these conflicting views, both shorter and longer event windows were used in this study to mitigate the risk of excluding expedited or delayed price fluctuations as a result of market imperfections. The first event window [-1,0], measures the CAR over 2 days, one day

⁴ Expected return and normal return is used interchangeably throughout the study.

before the event day and on the event day itself. At first, it might seem unusual to measure one day before the announcement, as one could assume nothing should, in perfect capital markets, happen then. However, in order to test for information leakage and information asymmetry, it is necessary to take days prior to the event (Alon, Anderson, Munim & Ho, 2018). This event window has also been replicated in earlier studies for similar reasons (Alon et al. 2018; Tao et al., 2017). The second and third event window $[-1,+1]$, $[-2,+2]$ measure the CAR for 3 days and 5 days respectively, both before the event, on the event as well as after the event. This is done to capture potential spillover effects after the acquisition announcement and continued price adjustments which could, according to Aggarwal & Chen (1985), last for several days after the event. These event windows are also frequently used in prior research when analyzing the short-term market effects for various events (Bhabra & Huang, 2013; Chi, Sun & Young, 2011; Tao et al., 2017).

Table 2. Event Windows

Event Window	Number of Days
$[-1,0]$	2
$[-1,+1]$	3
$[-2,+2]$	5

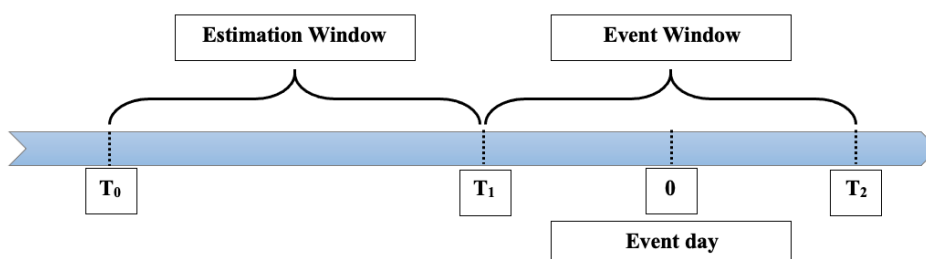
The negative operator (-) indicates the number of days before the event day (0) and the (+) operator indicates the number of days after the event day (0).

4.3.5. Estimation Window

For the market model, the estimation window is used to estimate both the alpha (α) and beta (β) for all the securities in the sample that later will be used to calculate the cumulative expected returns over each event window. When deciding on the length of the estimation window, it is important to consider both pros and cons of having a longer or shorter window. The same logic as with the general data collection is true for the estimation period - the longer the period, the greater the accuracy of the estimation of α and β , but at the cost of them being more outdated and potentially far from correct at the time of the event windows (Armitage, 1995). In contrast, a shorter estimation window results in more up to date α and β but, as a result of fewer observations, is exposed to the risk of being more inaccurate (Armitage, 1995).

There are many different interpretations on the optimal length of the estimation window. Locke, Duppati and Lawrence (2011) did use a shorter estimation period of 100 days prior to the event window, while Fischer (2015) used 190 days before the announcement of the acquisition. However, Francis, Hasan & Sun (2008) used an estimation window of 255 days, and Campbell, Lo and MacKinlay (1997) used 250 trading days before the chosen event window. Moreover, Peterson (1989) mentioned that the estimation window for previous research, specifically when observing the daily returns, have normally ranged from 100 to 300 days. With these studies in mind, the estimation window for this study has been set to 200 trading days before the start of the event window, in similarity with previous research (Uddin & Boateng, 2009; Li & Yang, 2020; Graham, Lemmon & Wolf, 2002). Hence, a decision has been made to compromise equally on the spectrum of relevance and accuracy when choosing an estimation window around the average length of previous literature.

Figure 3. Event Study Timeline



Source: (Adapted from MacKinlay, 1997)

4.3.6. Daily Return

To observe fluctuations, if any, in the stock price during the event window, the daily return has been calculated for all the stocks, as well as the Shanghai Stock Exchange Composite Index and the Shenzhen Composite Index using Equation 2 and Equation 3.

Equation 2: Daily Stock Return

$$R_{it} = \frac{P_{it} - P_{i(t-1)}}{P_{i(t-1)}}$$

R_{it} = Actual Stock_{*i*} Return for Time Period_{*t*}

P_{it} = Price of Stock_{*i*} for Time Period_{*t*}

Equation 3: Daily Market Return

$$R_{mt} = \frac{P_{mt} - P_{m(t-1)}}{P_{m(t-1)}}$$

R_{mt} = Actual Market_{*m*} Return for Time Period_{*t*}

P_{mt} = Price of Market for Time Period_{*t*}

By taking the closing price of day (t), subtracted by the closing price of the same stock on day (t-1), and then dividing it by the closing price of day (t-1), the daily return is calculated. The same logic applies to both the market return calculations as well as the stock return calculations.

4.3.7. Estimating Beta, Alpha and Normal Return

The normal return is simply the return of the stock if the event would not happen (MacKinlay, 1997). Thus, an indicator of what the return is normally. Before calculating the normal return, the beta and alpha for the stock must be estimated using Equation 4 and Equation 5 respectively.

Beta is a measure of the systematic risk, and a value of one means the stock has the same exact correlation as the market. In other words, the movement or fluctuation of the stock and

the market would be identical. A beta greater than one indicates that the volatility of the stock increases whereas a beta less than one indicates the opposite. Moreover, a beta greater than zero means that the stock moves in the same direction as the market. For instance, if the market goes up, so does the stock, whereas a beta less than zero means that the stock and market moves in opposite directions. The beta for all stocks in the sample are calculated by using Equation 4 and an estimation window of 200 trading days up until, but not including the event window, see Figure 3 (T_0-T_1).

Equation 4: Beta Estimation

$$\hat{\beta}_i = \frac{\sum_{\tau=T_0+1}^{T_1} (R_{i\tau} - \hat{\mu}_i) (R_{m\tau} - \hat{\mu}_m)}{\sum_{\tau=T_0+1}^{T_1} (R_{m\tau} - \hat{\mu}_m)^2}$$

Source: MacKinlay, 1997.

Alpha on the other hand, is a measure of the excess return, if any, based on its beta value or the systematic risk⁵. Thus, alpha is the actual stock return less than the beta of the stock, multiplied by the return of the market, stated in Equation 5. If the alpha is greater than zero, the stock has an excess return and performs better than expected, and if alpha is less than zero, the opposite is true. The alpha for all stocks in the sample are calculated by using Equation 5 and an estimation window of 200 trading days up until, but not including, the event window.

Equation 5: Alpha Estimation

$$\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_m$$

Source: MacKinlay, 1997.

After both the beta and alpha has been estimated, the normal or expected return of each stock can be calculated using Equation 6. Intuitively, the beta is multiplied by the market return and the alpha is thereafter added, which equals the normal return. In other words, the greater the risk, the greater return should be expected from the stock.

⁵ Beta and systematic risk will be used interchangeably.

Equation 6: *Normal Return Estimation*

$$E(R_{i\tau}) = \hat{\alpha}_i + \hat{\beta}_i R_{m\tau}$$

Source: MacKinlay, 1997.

4.3.8. *Cumulative Abnormal Return*

The abnormal return [AR] is defined as the actual return subtracted by the expected return, see Equation 7 (MacKinlay, 1997). Then, the cumulative abnormal return is received by adding the AR for consecutive days, over an event window, illustrated in Equation 8. Lastly, the cumulative average abnormal return is calculated by taking the average of CAR as shown in Equation 9.

Equation 7: *Abnormal Return*

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}$$

Source: MacKinlay, 1997.

See Appendix 2.6 for variable explanation.

Equation 8: *Cumulative Abnormal Return*

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau}$$

Source: MacKinlay, 1997.

See Appendix 2.6 for variable explanation.

Equation 9: *Cumulative Average Abnormal Return*

$$CAAR = \frac{1}{n} \sum_{i=1}^n CAR(t_1, t_2)$$

Source: MacKinlay, 1997.

See Appendix 2.6 for variable explanation.

4.4. Data Sources and Collection Process

4.4.1. *Zephyr Database by Bureau van Dijk*

The Zephyr database has rich and prominent M&A data with detailed information regarding the M&A specific features, such as cross-border deals, announcement dates, transaction values, and Standard Industrial Classification Codes (SIC-Codes). In addition, it was simple to filter out the data with specific company and deal requirements, and further export it to Excel for continued analysis.

4.4.2. *DataStream and Thomson Reuters Database*

While the Zephyr database had very prominent and detailed M&A data, it also had some weaknesses, especially regarding the lack of stocks' price information. To eliminate the risk of gathering incorrect data, DataStream complemented Zephyr and was used to extract the daily stock prices as well as the market capitalization for the acquiring firms. However, since DataStream was missing data on the Shenzhen Stock Exchange Composite Index, Thomson Reuters Eikon was instead used to collect both the daily Shanghai Stock Exchange Composite Index and the daily Shenzhen Composite Index respectively.

4.4.3. *Other Data Sources*

The World Bank offers a wide range of worldwide developmental data including financial, environmental and economic data sets. It was therefore easy to collect both the gross domestic product for each country and year. Moreover, World Bank was also used to gather the World Governance Indicator data, which was needed to calculate the institutional distance. Lastly, the data that was used to calculate cultural distance was collected from Hofstede Insights' website.

4.4.4. *Data Collection Process*

The process of collecting data from DataStream was straightforward; find the acquired company and choose the daily stock prices as well as the market capitalization for the time period. A problem that quickly arose however, was the fact that many of Chinese companies had different names in Zephyr and DataStream, which made it difficult to find and validate the original sample from Zephyr in DataStream. To remedy this, a comprehensive validation process took place. More specifically, each and every public company has a unique stock ticker symbol. This symbol stays consistent and does not change when or if the company

changes its name. It was therefore easy to validate each company, even if they had changed names over the years by using the ticker symbol and therefore be able to ensure that the right data was collected. Even with the solid validation process, many firms were not available on DataStream which inevitably resulted in a decrease in the sample size⁶.

4.5. Data Selection Criteria

4.5.1. *Geographical Market*

To examine the effects of cross-border acquisitions from Chinese firms, the study will solely focus on the geographical area of mainland China, thus excluding Hong Kong and Macau. Furthermore, only acquirers listed on either the Shenzhen Stock Exchange or Shanghai Stock Exchange will be included in the data set. The reason for studying China has to do with the fact that developed markets, such as the USA and the UK, have dominated the space in M&A literature for the last 30 years (Mateev 2017; Datta & Paui 1995).

4.5.2. *Time Period*

When choosing the time period for an empirical study, there is always a tradeoff between finding enough data and finding relevant data. Choosing a longer time period will increase the number of observations and make the data set more statistically robust, but it also comes with the risk of including outdated data. On the other hand, choosing a shorter time period will include only relevant and up to date data, but run the risk of not containing enough observations to analyze its statistical significance.

The time period, 01/01/2010 - 31/12/2018 has been chosen for this study, and there are three main reasons for deciding on this specific period. First, the financial crisis hit the world hard in 2008 and lasted till around mid 2009 (Liow & Ye, 2017; Dungey, Milunovich, Thorp & Yang, 2015). To decrease the risk of including the effects of the crisis, the year of 2010 was chosen as the starting point. Secondly, the USA is one of the most attractive targets for Chinese acquisitions. Moreover, since stricter regulations, concerning outward FDIs and the trade war between China and the USA that occurred in 2018, the risk of negatively affecting the data increases (Junzhi et al. 2020). Thus making the findings in this study less reliable. More specifically, these effects contributed to a staggering 59 percent decrease in transaction value of announced M&A's in 2018 (Zero2IPO Research Center, 2020). However, in the same year, the number of cross-border M&A deals surprisingly increased from 205 to 227

⁶ Find a more elaborated discussion about the missing data in section 4.12.6.

and it was not until 2019 that the number of deals significantly decreased to 128 deals. This is a staggering 44% decrease, which is the greatest drop since 2009 (Zero2IPO Research Center, 2020). Hence, the end of 2018 was chosen as the cutoff period for this thesis. Finally, the 9-year period (2010-2018) was the most recent period available to research where both relevant and enough data was found, as well as when the least amount of research on this topic has been published. Thus, the authors believe this study will shed some nuanced light on the already existing and rich M&A literature.

Table 3: Data Filtering Process

Steps	Database	Criteria	Description	Number of Announced Acquisitions
1	Zephyr	Public Companies	The acquiring company must be public.	369,165
2	Zephyr	Deal Type	Acquisitions.	192,910
3	Zephyr	Ownership	The acquiring company must not own more than 49% of the target company before the acquisition and no less than 51% of the target company after the acquisition.	123,163
4	Zephyr	Time Period & Deal Status	01/01/2010 – 31/12/2018 and announced acquisitions.	56,429
5	Zephyr	Geography	Cross-border deals from China.	456
6	Zephyr	Acquirer Country Code	Cross-border deals from mainland China only.	439
7	Zephyr	Target country code	Cross-border deals outside of China	433
8	Zephyr	Acquisition Transaction Value	Include all acquisitions with an available transaction value	331
9	DataStream	China Stock Market	The acquiring company must be listed on either Shanghai Stock Exchange or Shenzhen Stock Exchange and data must be available on DataStream.	279

10	DataStream	Relative Deal Size	The relative deal size (acquisition transaction value divided by acquirer's market capitalization) must be greater than 2% and less than 150%.	131
11	Zephyr & DataStream	Multiple Announcements	Acquirers with acquisitions announcements within the event window are excluded ⁷ .	122
12	Hofstede Insight	Missing Values	Countries with data are included.	118
13	Zehpyr	Countries in Tax Haven	Countries defined as tax havens are excluded.	99

Source: Zephyr by Bureau van Dijk, Thomson Reuters DataStream & Hofstede Insights

4.6. Trading Halt Classification

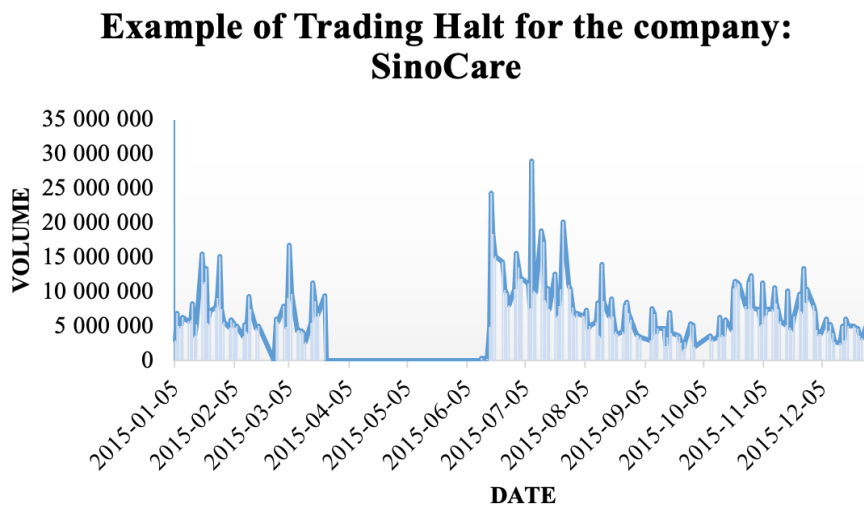
The distinction between a stock trade halt and a thinly traded stock is not always clear and the result of both can, not surprisingly, be the same. A thinly traded stock is defined as when no trading whatsoever takes place. Since there is not any established scientific way of classifying a trading halt, this study takes on a new method in doing so.

The first step, and initial sorting, is to filter out all the stock which had a daily return equal to zero when the comparative index did not have a daily return equal to zero. In other words, making sure that a return equal to zero was not caused by the fact of a closed stock exchange. Secondly, a year's worth of trading volume, during the year of the event was analyzed to figure out the average trading volume for each of the stocks on trading halt. This was done by searching for each stocks' ticker symbol on Bloomberg, downloading its historical trading data and analyzing the data in Excel. Lastly, the authors of this research concluded that if the stock had a trading voluming far exceeding zero during the days it was not zero, it was classified as a trading halt and not a thinly traded stock.

⁷ To include stocks with multiple acquisition announcements could potentially change the stock returns compared to if only one acquisition announcement was made. Since the rest of the data set only has one announcement during the event window, deals with two were not included in the sample.

Figure 4 shows an example of how the trading volume for SinoCare Inc. changed during the year of the event. Without diving into the specific numbers, it can be concluded that the stock could not possibly be an illiquid stock, since the average trading volume before it went to zero was close to 7 million and close to 7.5 million afterwards, but rather suspended from trading during mid 2015. This analysis was repeated for all stocks with a return equal to zero during the event window.

Figure 4: Trading Halt example



Source: Bloomberg

4.7. Regression Model Overview

When conducting econometrical research, regression analysis is one of the most prominent used tools. It describes the connection of two or more variables and if motion in one or more variables causes motion in a given variable (Brooks, 2019). The variable that is given is the dependent variable and the variables that could potentially cause motion in the dependent variables are called independent variables (Brooks, 2019). As this study conducts research on more than one independent variable, the assumption that the dependable variable CAR is affected by more than one variable is made based on results from previous research. Therefore, a multiple regression model will be applied.

4.7.1. Multiple Linear Regression model

Brooks (2019) describes the multiple regression model. The independent variables $x_{1i}, x_{2i}, \dots, x_{ki}$ are researched in order to derive a conclusion of if they affect the dependent variable y . The β is the coefficient estimate which shows the impact the independent variable x has on the dependent variable y . An important distinction with the interpretation of β in the multiple regression model compared to a simple regression model, is that the coefficients only partly describe the effect on y , in relation to the effect that all the other independent variables have on y . Therefore, the coefficients for each independent variable demonstrates the average shift in y per unit shift in x . Lastly, e is the error term in the regression (Brooks, 2019). The multiple regression model equation can be described as below:

Equation 10: Multiple Regression Model

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + e_i$$

Source: Dougherty, 2016

See Appendix 2.6 for variable explanation.

For the regression model and as well as the results to be correct, six assumptions must be satisfied (Dougherty, 2016):

1. *The model is linear in parameters and correctly specified*

For a linear model to exist, all the beta parameters, also known as the coefficients, must be linear without any built-in relationships. Additionally, the model is correctly specified if the independent variables are uncorrelated with the error term, e_i (Dougherty, 2016).

2. *There is some variation in the regressor in the sample*

When two or more independent variables are strongly intercorrelated, meaning their linear relationship is close to -1 or 1, the results from the regression model might be skewed or misleading. This is caused by the errors in the coefficients estimates which lead to multicollinearity in the regression model (Dougherty, 2016). In that case, the model will become sensitive to eventual adjustments and lead to wrong conclusions from significance tests (Brooks, 2019). To test for multicollinearity, different methods

can be used. The first step is usually to check the correlation between all independent variables in the regression model (Dougherty, 2016). If any independent variables have a correlation exceeding 0.8, the model might suffer from multicollinearity. Additionally, a variance inflation factor test can test the impact of the correlation between independent variables to the coefficients (Curto & Pinto, 2010).

3. *The expected value of the disturbance term is zero*

It is assumed that the disturbance term in any observation is equal to 0. Obviously, this is rarely the case but it is important that no systematic tendency, positive or negative, is present in the disturbance term (Dougherty, 2016). According to Brooks (2019), if a constant term is present this assumption will always be satisfied.

4. *The disturbance term is homoskedastic*

The assumption of a homoskedastic disturbance term is assumed to be met if the variance of the disturbance term is constant (Brooks, 2019). Should the variance not be constant, then the disturbance term is heteroscedastic. To test for heteroscedasticity, the Goldfeld-Quandt test or White test can be used.

5. *The values of the disturbance term have independent distributions*

If the disturbance terms are correlated with each other, then autocorrelation is present and the disturbance terms are not independent (Brooks, 2019). For the assumption to be satisfied, the covariance between the disturbance term must zero (Brooks, 2019). For instance, if the value of the disturbance term is small and negative, there should not be a tendency of the next observation being the same (Dougherty, 2016). If that is true, no systematic relationship between the values of the observations is present and the assumption is satisfied (Dougherty, 2016).

6. *The disturbance term has a normal distribution*

The assumption of normality must be satisfied before conducting hypothesis testing as well as constructing confidence intervals (Dougherty, 2016). To test for normality, a Jarque-Bera test can be used. The method tests whether the sample data, thus the disturbance term, have the skewness and kurtosis of a normal distribution (Brooks, 2019).

4.8. Cumulative Abnormal Return and Abnormal Return T-tests

Several t-tests were performed to test if the CAR and AR were significantly different from zero. This is important to test, to test, because if the CAR is not statistically significant, the independent variables would not be able to explain CAR. If that was the case, the regression models would try to explain something that does not exist. In other words, it would not be possible to test the independent variables. The results of the t-tests are described in Table 9 and analyzed in chapter 5.

4.9. Test for Normality

Jarque-Bera is often the test used to assess whether the residuals are normally distributed (Brooks, 2019). Brooks further explained that the Jarque-Bera equation tests whether the skewness and kurtosis match a normal distribution. The skewness can be described as a measure of the samples asymmetry while kurtosis is a measure of extreme values (Brooks, 2019). If the Jarque-Bera test has a p-value above 10%, the sample is said to be normally distributed at the 10% significance level.

4.10. Test for Multicollinearity

The reason behind multicollinearity might be caused by correlation or a linear relationship between two or more of the variables (Dougherty, 2016). When multicollinearity between variables occurs, the estimates for the model coefficients are not accurate or significant, and the model will become sensitive to eventual adjustments and lead to wrong conclusions from significance tests (Brooks, 2019). An indirect method to decrease multicollinearity is to combine the correlated variables into an index (Dougherty, 2016). Some of the indicators in WGI did show a correlation above 0.8 and therefore multicollinearity. To eliminate the effect of multicollinearity, the solution proposed in this research is to drop collinear variables by combining these variables to one aggregated variable. In similarity with the research made by Lim, Makhija & Shenkar (2016), the combined target country average of the six WGI indicators are calculated into a clustered variable, see Equation 12 and chapter 4.13.2.5.

4.11. Test for Heteroskedasticity

When the disturbance or error term in the regression model is different for all the observations, heteroskedasticity is present (Dougherty, 2016). Heteroskedasticity is important because of two different reasons (Dougherty, 2016). Firstly, if there is heteroskedasticity, the estimators of the OLS [Ordinary Least Squares] could be inefficient because other estimators would be more suitable with smaller variances. Secondly, standard errors of the regression coefficients' estimators would not be correct and the model is therefore built on the assumption that there is no heteroskedasticity.

To detect heteroskedasticity, the White test or the Goldfeld-Quandt test can be used (Dougherty, 2016). In this research, the White's test was used for all the different event windows. As long as the critical value of F-Statistics is above the 10% level, it is possible to assume no presence of heteroskedasticity. In the event of heteroskedasticity present, it is still possible to generate consistent estimators for the OLS by using robust standard errors (Dougherty, 2016).

4.12. Test for Linearity

To detect if there is evidence of nonlinearity in the regression model, the Ramsey Reset Test was used. The test indicates if there are one or more variables that are nonlinear (Dougherty, 2016). In the Ramsey RESET test, the probability of the T statistic is tested at a 10% level and the squared the fitted variables should be high to ensure that there is linearity.

4.13. Trading Halt and the Chow Test

Ma (1988) discusses three possible methods of handling trading halts when conducting event studies on Chinese stocks:

- To only use the returns of the trading days (the days when the stock is available to buy and sell).
- To appoint the value 0 on the returns of the stocks on the non-trading days.
- Creating a linear model in order to determine the returns of the non-trading days.

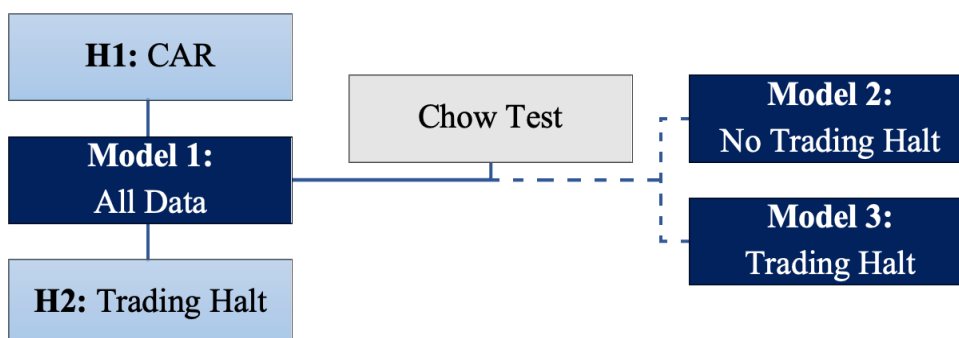
In this research, the returns that will be used are the returns of the trading days. There are advantages and disadvantages with the usage of the different methods. By not including the zero returns of the non trading days, there could be a risk where the analysis arrives at the

conclusion that the market would be efficient, when that might not be the case (Ma, 1988). Also, it can be argued that the zero returns mirror the authentic returns of the non trading days. According to research conducted by Xiao, Yang and Li (2020), the long-term trading halt did not assimilate the extravagant reaction of the stock market connected to M&A announcements.

Trading halt might affect the results of the regression model when there is a trading halt that takes place over a longer period of time, and during that time, other factors may affect the regression model, potentially causing abnormal returns. Because of this, it was decided to divide the regression model into two subsamples. One subsample for a regression that consists of data from deals with no trading halt over the event window and one subsample that consists of data with trading halts. The authors of this research came to the conclusion that it was necessary to further investigate if more reliable results can be obtained if the regression were to be pooled or divided into two different regression models.

When a regression model has two distinct subsamples, based on a dummy variable, the Chow test can be used to decide if it is satisfactory with a pooled regression or better with two separate regression models for each subsample (Dougherty, 2016; Brooks, 2019). The test shows if two subgroups are significantly different in terms of how the movement of the dependent variable is explained by the independent variables (Dougherty, 2016; Brooks, 2019). The Chow test could therefore be used in this research to determine which subsample and thus which regression model (Model 1 or Model 2) should be used to answer the hypothesis regarding the independent variables (H3-8), see Figure 5.

Figure 5: Chow test to decide which regression model to use



The Chow test is a form of F-test which focuses on the differences of the residual sum of squares from three regression models: one with the entire sample and one for each subsample, see Equation 11 (Dougherty, 2016; Brooks, 2019). If the critical value of the F-distribution, $F(k, T-2k)$, is less than the test statistic, it means that there is a significantly better fit to conduct two separate regression models, one for each subsample (Dougherty, 2016; Brooks, 2019).

Equation 11: Chow Test,

$$\text{test statistic} = \frac{RSS - (RSS_1 + RSS_2)}{RSS_1 + RSS_2} \times \frac{T - 2k}{k}$$

Source: Dougherty, 2016

See Appendix 2.6 for variable explanation.

4.13.1. The Dependent Variable of the Regression Model

For this study, the dependent variable in the regression model is the CAR. Since the study aims to answer the question about how shareholders are affected by announcements of cross border acquisitions by Chinese companies, the cumulative effect of the daily returns is the most suitable variable to study.

4.13.2. The Independent Variables of the Regression Model

4.13.2.1. Trading Halt

Trading halt suspends a stock from trading, making the daily return of the stock zero. In other words it cannot be defined as a trading day⁸. Thus, the return for the day cannot be observed. To remedy this, the days in which stocks were suspended, the closest available trading day was used instead. However, to control for this a dummy variable named DUMMY_TRADING_HALT was created to observe if and how it affected the cumulative abnormal return. The variable takes the value of one if there has been any trading halt during the event window and zero otherwise.

⁸ A trading day is defined as a day in which a stock can be bought and sold on the stock exchange.

4.13.2.2. Market Size

The size of a country's market will be determined by their gross domestic product (GDP), accounting for both the target country as well as the year of the announced acquisition. Thus making the GDP of the country specific to the year of the acquisition announcement. This proxy has been tested in previous research against the dependent variable FDI (Buckley et al., 2010; Feenstra & Wei, 2010). The authors therefore find it a suitable benchmark for the market size of the target countries.

Buckley et al. (2010) is measuring the absolute market size as the logarithmized GDP of the host country. Feenstra & Wei (2010) is also using the logarithmized GDP of the host country, measured in constant prices. The independent variable GDP_LN, logarithmized GDP of each target country, will be used in this study as a measurement of the market size of the target country.

4.13.2.3. Competitive Industry and Industry Relatedness

Standard industry classification (SIC) codes are used to separate both the acquiring and target firm into ten different industries, see Appendix 2.2. Since there are only ten categories, some enterprises will naturally fall into a grey area where they may belong to multiple industries. Hence, the primary SIC code was used, meaning that only one and especially the primary SIC code was assigned to each enterprise. For the fact that Zephyr had the option to sort the SIC primary codes and multiple previous studies have used this industry classification before (Akbulut & Matsusaka, 2010; Denis, Denis & Yost, 2002; Moeller, Schlingemann & Stulz 2004; Slangen, 2006), it was an easy decision to make.

DUMMY_MANUFACTURING is a dummy variable and it will take the value of 1 if the target operates in the manufacturing industry and 0 otherwise. Likewise, DUMMY_SAME_INDUSTRY is also a dummy variable and will take the value of 1 if both the acquirer and target operate in the same industry and 0 otherwise.

4.13.2.4. Relative Deal Size

A vital part during the data cleaning process is to filter out acquisitions where the size of the acquirer, target or deal is too far apart. If the size of the acquirer is too big compared to the acquisition, the impact of the acquisition would be very small at best, but more likely close to zero. Hence, it would only make the study less trustworthy if insignificant acquisitions were

to be included. For that reason, a criterion must be determined to remove those observations. There are many different methods to distinguish the size of an acquisition, for instance, absolute deal value, pre-acquisition ownership stake, post-acquisition ownership stake and relative measures between the deal value and total assets or market capitalization of the acquirer. While previous research papers have used ownership stake criteria (Datta, Kdwani & Viney 2013; Nicholson & Salaber 2013; Boateng, Du, Bi & Lodorfors, 2019), or a combination of both (Cybo-Ottone & Murgia, 2000) or no deal value threshold at all (Hassan, Patro, Tuckman & Wang, 2007; Cortés, García & Agudelo, 2015; Alon, Anderson, Munim & Ho, 2018) to control for acquisition size, this study find it more reasonable to compare the size of the acquisition through their relative size, similar to what Furfine and Rosen (2011) and Pelov and Nguyen (2018) did in their research. In greater detail, the deal value was divided by the acquirer's pre-acquisition market capitalization and deals with a relative deal size below 2% were excluded from the sample, as they are not expected to have any impact on the acquiror⁹. In addition, deals with a relative deal size above 150% were also removed. The independent variable `RELATIVE_DEAL_VALUE` is therefore a continuous variable in the regression model.

4.13.2.5. Institutional Distance

With reference to earlier research (Gubbi et al. 2010; Tao et al. 2017), the world governance indicators [WGI] is used to measure institutional distance, based on the work by Kaufmann, Kraay, & Mastruzzi (2010). The WGI is a well-known index, collecting data from over 200 countries (Kaufmann, Kraay, & Mastruzzi, 2010), and therefore containing data from most of the countries in the world. It is defining six dimensions of governance (The World Bank, 2009). The six dimensions are the following:

- *Voice and Accountability* measures the extent of which the residents have the right to and can choose their authorities, having the right to express oneself freely, ability to participate in association of choice and having access to uncontrolled communication by publication or broadcast (Kaufmann, Kraay, & Mastruzzi, 2010).
- *Political Stability and Absence of Violence* is calculating the probability of political volatility as well as politically stimulated brutality, along with terrorism (Kaufmann, Kraay, & Mastruzzi, 2010).

⁹ At least no impact that can be attributed to the acquisition announcement.

- *Government Effectiveness* is measuring the impressions of the characteristics and value of the public service, condition of public service and the level of autonomy from political pressures (Kaufmann, Kraay, & Mastruzzi, 2010).
- *Regulatory Quality* is measuring the impressions of the degree the authorities are able to create and apply proper policies and regulations that regulate the growth of the private sector (Kaufmann, Kraay, & Mastruzzi, 2010).
- *Rule of Law* is measuring the impressions of the degree the agents are acknowledging, accepting and following the regulations in the society, especially in the case of property rights, judicial system and the police force (Kaufmann, Kraay, & Mastruzzi, 2010).
- *Control of Corruption* is measuring the impressions of the degree that public power is used in private concerns, with involvement of both big and small types of corruption (Kaufmann, Kraay, & Mastruzzi, 2010).

Tao et al. (2017) are grouping together the different dimensions into two different groups, where voice and accountability and political stability and absence of violence is grouped to quantifying political stability, and the other indicators are grouped together to quantify governance quality. According to Kaufmann, Kraay and Mastruzzi (2010), the different indicators are measured on a scale from -2.5 up to 2.5, and also ranked on a scale from 0-100 in percentile. A high value which is above 0 means low political risk is in the target country, and the opposite applies for an increased political risk when the value is seen as low, below 0 (Tao et al. 2017). As the indicators are showing different scores annually, this study is using the indicator score of the announcement year, in line with previous research from Lim, Makhija & Shenkar (2016). Following the research by Li, Wang, Ren & Zhao (2020), the institutional distance is measured according to the equation below:

Equation 12: Institutional Distance

$$FID_j = \sqrt{\sum_i^6 \frac{(I_{ij} - I_{ic})^2}{V_i}}$$

Source: Li et al. (2020)

See Appendix 2.6 for variable explanation.

FID_j constitutes the institutional distance measured between the acquiring country and the target country, I_{ij} constitutes the total points for the target country j within the WGI dimension i for the year t , I_{ic} consists of the total points for the acquiring country and V_i constitutes the deviation in the WGI dimension i for the year t (Li et al. 2020). The institutional distance will be measured as one aggregated variable called WGI_COMPOSITE, with the motivation of existing multicollinearity between the variables.

4.13.2.6. Cultural Distance

In the research on the Hofstede model that was conducted by Kirkman, Lowe, and Gibson (2006), they concluded that most research on cultural distance used the index created by Kogut and Singh [KSI] (1988), which also Konara and Mohr (2019) support. However, Shenkar (2001) offers criticism on using the KSI (1988), especially when researching FDI, indicating that hidden assumptions could cause conflicting findings within the field (Kirkman, Lowe & Gibson, 2006). Konara and Mohr (2019) also points out in their research article, how KSI can be misleading because of an inaccuracy problem. The authors explain and show that there is a distortion of distances when using KSI because of its “violation of the triangular inequality”, which becomes more evident when there is a greater cultural distance between two countries within a Hofstede dimension. They also suggest the use of the Euclidean distance formula to more correctly measure the cultural distance and advise against using the KSI in future studies. Because of these findings, this research used the Euclidean distance formula, see Equation 13.

Equation 13: Euclidean Distance for cultural distances

$$\text{Euclidean Distance (Standardized)}_{ij} = \sqrt{\sum_{k=1}^5 \left(\left(\frac{I_{ki} - \mu_k}{SD_k} \right) - \left(\frac{I_{kj} - \mu_k}{SD_k} \right) \right)^2} = \sqrt{\sum_{k=1}^5 \frac{(I_{ki} - I_{kj})^2}{V_k}}$$

Source: Konara & Mohr, 2019

See Appendix 2.6 for variable explanation.

If the cultural distance proxies would have been significantly correlated to each other, it would have resulted in multicollinearity problems, and the authors would not be able to use them in the same regression model. Other researchers have used a proxy composite index of cultural distance, trying to capture all the dimensions of cultural distance in the case of multicollinearity (Nicholson & Salaber 2013; Li, Li & Wang, 2016). The euclidean formula combines the result from all cultural dimensions in Hofstede's, and $(I_{ki} - I_{kj})^2 / V_k$, represents each dimension, see Equation 13.

4.14. Regression model summary

In this study, three different data sample models for each of the three event windows were tested with CAR as the dependent variable, generating nine regressions in total. Model 1 consists of the full data sample of 99 observations, including both stocks with and without trading halt, and studying eleven independent variables in total. Model 2 only includes firms not suspended from trading whereas Model 3 only includes firms suspended from trading. Both Model 2 and Model 3 are studying ten independent variables each, as DUMMY_TRADING_HALT is not included in these regressions.

4.15. Methodology Critique and Discussion

4.15.1. Selection of databases

When choosing a database, it is important to acknowledge the criteria in which the data is collected as well as what data is available. Apart from Zephyr, the S&P Capital IQ database was also considered. However, since the option to specify ownership distribution before and after the deal was not possible, as well as a large number of missing SIC-codes for both the acquirer and target, it made it more convenient to choose Zephyr.

Thomson Reuters' Securities Data Company M&A [SDC] is also a well known and commonly used database within the subject of M&A research. SDC has data since 1965 and more than 75% of empirical research published in renowned journals between 2000-2010 used SDC data (Bollaert & Delanghe, 2015). However, in order for a M&A transaction to be recorded in SDC, it must meet one of two criteria; the acquisition must either have a minimum deal value of 1 million USD with a 3% acquired stake or a 5% acquired stake (Bollaert & Delanghe, 2015). In contrast, the inclusion criteria for Zephyr only requires the transaction value to be at least 1 million GBP or a 2% acquired stake (Bollaert & Delanghe, 2015). This may not seem like a noteworthy difference, but when the interest is in the relative deal size and not the absolute size, meaning the deal value in relation to the acquirers market capitalization, the more deals a database has the more data can be included in the research and finally lead to a more trustworthy and generalized result. For those reasons, the Zephyr database was the best option and thus served as the main data source for this thesis.

It is important to be critical towards all data since it has been obtained as secondary data, and therefore it has not been possible for the authors to control for how the databases collect and process their data. As the databases are frequently used in well-cited sources and seen as reliable among other researchers, the authors are making the judgement that the data collected from these databases is reliable and can be used in this study. Previous researchers have often used the databases CSMAR or WIND in order to access specific Chinese company and stock market data (Zhang, Lyles & Wu, 2020; Li et al., 2020; Liu et al., 2019). As Lund University does not provide access to these databases, it is possible that this study could have attained more relevant information and therefore created other possible results with access to these databases.

4.15.2. Missing Data Analysis

The data was collected from multiple data sources and filtered before using the next data source. As a result, the sample size decreased sequentially throughout the data collection process which is explained and analyzed below.

The original sample from the Zephyr database consisted of 433 deals, which all met the first seven criteria seen in Table 3. However, there were 102 deals that did not have any transaction value available. Since a vital part of the sample selection process was to only select acquisition deals that were expected to potentially have an impact on the acquirer, the

transaction value had to be available in order to compute the relative deal size. Hence, the sample was decreased to a size of 331 acquisition deals. It is not optimal to miss these deals since they can provide valuable insight regarding the research question. However, it is more reliable to only focus on acquisitions that are large enough to have potential impact on the acquirer. If the acquisitions with missing transaction deal value had been included, the data set would have been distorted to a higher extent and thus potentially given inaccurate results.

The next part of the data collection process where deals were dropped as a result of missing data on DataStream. More specifically, some acquirers did not have the same name on DataStream as in Zephyr, which were further determined to be caused by the company changing name. Even with a comprehensive process of finding each firm's stock ticker symbol, many stocks were not found in DataStream. This led the sample to decrease by another 52 deals down to 279, seen in step 9 in Table 3.

In step 10, firms which had multiple announcements during the event window were determined to potentially cause problems in the data sample and were therefore manually removed. The reason for this has to do with the fact that it would be objectively wrong to compare firms with one announcement to firms with multiple announcements, as it could cause the stock price to act differently.

Moving further down in the data selection process, four deals did not have Hofstede data available, which decreased the sample size by another four deals¹⁰. Additionally, in step 13 yet another 19 acquisitions were removed from the sample since the target country was located in a tax havens¹¹, which causes one main concern (Buckley, Yu, Liu, Munjal & Tao, 2016). The concern is that it is likely that they are motivated by tax purposes and as a consequence of that the final destination of the investment is uncertain (Buckley et al., 2016).

Since this study aims to answer questions regarding announced cross-border acquisitions, the authors find it important that the final data sample is as pure as possible sample. That is the main reason for the meticulous data selection process as well as this missing data analysis.

¹⁰ The countries with missing data were, Anguilla, Bermuda, Brunei and Mongolia.

¹¹ Territories defined as tax havens are the Cayman Islands and the British Virgin Islands.

4.15.3. *Critique of Sources*

The study is using trustworthy sources from articles in scientific journals and books. It is worth noticing that there are articles and books that are not accessible due to payment requirements, or are not within the Lund University article database or accessible in the university library. Therefore, the method and information collected in this research have to the largest possible extent included relevant previous research and methods that are existing to this very day, but it is possible that the hypotheses and the results might have been different if other potentially important sources could have been included. However, the sources that are currently included are trustworthy and credible, and therefore the authors make the judgment that the information collected is reliable.

4.15.4. *Critique of the Time Period*

By limiting the study to research the time period after the financial crisis 2008-2009, a gap in current research is meant to be filled, as not many previous studies examine Chinese acquisitions during that specific time period. The study might have been enriched with more data samples by including a longer time period, which might have created different results. However, the authors made the time period limitation for the sake of generating a transparent data sample by not including the acquisitions that were announced during the financial crisis 2008-2009.

Time constraints of the research process are also a limitation to the study, as more time to research the variables and conduct the study might have resulted in a different outcome. If more time would have been given to the study, it could have been possible to handle firm-level data and researching specific company intentions for conducting acquisitions.

4.15.5. *Reliability and Replicability*

A concept is defined as the base for a theory and is the area for business research (Bell, Bryman & Harley, 2019). Bell, Bryman & Harley (2019) define reliability as when the research is possible to repeat, which is especially important within quantitative studies. Replicability is connected to reliability, and is defined as the ability to recreate the same study with the same results. In order for a concept to be reliable, it must be possible to replicate it by another researcher (Bell, Bryman & Harley, 2019). As the steps for conducting this study is stated and explained in great detail, the study is replicable for other researchers. Since the

data is obtained from adequate databases, the same sample used in this study would be generated from applying the same falling out measures for the data. The reliability is also enhanced by using well cited databases such as Zephyr and Datastream.

4.15.6. *Validity*

Despite the fact that reliability and validity are different, validity presumes reliability. Validity is defined as if the scope of a concept is measuring what it is determined to measure (Bell, Bryman & Harley, 2019). Validity can be described from an internal and an external perspective. Internal validity is examining the causality among variables, and is questioning whether the study can conclude that the independent variable is causing changes in the dependent variable (Bell, Bryman & Harley, 2019). The hypotheses that are researched in this study has partly been developed through previous empirical research, and therefore the authors are complementing additional theory in the study to form new hypotheses that differ from previous research, among them a dummy variable for trading halt. The chosen theories are estimated to give an appropriate base for researching this area. The authors have performed different tests in this chapter as a common practice within econometrics to ensure the quality of the regression, and therefore the assumption of internal validity can be made. External validity is concerning the generalization of the study and if it can represent the population (Bell, Bryman & Harley, 2019). Due to heavy fall-outs in the sample to ensure purity in the data, it can be debated if the results can be generalized outside of this specific data sample. However, the data sample, as discussed previously, is carefully filtered to avoid noise in the data that would affect the results. But at the same time, it can be argued that a larger data sample would have given a more fair interpretation of the population as a whole. The results are also specific for the Chinese acquisition activity, taking the functionality of Chinese stock market into account, and therefore the generalizations to other markets should be cautiously made.

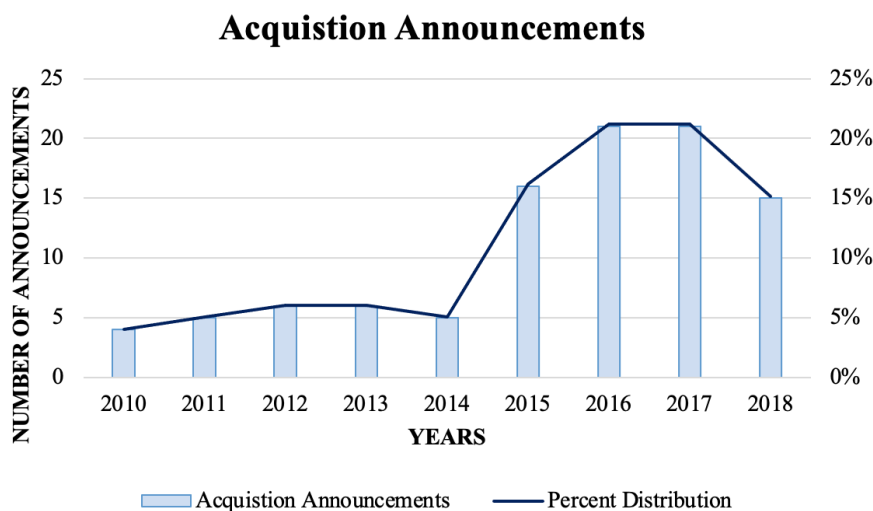
5. Empirical Results and Analysis

In this chapter, the results from the various statistical tests as well as all the regression models will be presented and further explained. The descriptive statistics will mainly explain and demonstrate the final sample from Model 1, but similar charts and tables will be available for all models in the Appendix. After the descriptive statistics, the hypothesis will be analyzed and either accepted or rejected.

5.1. Descriptive Statistics and Data Sample Distribution

The majority of the 99 acquisition deals in this research are announced during 2015-2018, which collectively make up 74% of the final sample whereas 26% come from 2010-2014, see Figure 6. In Model 2 (no trading halt) and Model 3 (trading halt) respectively, the same acquisition pattern with fewer announcements in 2010-2014 and more during 2015-2018 can also be observed, see Appendix 3.6 and 3.7.

Figure 6: Number of acquisition announcements per year.



Out of the 99 deals, in all the event windows, more than 50% of the stocks of the acquiring firms are suspended from trading around the time of the acquisition announcement, see Table 4. Furthermore, when the event window is increased, more firms are subject to trading halts which is why the event window $[-1,0]$ and event window $[-2,+2]$ have 55 deals and 65 deals, respectively. This means that the difference between deals with no trading halt and trading halt increases when the event window is longer. As a result, the event window $[-2,+2]$ has 34 deals with no trading halt and almost twice as many deals with trading halts, see Table 4.

Table 4: Trading Halt Distribution

Event Window	[-1,0]	[-1,+1]	[-2,+2]
No Trading Halt	44 (44%)	41 (41%)	34 (34%)
Trading Halt	55 (56%)	58 (59%)	65 (66%)

The mean of CAR stays consistent for all event windows at just over 2%. The standard deviation of CAR increased as the event window became longer. Furthermore, the independent continuous variables are less normally distributed. The largest standard deviation is observed among the institutional (WGI Composite), cultural (CD) and GDP variables. Since both the institutional and cultural differences vary depending on the target country, substantial variation is seen in the data set. An example is seen in Table 7, where the cultural distance between China and USA, for almost all dimensions, are very different while the scores for China and Hong Kong are much more similar. In terms of GDP, a high standard deviation is expected since the sample consisted of both small and very large economies.

Table 5. Descriptive statistics for the continuous variables in Model 1 (all data)

Continuous Variables	Mean	Median	Max	Min
CAR [-1,0] (%)	2.320	1.725	17.568	-11.267
CAR [-1,+1] (%)	2.312	1.936	24.687	-21.933
CAR [-2,+2] (%)	2.232	2.865	34.405	-32.523
GDP (T USD)	3.790	1.230	2.060	0.010
Relative Deal Size (%)	16.254	8.018	145.148	2.005
WGI Composite	2.941	3.143	6.114	0.004
CD UA	1.707	0.782	7.034	0.002
CD FVM	0.687	0.224	7.468	0.000
CD LVS	3.446	1.817	10.666	0.003
CD PD	2.093	1.816	9.608	0.002
CD IVC	3.412	2.817	8.874	0.000

Table 6: Descriptive statistics for the dummy (independent) variables

Dummy Variable	Model 1	Model 2	Model 3
Manufacturing	54 (55%)	24 (55%)	30 (55%)
Same Industry	66 (67%)	28 (64%)	38 (69%)
Total Observations	99 (100%)	44 (100%)	55 (100%)

As for the dummy variables in Model 1, 54 targets' primary industry is manufacturing and 66 announced acquisitions are made where the acquirer and the target are in the same industry, see Table 6. In greater detail, the manufacturing industry, for both the acquirer and the target, is the most represented industry by far, see Appendix 2.3. The same representation is observed for Model 2 and Model 3 as well, see Appendix 2.4 and 2.5 respectively. This is to be expected when comparing to previous studies (Nicholson & Salaber, 2013; Tao et al., 2017). Overall, 8 out of 10 industries are represented in the sample for all models, see Appendix 2.3-2.5.

Table 7: Cultural distance dimensions for China, Hong Kong, USA and Germany

Cultural Distance Dimensions	China	Hong Kong	USA	Germany
Power Distance [CD_PD]	80	68	40	35
Individualism [CD_IVC]	20	25	91	67
Masculinity [CD_FVM]	66	57	62	66
Uncertainty Avoidance [CD_UA]	30	29	46	65
Long-Term Orientation [CD_LVS]	87	61	26	83

The most frequent countries of target firms are Hong Kong with 25% of all announced acquisitions followed by USA and Germany at 14% and 12%, respectively. They collectively stand for 51% of all announced deals. As seen in Table 8, all the models have a similar distribution of countries. Overall, 20 out of 28 target countries had three or less acquisitions announcements during the time period of the study, see Appendix 3.2.

Table 8. Distribution of top target countries

Top Target Countries	Model 1	Model 2	Model 3
Hong Kong	25 (25%)	9 (20%)	16 (29%)
USA	14 (14%)	7 (16%)	7 (13%)
Germany	12 (12%)	6 (14%)	6 (11%)

5.2. Empirical Results and Analysis of Cumulative Abnormal Return

The t-tests show that the CAR is positively significantly different from 0 for all three event windows. The AR on day [-1] and day [0] are significant at the 1% and 5% level, respectively. Most interesting is the fact that AR is by far the most significant the day before the announcement, which leads to two interesting findings. First, it is evident that information about the upcoming news is leaking out to the market before the announcement, which is reflected in the abnormal return of the stock. Secondly, the results indicate that the Chinese markets are at least semi-strong efficient, since the information about the acquisition is shown by the significant price increase according to the efficient market hypothesis. In addition, since the AR is not significant after day [0], it indicates that the news about the acquisition announcement has already been absorbed by the market during day [-1] and day [0] which would lead to the stock return being normal on day [+1] and day [+2]. In other words, not generating abnormal returns. These findings therefore explain why CAR, in this research, is the most significant during the event window [-1,0] and less significant the longer the event windows become.

These findings also support earlier research regarding that announcements of Chinese CBM&As are generating a significant cumulative abnormal return on the 1% significance level during the event window [-1,0] (Tao et al., 2017; Lin et al., 2020; Chi, Sun, & Young, 2011).

We therefore fail to reject the main hypothesis: *Chinese acquiring firms show a significantly positive cumulative abnormal return around the announcement day of cross-border acquisitions.*

Table 9: CAR T-tests over single days and event windows

<i>Abnormal Return</i>	<i>N</i>	<i>S.D.</i>	<i>t-Statistic</i>	<i>P-Value</i>	
<i>AR [-2]</i>	99	0.02332	0.43887	0.66172	
<i>AR [-1]</i>	99	0.02973	3.25554	0.00155***	
<i>AR [0]</i>	99	0.06331	1.99187	0.04917**	
<i>AR [+1]</i>	99	0.04833	-0.15158	0.87983	
<i>AR [+2]</i>	99	0.04198	-0.74742	0.4566	
Cumulative					
Abnormal Return					
					CAAR
<i>CAR [-1,0]</i>	99	0.06328	3.64732	0.00043***	0.02320
<i>CAR [-1,+1]</i>	99	0.09636	2.38772	0.01887**	0.02312
<i>CAR [-2,+2]</i>	99	0.13068	1.69952	0.09239*	0.02232
Significance level					
*: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$					

5.3. Empirical Results and Analysis of Regression Models

5.3.1. Model 1: All Data

Regression Model 1, in which all deals and independent variables are researched, resulted in low adjusted explanation ratios for all the event windows, see Table 10. In the regression for event window [-1,0] the adjusted explanation ratio (Adjusted R^2) is only 4.3%. This indicates that only 4.3% of the movement in CAR can be explained by the variables used within the regression model, which means that the variation in CAR cannot be explained by the regression model very well. For the event window [-1,+1] the adjusted R^2 is even lower and during [-2,+2] it is negative. This means that the regression model fits the data very poorly (Brooks, 2019). Two things can be the reason for the low adjusted R^2 . Firstly, there might be

other factors affecting the movement of CAR, which are not included in this regression. Secondly, some variables might be better to exclude since they cannot be used to explain the movement of CAR, and therefore affects the adjusted R² negatively by being included in the regression. If these independent variables were excluded from the regression model, the explanatory ratio would increase. In short, the variables according to earlier research affect CAR significantly, see Appendix 1.1., are not very good at explaining the movement of CAR with this regression model.

Table 10: Adjusted R² for regression Model 1

<i>Model 1: All Data</i>	<i>[-1,0]</i>	<i>[-1,+1]</i>	<i>[-2,+2]</i>
<i>Adjusted R²</i>	<i>0.043473</i> <i>(0.043473)</i>	<i>0.008433</i>	<i>-0.047816</i> <i>(-0.025359)</i>
<i>() = value before the fulfilling the assumptions of OLS</i>			

Regression Model 1 for event window [-1,+1] fulfills all the requirements when using OLS, see Appendix, 3.4. The regression model for event window [-1,0] had heteroskedasticity and hence the Huber-White-Hinkley test was conducted to adjust for heteroskedasticity, see Appendix 3.4. Event window [-2,+2] on the other hand was not normally distributed, but through logarithmizing and winsorizing a normal distribution was achieved, see Appendix, 3.4.

5.3.2. *Trading Halt*

5.3.2.1. *Trading Halt and CAR*

To answer the second hypothesis concerning trading halt, the event window [-1,0] in Model 1 is used since CAR is most significant during this period, and the regression Model 1 is also the most explanatory. In regression Model 1, the dummy variable for trading halt is a significant explanatory variable at the 10% significance level for CAR and further affects CAR positively, see Table 11. In the other event windows [-1,+1] and [-2,+2], trading halt is not a significantly explanatory variable.

The previous research examined before this study, did not account for trading halt when explaining how shareholder wealth is created in Chinese CBM&As. This indicates that an important explanatory variable was not controlled for in comparison to this study. According

to studies on trading halt, the effect on shareholder wealth is overall negative around the time of suspension. However, this study shows a positive effect of trading halt on CAR, see Table 11, and thus a positive market reaction.

While the effect of trading halt is observed in the regression model, an explanation as to why it is positive cannot objectively be explained in the results. However, a reasonable analysis in regards to the type of news is that an acquisition would likely be seen as something positive and thus explain the positive CAR. When the stocks are suspended from trading, sometimes for months, around the acquisition announcement day, the market can gain knowledge of the acquisition, which later will be shown in the stock price once it starts trading. According to the signaling theory, when more investors have knowledge of the acquisition, it can be seen as a positive signal in regards to future advantages for the acquirer, which could explain a positive CAR.

However, many other things could have happened during the trading halt and especially when it lasts over weeks or months, it is not possible to disregard other events which might contribute to the positive CAR. Hence, the cause of effect is not explained.

Based on the results, we fail to reject the hypothesis: *Trading halt will significantly affect short-term shareholder wealth positively when Chinese acquiring firms announce cross-border acquisitions.*

Table 11: Trading Halt in regression Model 1

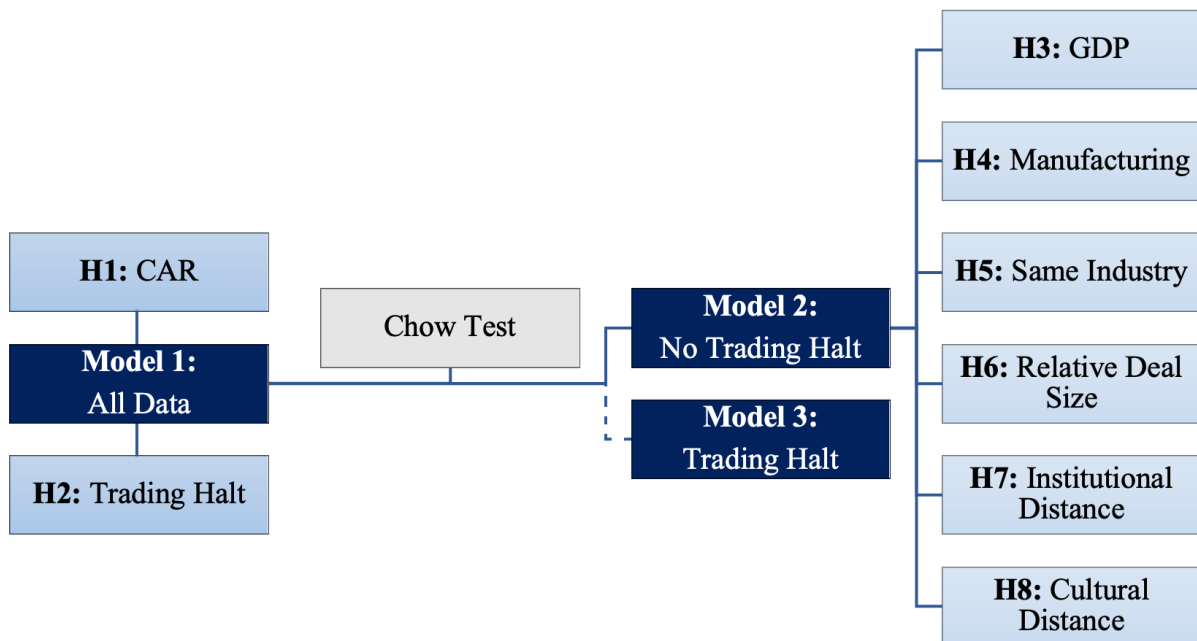
Model 1: All Data	[-1,0]	[-1,1]	[-2,2]
Trading halt	0.021172*	0.018767	0.021551
<p><i>Dummy variable for Trading Halt used.</i> <i>1 = Trading halt, 0 = No trading halt</i> Significance level <i>*:p<0.1, **:p<0.05, ***:p<0.01</i></p>			

5.3.2.2. Chow Test Results

Taking the Chow test into account, it becomes evident that Model 1 needs to be separated into two regression models, see Appendix 3.5. For event windows $[-1,0]$ and $[-1,+1]$, the results from the Chow test conclude that a separation into two distinct models is a better fit at the 5% significance level while for the event window $[-2,+2]$ at the 10% significance level. More specifically, one model will include all the deals without trading halt (Model 2) and the other will contain the deals with trading halt (Model 3), see Appendix 3.5. The deals with trading halt are not affected by the independent variables in the same way as the deals without trading halts are.

Since Model 2 only includes deals with no trading halt, the model will in a more objective manner explain the effect of acquisition announcements on CAR. This has to do with the fact that deals with trading halt could be affected by other events. Hence, Model 2 serves as the main model for the analysis and answers to hypothesis 3 through 8.

Figure 7: Chow Test Result and Hypothesis Overview



5.3.2.3. Model 2: No Trading Halt

Running the regression in Model 2 for the event window [-1,0], the adjusted R² is 15.7%, see Table 12, compared to the 4.3% in Model 1. When excluding the deals with trading halt, the independent variables can explain movement of CAR on a higher level, but still quite poorly. The adjusted R² for the event windows [-1,+1] and [-2,+2] are close to zero or even negative, see Table 12. Model 2, and especially the event window [-1,0] is therefore the most suitable model combination to explain the movement of CAR for hypothesis 3 through 8.

At first, Model 2 is not linear for the event window [-1,0], but it is resolved by squaring the independent variable WGI_COMPOSITE, see Appendix 3.4, 3.9.11 and 3.9.1.2. The model satisfies all the other assumptions of OLS, see Appendix 3.4. The event window [-1,+1] for Model 2 meets all the assumptions of OLS, but the regression for event window [-2,+2] is not normally distributed. To achieve a normal distribution, the regression for event window [-2,+2] for Model 2 is winsorized, see Appendix 3.4 and 3.9.5.1.

Table 12: Adjusted R² for regression Model 2

Model 2: No Trading Halt	[-1,0]	[-1,+1]	[-2,+2]
Adjusted R²	0.157389 (0.166129)	0.017624	-0.083104 (0.076836)
<i>() = value before the fulfilling the assumptions of OLS</i>			

5.3.2.4. Model 3: Trading Halt

In Model 3, when only the deals with trading halt are included, the regression models are poorly explaining the movement of CAR which is indicated by the negative R² for all event windows, see Table 13. However, the model satisfies all assumptions of OLS.

Table 13: Adjusted R² for regression Model 3

Model 3: Trading Halt	[-1,0]	[-1,+1]	[-2,+2]
Adjusted R²	-0.000619	-0.017122	-0.034480
<i>() = value before the fulfilling the assumptions of OLS</i>			

5.3.3. Results of the Independent Variables

5.3.3.1. Market Size

GDP is not a significant explanatory variable in Model 2 nor Model 3, see Table 14. However, within the event window [-1,0] for Model 1, the market size of the target country has a positive significant effect on CAR at the 10% significance level. Aligned with the CAGE framework, the Chinese acquirers are experiencing a significant CAR when they target bigger economies. Hence, the results suggest that a target country with a high GDP, as opposed to a low GDP, is yielding better short-term wealth for the shareholders. While previous studies show that market size is affecting FDI significantly in a positive way (Buckley et al., 2010; Feenstra & Wei, 2010), no research regarding the effects on CAR is found.

However, since Model 2 shows no significance, the results should be observed with caution. Nonetheless, these results bring a new perspective where market size is found to not significantly affect CAR in the regression Model 2. Based on the findings, we reject the hypothesis that: *Market size significantly affects short-term shareholder wealth positively when Chinese acquiring firms announce cross-border acquisitions.*

Table 14: Market size coefficients and significance levels

Coefficient <i>GDP_LN</i>	[-1,0]	[-1,+1]	[-2,+2]
Model 1: All Data	0.011015*	0.011866	0.009413
Model 2: No Trading Halt	0.005016	-0.000515	-0.005456
Model 3: Trading Halt	0.018754	0.016928	0.007316
Significance level *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$			

5.3.3.2. Competitive industry

In this study, the event window [-1,0] in Model 2 was the only event window which had significant correlation with the dummy variable manufacturing. However, the coefficient is negative at the 5% significance level which means that shareholders of Chinese firms earn a

negative abnormal return when the firms announce an acquisition with the target being in the manufacturing industry. In contrast to our results, previous study by Nicholson & Salaber (2013) find the opposite, where Chinese acquirers experience a positive CAR at the 1% significance level when the target main industry is manufacturing.

Since this study however, the Chinese government announced the “Made in China 2025” initiative in 2015 (Wang, Charifzadeh & Herberger, 2020) which shifted its focus and priority from low cost industries, like manufacturing, to more technologically advanced industries like transportation and telecommunications (Blau, 2017). Nevertheless, it gives Chinese acquirers incentives to shy away from manufacturing and instead focus on other industries that are aligned with the strategic goals of the initiative. This is however not shown in this study, since manufacturing is still the industry where most acquisitions are announced. This indicates that, even with the “Made in China 2025” initiative, the focus has not shifted. Since our study covers the time period 2010-2018, it is shown that 70% of the sample¹² lies between 2015-2018 and 52% of these in manufacturing, which is when the initiative was first announced, making these new findings up to date and highly relevant, see Table 15.

Table 15: Manufacturing coefficients and significance levels

<i>Coefficient</i>	<i>[-1,0]</i>	<i>[-1,+1]</i>	<i>[-2,+2]</i>
<i>Manufacturing</i>			
<i>Model 1: All Data</i>	<i>0.002414</i>	<i>0.023780</i>	<i>0.018451</i>
<i>Model 2: No Trading Halt</i>	<i>-0.036812**</i>	<i>-0.009907</i>	<i>-0.048380</i>
<i>Model 3: Trading Halt</i>	<i>0.026049</i>	<i>0.045026</i>	<i>0.046829</i>
<i>Significance level</i>			
<i>*:p<0,1, **:p<0,05, ***:p<0,01</i>			

Based on the results in this research, we therefore reject the hypothesis: *Shareholders of Chinese acquiring firms experience significantly more favorable cumulative abnormal returns when the target firm's primary industry is manufacturing.*

¹² The sample distribution concerns Model 2.

5.3.3.3. Industry Relatedness

The dummy variable industry relatedness shows no significance on CAR for any model or event window. While economies of scale are mostly likely to occur when two firms within the same industry consolidate, industry diversification is also reasonable to consider in order to diversify across multiple industries. The results are therefore different from the results obtained by Akbulut & Matsusaka (2010), Slangen (2006), Bhabra & Huang (2013), and Nicholson & Salaber (2013). Interesting to observe is the fact that the studies by Bhabra & Huang (2013) and Nicholson & Salaber (2013) focus on a similar time period, but they arrive at different significant results. For this study, a more recent time period is researched and it finds no statistically significant results, which indicates that investors do not seem to react if the target company is in the same industry as the acquiring firm or a different one. Since industry relatedness is not significant in this research, neither economies of scale nor industry diversification can be argued for.

Our research results in the rejection of the hypothesis: *Shareholders of Chinese acquiring firms experience significantly more favorable cumulative abnormal returns when the target firm operates within the same industry.*

Table 16: Same industry coefficients and significance levels

Coefficient <i>Same industry</i>	[-1,0]	[-1,+1]	[-2,+2]
Model 1: All Data	-0.006342	-0.024492	-0.017578
Model 2: No Trading Halt	-0.001347	-0.023967	0.003359
Model 3: Trading Halt	-0.002933	-0.009527	-0.004984
Significance level *: $p < 0,1$, **: $p < 0,05$, ***: $p < 0,01$			

5.3.3.4. Relative Deal Size

Similar to the result of industry relatedness, the relative deal size can not be used to explain the fluctuations in the CAR in any of the nine regression models conducted for this research.

Previous research with emerging economies and BRICS¹³ countries (Dell'Acqua et al., 2018; Bhagat, Malhotra & Zhu, 2011) finds that the shareholders of acquiring firms benefit from a larger relative deal size. The results obtained in this study are also contrary to the results of Moeller, Schlingemann & Stulz (2004) and Alexandridis et al. (2013), as they showed that larger deal size is significantly negative for the shareholders.

This study is controlling for extreme values in the relative deal size by not including deals with very low or very high relative deal values. This selection criteria has not been seen in the studies referenced above. It cannot be determined how and if it affects results, but what can be argued for is the fact that extremely small acquisitions are highly unlikely to affect a massive acquirer in any shape or form. Then, if the relative deal size is not controlled for, small deals will inevitably be included in the data set. Furthermore, it is clear that the data set is not normally distributed, see Appendix 3.1. In greater detail, for Model 2, 41% and 68% are below the 5% and 10% mark in terms of relative deal size, respectively, see Appendix 3.1. Moreover, only 18% are above the 20% mark. This could potentially affect the results, as the majority of the transaction values were relatively small in relation to the market capitalization of the bidding firm. For an acquisition to even have a reasonable chance to experience economies of scale, the relative deal size must be substantial enough.

The results concluded in this study therefore leads to the rejection of the hypothesis: *Relative deal size significantly affects shareholders' cumulative abnormal returns in Chinese cross-border acquisitions.*

Table 17: Relative Deal Value coefficients and significance levels

<i>Coefficient</i> <i>Relative Deal Value</i>	<i>[-1,0]</i>	<i>[-1,+1]</i>	<i>[-2,+2]</i>
<i>Model 1: All Data</i>	-0.003153	-0.018294	0.008321
<i>Model 2: No Trading Halt</i>	-0.031923	0.009921	0.036123
<i>Model 3: Trading Halt</i>	-0.014130	-0.055095	-0.108698
<i>Significance level</i> *: $p < 0,1$, **: $p < 0,05$, ***: $p < 0,01$			

¹³ Brazil, Russia, India, China and South Africa

5.3.3.5. Institutional Distance

Model 1, during the event window [-2,+2] is negatively significant at the 10% level which suggests that a smaller institutional distance positively affects CAR. However, with a negative adjusted R², the model does not explain the variation in CAR very well and is therefore of limited use at best. For all other models and all event windows, WGI is not statistically significant which means that institutional distance, long or short, does not affect the CAR.

Based on the result, we reject the hypothesis: *Institutional distance between the target country and China has a significant effect on cumulative abnormal return of shareholders of Chinese acquiring firms.*

Table 18: Institutional distance coefficients and significance levels

Coefficient	[-1,0]	[-1,1]	[-2,2]
<i>WGI_COMPOSITE</i>			
Model 1: All Data	-0.006651	-0.012004	-0.022917*
Model 2: No Trading Halt	-0.015519	-0.004572	-0.004909
Model 2: No Trading Halt <i>WGI_COMPOSITE (Squared)</i>	0.001488		
Model 3: Trading Halt	-0.005923	-0.019236	-0.026048
Significance level *: <i>p</i> <0,1, **: <i>p</i> <0,05, ***: <i>p</i> <0,01			

5.3.3.6. Cultural Distance

In Model 1, both masculinity versus femininity [CD_FVM] and long term versus short term [CD_LVS] is significantly affecting CAR during the event window [-1,0] while in Model 3, the only dimension which shows statistical significance is femininity versus masculinity. As for the main model, Model 2, masculinity versus femininity, long term versus short term and individualism versus collectivism are significantly affecting CAR during one or more event windows which is analyzed below.

For the event window [-1,0] and [-1,+1], masculinity vs femininity is positively significant at the 5% and 10% significance level respectively, which suggests that Chinese acquirers experience a positive CAR when they target countries scoring high on the dimension for masculinity versus femininity. As seen in Table 19, the average score on masculinity versus femininity is much lower at 30 than China at 66. This means that the shareholder wealth is increased when China acquires target countries with a masculine culture that is associated with more priority for competitiveness and career than overall life quality. Since the most acquisition announcements are targeting Hong Kong, USA, and Germany, which all score similarly to China, the cultural distance suggested by CAGE is quite small which means easier integration between the acquirer and target.

Table 19: Hofstede Cultural Scores

Country	Power Distance [CD_PD]	Uncertainty Avoidance [CD_UA]	Individualism vs. Collectivism [CD_IVC]	Masculinity vs. Femininity [CD_FVM]	Long Terms vs. Short Term [CD_LVS]
China	80	30	20	66	87
Hong Kong	68	29	25	57	61
USA	40	46	91	62	26
Germany	35	65	67	66	83
<i>Average</i>	55	50	66	30	87

The table shows the score for each dimension and for the countries with most acquisition announcements. The average for the entire sample is also included.

The cultural dimension of individualism versus collectivism are significantly affecting the shareholder wealth during event windows [-1,+1] and [-2,+2]. Since China's score, at 20, is way below the average at 66, it suggests that target countries with higher scores are yielding a higher CAR for the shareholders, creating a greater distance between the score of China and the score of the target country. Moreover, long-term versus short-term shows negative relation to CAR which suggests that the market holds firm on values like tradition and personal stability. In other words, target countries with lower scores on CD_LVS may generate more wealth for shareholders.

Other studies have shown that there is a significant effect of cultural distance. (Nicholson and Salaber, 2013; Chakrabarti, Gupta-Mukherjee, and Jayaraman (2008). The studies researched different dimensions of cultural distance and it is clear that some dimensions are both positively and negatively affecting the regression in a significant way. This indicates that, as mentioned earlier, the Hofstede model might simplify distance too much by composing them into one variable. Overall, since Hong Kong, USA, and Germany represent 50% of the sample, the cultural distance is mostly affected by their culture differences.

The hypothesis: *Cultural distance between the target country and China has a significant effect on cumulative abnormal return of shareholders of Chinese acquiring firms*, is not rejected.

Table 20: Cultural distance coefficients and significance levels

<i>Coefficient</i> <i>Cultural distance</i>	<i>[-1,0]</i>	<i>[-1,+1]</i>	<i>[-2,+2]</i>
<i>Model 1: All Data</i>			
<i>CD_PD</i>	-0.002161	-0.003915	-0.001967
<i>CD_IVC</i>	0.002596	0.004134	0.011663
<i>CD_FVM</i>	0.011173***	0.012260	0.008922
<i>CD_UA</i>	-0.001570	-0.003250	-0.010169
<i>CD_LVS</i>	-0.004533**	-0.005450	-0.007852
<i>Model 2: No Trading Halt</i>			
<i>CD_PD</i>	0.007636	-0.000420	-0.008186
<i>CD_IVC</i>	0.003173	0.009051*	0.015604**
<i>CD_FVM</i>	0.010219**	0.009898*	0.013104
<i>CD_UA</i>	-0.001200	0.003823	0.004881
<i>CD_LVS</i>	-0.003033*	-0.004368	-0.004959

Model 3: Trading Halt			
<i>CD_PD</i>	-0.006442	-0.008958	-0.014582
<i>CD_IVC</i>	0.002106	0.005541	0.012397
<i>CD_FVM</i>	0.016092*	0.018466	0.013361
<i>CD_UA</i>	-0.003510	-0.010598	-0.013894
<i>CD_LVS</i>	-0.005527	-0.007567	-0.010072
Significance level			
*: $p < 0,1$, **: $p < 0,05$, ***: $p < 0,01$			

6. Conclusion

In conclusion, Chinese acquirers create short-term shareholder wealth through cross-border acquisitions. This is also the case for the independent variable trading halt, which shows that shareholders' abnormal return, thus their wealth, is positively affected by trading halts.

The main regression, only including the deals with no trading halt shows that both manufacturing and cultural distance is significantly affecting the cumulative abnormal return experienced by Chinese acquiring firms. The other variables, market size, industry relatedness, relative deal size, or institutional distance, does not affect short-term shareholder wealth in this study.

7. Discussion

These findings suggest that investors on the Chinese stock markets find the announcement of an acquisition as a positive signal, which could indicate that investors do not believe Chinese acquirers overpay or acquire other companies without it being beneficial for the firm and its shareholders.

The findings of this study is quite different from what previous studies have found, which can be caused by several factors. Firstly, the change over time can affect how investors on the Chinese stock market react to certain news or deal specifications. For instance, when earlier research found a positive CAR for acquisitions within the manufacturing industry, China was probably not as technologically advanced as they are today. That could be a reason as to why the market reacts negatively to acquisitions during a more recent time period as was the case in this study. Secondly, since the Chinese CBM&As have increased tremendously during the past decades, the investors might have become more used to the frequency of acquisition announcements, making them overall less exciting. Thirdly, the selection of which announced deals are included in this research is different from the criteria of previous research mentioned in this study. The most significant one being the criteria to only include deals that were big enough up to a certain threshold measured by the relative deal size. Since previous studies most likely have included small deals in their data sample, in relative terms, it could decrease the validity of their findings since those deals almost certainly can not affect the acquirer in any way. In other words, small deals get blended with bigger deals which dilutes the data and ultimately make the result less accurate with findings that may be explained by other factors other than what was intended, namely acquisition announcements. Lastly, with globalization and internationalization between countries and companies, both the institutional and cultural distance decrease which might lead to easier cross-border acquisition integrations making the distance between the acquirer and target less of a problem.

It is very interesting that the three models (Model 1, 2 and 3) differ from each other in two ways. Firstly, in terms of which variables that are significantly explanatory to the movement of CAR and secondly, in terms of how much of the movement in CAR can be explained by the variables within the models. Previous research conducted on Chinese acquiring firms does, as earlier mentioned, not seem to control for trading halts. If that is the case, all

previous research based their results on a regression model that is similar to Model 1. In other words, a model which includes stocks on trading halts as well as stocks open for trading.

Looking specifically at the cultural dimension, it is possible to see how different cultural dimensions are significantly explanatory of the CAR in all the three models. The cultural variable femininity versus masculinity is for instance both significant in Model 2 on a 5% level and in Model 3 on a 10% level, but in the combined Model 1, the significance level is at the 1% level. A result that is even more interesting is that the acquisitions within manufacturing firms are significantly affecting the CAR in Model 2, while not being significant in Model 1 or Model 3. This begs the question whether researchers only focusing on Model 1 miss important information regarding the variables who indeed affect the CAR. One problem is that we do not know if announcements during trading halts would lead to the same reaction if they were open for trading. Moreover, since the trading halt can last for weeks and months, anything can happen while the stock is suspended that affects the stocks once it opens. It might be the acquisition announcement but it could also be an earnings report or a negative news article which makes the trading halt phenomena very complex.

China has accumulated knowledge, new technology and other beneficial information through CBM&As, and at the same time generated short-term shareholder wealth. Taking these findings into account, it could be beneficial for other emerging markets to use the same type of laws to promote their own CBM&As, and by this further develop their economy. However, the laws to promote outward direct investments that are applied in China are also the cause of a trade war and many new upcoming, or already established, protective laws in countries around the world. One might wonder if there would be the same type of response if the Chinese government did not have the same influence over Chinese firms.

If China is crossing the line, but at the same time generating short-term shareholder wealth for the stock market investors, is it worth trade wars and conflicts with other countries in the end?

8. Future Research

The topic of trading halt in relations to the cumulative abnormal return is an untapped research area with plenty of room for more findings. Since this study only concludes that trading halts affects the shareholder wealth, there is room for more studies about how and why that is the case. It would therefore be interesting if previous studies get replicated while also controlling for trading halts to see if the results change. Moreover, it would be interesting to research if previous ownership, friendly or hostile takeovers and SOEs explain CAR with account to voluntary and or mandatory trading halts. By answering the question about how and why trading halts affect Chinese acquisition, valuable insights can be attributed to the modern M&A literature.

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Appendices

1. Appendix A: Attachments connected to the theory

1.1. Table: List over previously made research focusing on Chinese acquisitions

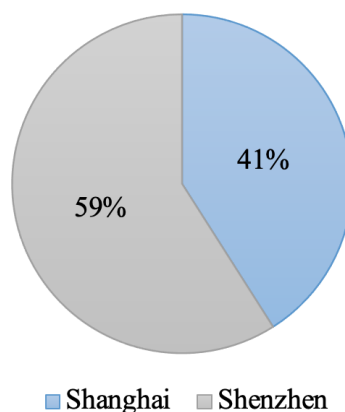
Authors and Publication	Info regarding Time period, Amount of deals and if Trading Halt (TH) is mentioned	Significance	Publication
Chen, Y.Y. & Young, M.N.	<ul style="list-style-type: none"> •2000-2008 •39 deals •No info about TH 	<p>Control variables: Share type, firm size (*=all), industry, acquisition year.</p> <p>Independent variable: Government ownership (* = model 2-3 and † = model 4)</p>	<p>Asia Pacific Journal of Management</p> <p>(article citation: 184 LubSearch)</p>
Chi, J., Sun, Q. & Young, M.	<ul style="list-style-type: none"> •1998-2003 •1148 deals •No info about TH 	<p>CAR: [-2,2]**, [-1,1]***, [-2,0]***, [-1,0]***</p> <p>Variables:</p> <p>R1: State-share***, Profit-before***, same-government[^], cash-payment, dilution*, 1998[^], 1999[^], 2000[^], 2001, 2002, 2003*</p> <p>R2: Legal-share***, Profit-before***, same-government[^], cash-payment**, dilution*, 1998***, 1999***, 2000***, 2001, 2002, 2003</p>	<p>Emerging Markets Review</p> <p>(article citation: 100 Google Scholar)</p>
Li, J., Li, P., & Wang, B.	<ul style="list-style-type: none"> •2000-2011 •367 deals •No info about TH 	<p>CAR: [-1,1]***, [-2,2]***, [-5,5]***</p> <p>Variables: Cultural distance***, Institution index, Acquirer size***, Acquisition experience(** or *), same industry(* or no significance), financial advisor, acquirer SOE, Friendly target(** or *), Public target, Cash deal</p>	<p>International Business Review</p>

<p>Lin, X., Li, Y., Wan, X., & Wei, J.</p>	<ul style="list-style-type: none"> •2010-2015 •472 deals •No info about TH 	<p>CAR: [-1,0]***, [-0,1]**, [-1,1]***, [-2,2]**, [-5,5]</p> <p>Variables:</p> <p>R1: Firm age, profitability***, SOE, Manufacturing, completed deal, Deal shares</p> <p>R2: (difference from R1): Firm age**, Hong Kong stock market***</p> <p>R3: (difference from R1): Firm age**, Hong Kong stock market***, Target technology*</p> <p>R4: (difference from R1): Firm age**, Hong Kong stock market***, Target technology**, Preannouncement***</p>	<p>Chinese Management Studies</p>
<p>Song, X., Tippett, M., & Vivian, A.</p>	<ul style="list-style-type: none"> •1990-2008 •279 deals •No info about TH 	<p>CAR: [0]**, [9]***, [10]**</p> <p>Variables: Earnings-Price(1)**, Earnings-Price(2)**, Earnings-price ratio is below median*, Earnings-price ratio is below 33rd percentile**, Book-Market ratio(1)**, Book-Market ratio(2)**,</p>	<p>Research in International Business and Finance</p> <p>(article citation: 8 Google Scholar)</p>
<p>Tao, F., Liu, X., Gao, L. & Xia, E.</p>	<ul style="list-style-type: none"> •2000–2012 •165 deals •No info about TH 	<p>CAR: [-1,0]***, [-0,1]**, [-1,1]***, [-2,2], [-5,5]</p> <p>Variables (focusing on event window [-1,0],[0,1] and [-1,1]):</p> <p>Voice and Accountability: High(*** or **) VS Low</p> <p>Political Stability and Absence of Violence: High (** or ***) VS Low(* or no sig.)</p> <p>Government Effectiveness: High(*** or **) VS Low</p> <p>Regulatory Quality: High(*** or **) VS Low</p> <p>Rule of Law: High(*** or **) VS Low</p> <p>Control of Corruption: High (*** or **) VS Low</p> <p>Ownership: Private(*** or **) VS SOE. The t-Value of the ownership status effect(* or **)</p>	<p>International Business Review</p> <p>(article citation: 83 Google Scholar)</p>
<p>Significance level *:p<0.1, **:p<0.05, ***:p<0.01</p>			

2. Appendix B: Attachments connected to the method

2.1. Figure: Sample distribution over Shanghai and Shenzhen Stock Exchange

Stock Exchange Distribution



The figure shows the distribution of stocks on the Shenzhen and Shanghai Stock Exchange

Source: DataStream

2.2. Table: Industry Classification (SIC Codes)

<i>SIC Code</i>	<i>Industry Name</i>
0100-0999	<i>Agriculture, Forestry & Fishing</i>
1000-1499	<i>Mining</i>
1500-1799	<i>Construction</i>
1800-1999	<i>(Not used)</i>
2000-3999	<i>Manufacturing</i>
4000-4999	<i>Transportation, Communications, Electric, Gas & Sanitary Service</i>
5000-5199	<i>Wholesale Trade</i>
5200-5999	<i>Retail Trade</i>
6000-6799	<i>Finance, Insurance & Real Estate</i>
7000-8999	<i>Services</i>
9100-9729	<i>Public Administration</i>
9900-9999	<i>Nonclassifiable</i>

Source: U.S Securities and Exchange Commission

2.3. *Table: Sample distribution over acquirer and target industry in Model 1*

Industry	Acquirer	Acquirer % of Total	Target	Target % of Total
Agriculture, Forestry, and Fishing	3	3	1	1
Mining	4	4	4	4
Construction	0	0	0	0
Manufacturing	63	64	54	55
Transport, Communication, Electric, Gas and Sanitary Service	5	5	6	6
Wholesale Trade	4	4	7	7
Retail Trade	6	6	1	1
Finance, insurance and Real Estate	6	6	14	14
Services	8	8	12	12
Public Administration	0	0	0	0
Total	99	100	99	100

2.4. *Table: Sample distribution over acquirer and target industry in Model 2*

Industry	Acquirer	Acquirer % of Total	Target	Target % of Total
Agriculture, Forestry, and Fishing	2	5	2	5
Mining	1	2	1	2
Construction	0	0	0	0
Manufacturing	27	61	27	61
Transport, Communication, Electric, Gas and Sanitary Service	3	7	3	7
Wholesale Trade	2	5	2	5

Retail Trade	2	5	2	5
Finance, insurance and Real Estate	3	7	3	7
Services	4	9	4	9
Public Administration	0	0	0	0
Total	44	100	44	100

2.5. Table: Sample distribution over acquirer and target industry in Model 3

Industry	Acquirer	Acquirer % of Total	Target	Target % of Total
Agriculture, Forestry, and Fishing	1	2	1	2
Mining	3	5	3	5
Construction	0	0	0	0
Manufacturing	36	65	36	65
Transport, Communication, Electric, Gas and Sanitary Service	2	4	2	4
Wholesale Trade	2	4	2	4
Retail Trade	4	7	4	7
Finance, insurance and Real Estate	3	5	3	5
Services	4	7	4	7
Public Administration	0	0	0	0
Total	55	100	54	100

2.6. **Table: variable explanation for equations**

<p>Equation 1: The Market Model R_{it} = Stock_i Return for Time Period_t α_i = Stock_i Intercept β_i = Stock_i Sensitivity R_{mt} = Market Return for Time Period_t ϵ_{it} = Stock_i Error Term for Time Period_t</p>	<p>Equation 7: Abnormal Return AR_{it}=Abnormal Stock_i Return for Time Period_t R_{it}=Actual Stock_i Return for Time Period_t α_i=Estimated Stock_i Intercept β_i=Estimated Stock_i Sensitivity R_{mt}=Market Return for Time Period_t</p>
<p>Equation 8: Cumulative Abnormal Return CAR_i=Cumulative Abnormal for Stock_i $T1$=The start of the event window $T2$=The end of the event window AR_{it}=Abnormal Stock_i Return for Time Period_t</p>	<p>Equation 9: Cumulative Average Abnormal Return $CAAR$=Cumulative Average Abnormal Return n=Number of observations CAR=Cumulative Abnormal Return $T1$=The start of the event window $T2$=The end of the event window</p>
<p>Equation 10: Multiple Regression Model y_i=Dependent variable_i β_0=Intercept β=Coefficient x=Independent variable_i e_i=Random error term k_i=Number of independent variables i=Number of observations</p>	<p>Equation 11: Chow Test RSS = Residual sum of squares for whole sample RSS_1 = Residual sum of squares for sample without trading halts RSS_2 = Residual sum of squares for sample with trading halts T = Number of observations $2k$ = Number of regressors in the “unrestricted” regression k = Number of regressors in (each) “unrestricted” regression</p>
<p>Equation 12: Institutional Distance FID_j = Institutional distance between two countries l_{ij} = Total points for target country “j” l_{ic} = Total points for acquiring “c” V_i = Variance for year “i”</p>	<p>Equation 13: Euclidean Distance adjusted to 6 dimensions I_{ki} = Target country’s cultural dimension value I_{kj} = China cultural dimension value k = cultural dimensions ($k = 1-5$). μ_k = mean SD_k = standard deviation V_k = variance</p>

3. Appendix C: Attachments connected to the results

3.1. Table: Distribution over the relative deal size

Relative Deal Size (RDS)	Model 1	Model 2	Model 3
$2\% \leq \text{RDS} < 5\%$	30	18	12
$5\% \leq \text{RDS} < 10\%$	24	12	12
$10\% \leq \text{RDS} < 20\%$	24	6	18
$20\% \leq \text{RDS} < 50\%$	14	6	8
$50\% \leq \text{RDS}$	7	2	5
<i>Total</i>	<i>99</i>	<i>44</i>	<i>55</i>

Source: DataStream & Zephyr

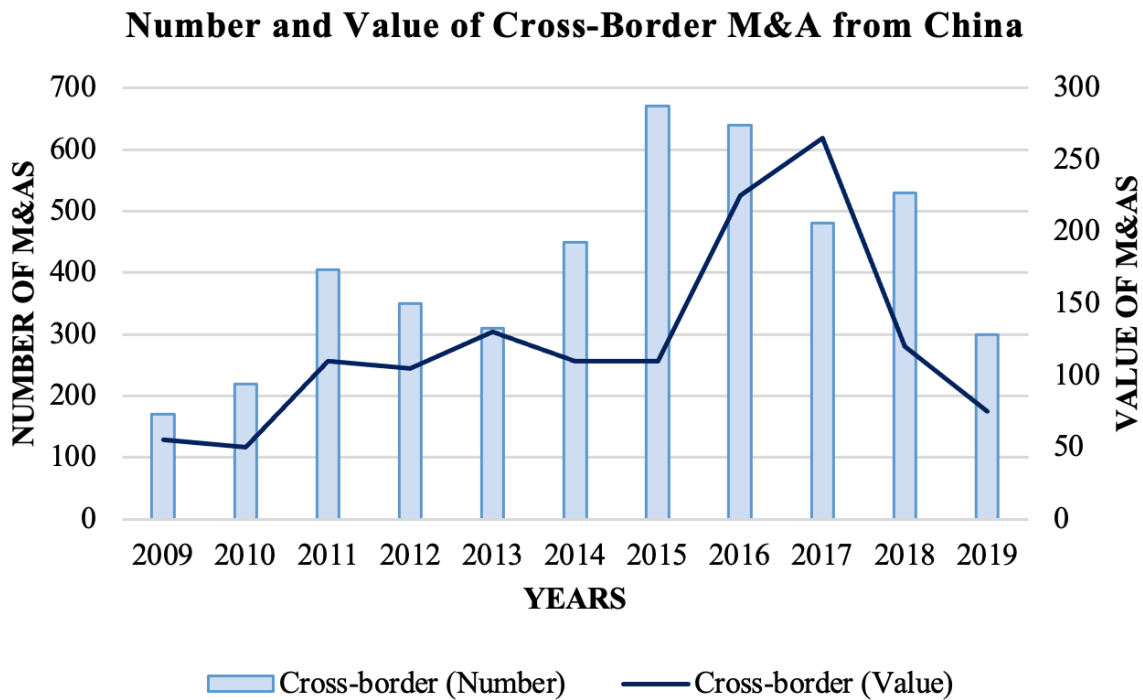
3.2. Table: Sample distribution of target countries

Target Country	Acquisition Announcements	Percent of Total
<i>Australia</i>	<i>2</i>	<i>2%</i>
<i>Belgium</i>	<i>1</i>	<i>1%</i>
<i>Brazil</i>	<i>2</i>	<i>2%</i>
<i>Canada</i>	<i>2</i>	<i>2%</i>
<i>Croatia</i>	<i>1</i>	<i>1%</i>
<i>Czech Republic</i>	<i>1</i>	<i>1%</i>
<i>Finland</i>	<i>3</i>	<i>3%</i>
<i>France</i>	<i>3</i>	<i>3%</i>
<i>Germany</i>	<i>12</i>	<i>12%</i>
<i>Hong Kong</i>	<i>25</i>	<i>25%</i>
<i>Hungary</i>	<i>1</i>	<i>1%</i>

<i>India</i>	<i>1</i>	<i>1%</i>
<i>Italy</i>	<i>5</i>	<i>5%</i>
<i>Japan</i>	<i>2</i>	<i>2%</i>
<i>Kazakhstan</i>	<i>1</i>	<i>1%</i>
<i>Luxembourg</i>	<i>3</i>	<i>3%</i>
<i>Malta</i>	<i>1</i>	<i>1%</i>
<i>Mexico</i>	<i>1</i>	<i>1%</i>
<i>Netherlands</i>	<i>2</i>	<i>2%</i>
<i>New Zealand</i>	<i>1</i>	<i>1%</i>
<i>Peru</i>	<i>1</i>	<i>1%</i>
<i>Poland</i>	<i>1</i>	<i>1%</i>
<i>Serbia</i>	<i>1</i>	<i>1%</i>
<i>Singapore</i>	<i>4</i>	<i>4%</i>
<i>Spain</i>	<i>2</i>	<i>2%</i>
<i>Thailand</i>	<i>1</i>	<i>1%</i>
<i>United Kingdom</i>	<i>5</i>	<i>5%</i>
<i>United States</i>	<i>14</i>	<i>14%</i>
<i>Total</i>	<i>99</i>	<i>100%</i>

Source: Zephyr

3.3. *Figure: Number of completed domestic and cross-border M&A deals involving companies from mainland China between 2009 and 2019*



Source: Zero2IPO (2019).

3.4. *Table: Tests and transformations*

<i>Do we have ... ? If the answer is false, transformations have been made</i>	<i>Normality</i>	<i>Homoskedacity</i>	<i>Linearity</i>	<i>No Multicollinearity</i>
Model 1				
<i>[-1,0]</i>	<i>true</i>	<i>false</i> ¹⁴	<i>true</i>	<i>true</i>
<i>[-1,1]</i>	<i>true</i>	<i>true</i>	<i>true</i>	<i>true</i>
<i>[-2,2]</i>	<i>false</i> ¹⁵	<i>true</i>	<i>true</i>	<i>true</i>

¹⁴ Adjusted with white standard errors.

¹⁵ All continuous independent variables are logarithmized and all the variables are winsorized at a 5% level to make the residuals normally distributed.

Model 2				
<i>[-1,0]</i>	<i>true</i>	<i>true</i>	<i>false</i> ¹⁶	<i>true</i>
<i>[-1,1]</i>	<i>true</i>	<i>true</i>	<i>true</i>	<i>true</i>
<i>[-2,2]</i>	<i>false</i> ¹⁷	<i>true</i>	<i>true</i>	<i>true</i>
Model 3				
<i>[-1,0]</i>	<i>true</i>	<i>true</i>	<i>true</i>	<i>true</i>
<i>[-1,1]</i>	<i>true</i>	<i>true</i>	<i>true</i>	<i>true</i>
<i>[-2,2]</i>	<i>true</i>	<i>true</i>	<i>true</i>	<i>true</i>

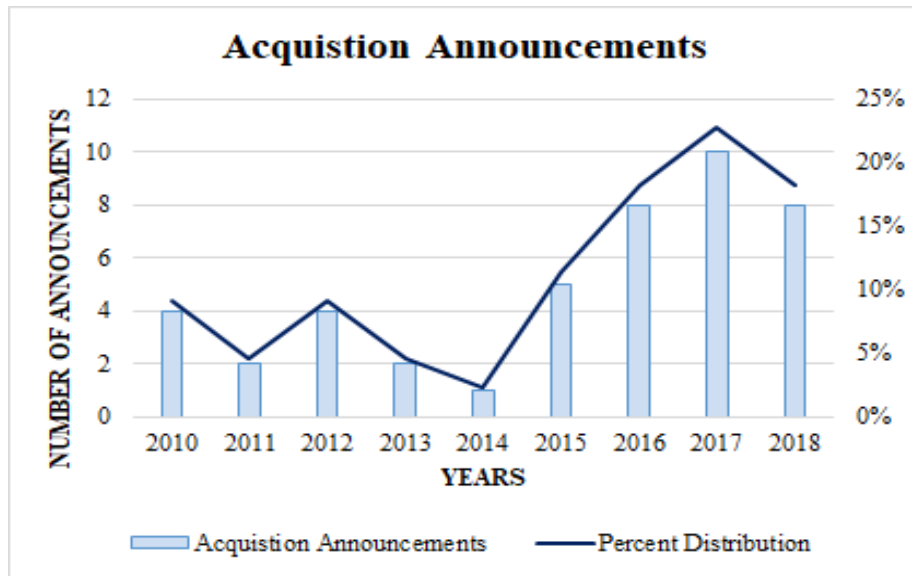
3.5. Table: Results from the Chow Test

Chow Test: to determine if there is a better fit when divided the regression into two regressions based on the dummy variable Trading Halt			
Event window:	Chow test value	Critical interval of $F[2,95]$	Better fit with two regressions?
<i>[-1,0]</i>	<i>4.328**</i>	<i>3.092</i>	<i>Yes</i>
<i>[-1,+1]</i>	<i>3.125**</i>	<i>3.092</i>	<i>Yes</i>
<i>[-2,+2]</i>	<i>3.083*</i>	<i>2.359</i>	<i>Yes</i>
Significance level <i>*:p<0.1, **:p<0.05, ***:p<0.01</i>			

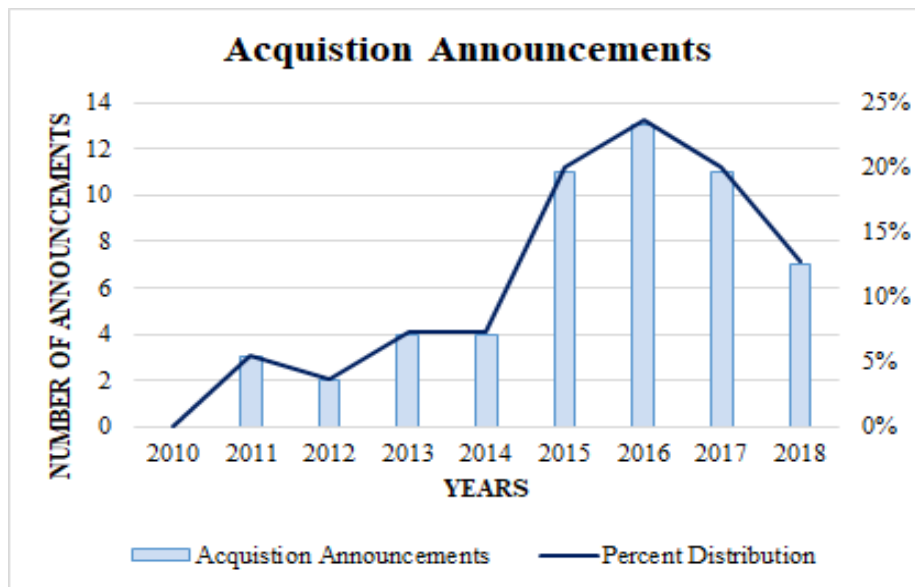
¹⁶ The variable WGI² is included in the regression to make the model linear.

¹⁷ All the variables are winsorized at the 5% level to make the residuals normally distributed.

3.6. *Figure: Event Window [-1,0] No Trading Halt Distribution*



3.7. *Figure: Event Window [-1,0] Trading Halt Distribution*



3.8. Regression: Model 1

3.8.1. Model 1: Regression output [-1,0] (after adjustments)

Dependent Variable: CAR__1_0_				
Method: Least Squares				
Date: 01/12/21 Time: 12:22				
Sample: 1 99				
Included observations: 99				
Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors and covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.264610	0.169038	-1.565388	0.1211
DUMMY_MANUFACTURI	0.002414	0.018167	0.132880	0.8946
DUMMY_SAME_INDUST	-0.006342	0.016939	-0.374417	0.7090
DUMMY_TRADING_HALT	0.021172	0.011621	1.821804	0.0719
RELATIVE_DEAL_VALUE	-0.003153	0.042415	-0.074331	0.9409
WGI_COMPOSITE	-0.006651	0.005751	-1.156501	0.2506
CD_FVM	0.011173	0.003593	3.109507	0.0025
CD_IVC	0.002596	0.003764	0.689890	0.4921
CD_LVS	-0.004533	0.001745	-2.598422	0.0110
CD_PD	-0.002161	0.007112	-0.303860	0.7620
CD_UA	-0.001570	0.004456	-0.352413	0.7254
GDP_LN	0.011015	0.006087	1.809609	0.0738
R-squared	0.150838	Mean dependent var	0.023196	
Adjusted R-squared	0.043473	S.D. dependent var	0.063278	
S.E. of regression	0.061888	Akaike info criterion	-2.613781	
Sum squared resid	0.333217	Schwarz criterion	-2.299221	
Log likelihood	141.3821	Hannan-Quinn criter.	-2.486509	
F-statistic	1.404908	Durbin-Watson stat	2.298891	
Prob(F-statistic)	0.185166	Wald F-statistic	4.289796	
Prob(Wald F-statistic)	0.000043			

The model has been adjusted due to heteroskedasticity.

3.8.1.1. Model 1: Heteroskedasticity test [-1,0]

Heteroskedasticity Test: White				
Null hypothesis: Homoskedasticity				
	F-statistic	1.972319	Prob. F(73,25)	0.0296
	Obs*R-squared	84.35323	Prob. Chi-Square(73)	0.1712
	Scaled explained SS	63.17563	Prob. Chi-Square(73)	0.7872
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 01/12/21 Time: 12:21				
Sample: 1 99				
Included observations: 99				
Collinear test regressors dropped from specification				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.138712	0.247439	-0.560593	0.5801
DUMMY_MANUFACTURING^2	0.276624	0.332975	0.830766	0.4140
DUMMY_MANUFACTURING*DUMMY_S	0.004953	0.005710	0.867291	0.3940
DUMMY_MANUFACTURING*DUMMY_T	0.004501	0.006092	0.738925	0.4668
DUMMY_MANUFACTURING*RELATIVE_	0.051099	0.041093	1.243496	0.2252
DUMMY_MANUFACTURING*WGI_COM	-0.016807	0.011163	-1.505639	0.1447
DUMMY_MANUFACTURING*CD_FVM	0.012735	0.011228	1.134252	0.2674
DUMMY_MANUFACTURING*CD_IVC	0.006260	0.008486	0.737650	0.4676
DUMMY_MANUFACTURING*CD_LVS	-0.003310	0.003376	-0.980427	0.3363
DUMMY_MANUFACTURING*CD_PD	-0.003817	0.013997	-0.272703	0.7873
DUMMY_MANUFACTURING*CD_UA	-0.010178	0.007258	-1.402241	0.1731
DUMMY_MANUFACTURING*GDP_LN	-0.008505	0.012395	-0.686149	0.4989
DUMMY_SAME_INDUSTRY^2	-0.375812	0.249332	-1.507275	0.1443
DUMMY_SAME_INDUSTRY*DUMMY_TR	-0.001344	0.003558	-0.377714	0.7088
DUMMY_SAME_INDUSTRY*RELATIVE_	-0.076118	0.047509	-1.602177	0.1217
DUMMY_SAME_INDUSTRY*WGI_COMP	0.008730	0.004658	1.874385	0.0726
DUMMY_SAME_INDUSTRY*CD_FVM	-0.005399	0.010229	-0.527824	0.6023
DUMMY_SAME_INDUSTRY*CD_IVC	-0.012983	0.008401	-1.545448	0.1348
DUMMY_SAME_INDUSTRY*CD_LVS	0.004155	0.003069	1.353570	0.1880
DUMMY_SAME_INDUSTRY*CD_PD	0.013433	0.014770	0.909462	0.3718
DUMMY_SAME_INDUSTRY*CD_UA	0.006297	0.004689	1.342965	0.1913
DUMMY_SAME_INDUSTRY*GDP_LN	0.012808	0.009164	1.397688	0.1745
DUMMY_TRADING_HALT^2	-0.247737	0.216671	-1.143382	0.2637
DUMMY_TRADING_HALT*RELATIVE_D	0.030694	0.014592	2.103538	0.0456
DUMMY_TRADING_HALT*WGI_COMPOS	-0.002820	0.003056	-0.922646	0.3650
DUMMY_TRADING_HALT*CD_FVM	0.007591	0.008603	0.882400	0.3860
DUMMY_TRADING_HALT*CD_IVC	0.000565	0.001837	0.307316	0.7611
DUMMY_TRADING_HALT*CD_LVS	-0.004063	0.003325	-1.221819	0.2332
DUMMY_TRADING_HALT*CD_PD	-0.005617	0.004885	-1.149665	0.2612
DUMMY_TRADING_HALT*CD_UA	-0.007834	0.005997	-1.306205	0.2034
DUMMY_TRADING_HALT*GDP_LN	0.010040	0.008606	1.166580	0.2544
RELATIVE_DEAL_VALUE^2	0.017988	0.020243	0.888634	0.3827
RELATIVE_DEAL_VALUE*WGI_COMPOS	-0.010997	0.032948	-0.333758	0.7413
RELATIVE_DEAL_VALUE*CD_FVM	0.101353	0.136813	0.740809	0.4657
RELATIVE_DEAL_VALUE*CD_IVC	-4.33E-05	0.010050	-0.004309	0.9966
RELATIVE_DEAL_VALUE*CD_LVS	-0.009641	0.008409	-1.146524	0.2624
RELATIVE_DEAL_VALUE*CD_PD	0.012155	0.028595	0.425078	0.6744
RELATIVE_DEAL_VALUE*CD_UA	-0.025109	0.029565	-0.849272	0.4038
RELATIVE_DEAL_VALUE*GDP_LN	0.023010	0.014284	1.610933	0.1197
RELATIVE_DEAL_VALUE	-0.598556	0.375571	-1.593722	0.1236
WGI_COMPOSITE^2	0.000672	0.003071	0.218942	0.8285
WGI_COMPOSITE*CD_FVM	-0.016325	0.021331	-0.765297	0.4513
WGI_COMPOSITE*CD_IVC	-0.001041	0.003787	-0.274921	0.7856
WGI_COMPOSITE*CD_LVS	0.000110	0.004576	0.024074	0.9810
WGI_COMPOSITE*CD_PD	-0.004160	0.002646	-1.572017	0.1285
WGI_COMPOSITE*CD_UA	0.006770	0.009432	0.717790	0.4795

WGI_COMPOSITE*GDP_LN	0.004644	0.003112	1.492218	0.1482
WGI_COMPOSITE	-0.119673	0.093895	-1.274545	0.2142
CD_FVM^2	-0.007342	0.014566	-0.504062	0.6186
CD_FVM*CD_IVC	0.009564	0.006934	1.379339	0.1800
CD_FVM*CD_LVS	-0.001916	0.005260	-0.364167	0.7188
CD_FVM*CD_PD	0.010432	0.027961	0.373084	0.7122
CD_FVM*CD_UA	-0.015524	0.014342	-1.082355	0.2894
CD_FVM*GDP_LN	-0.024093	0.020510	-1.174698	0.2512
CD_FVM	0.685195	0.485012	1.412738	0.1701
CD_IVC^2	0.000836	0.003547	0.235823	0.8155
CD_IVC*CD_LVS	-0.000662	0.001341	-0.493693	0.6258
CD_IVC*CD_PD	-0.003721	0.007382	-0.504089	0.6186
CD_IVC*CD_UA	-0.008289	0.004957	-1.672232	0.1069
CD_IVC*GDP_LN	0.003449	0.005408	0.637802	0.5294
CD_IVC	-0.078916	0.157347	-0.501542	0.6204
CD_LVS^2	-9.10E-05	0.000657	-0.138551	0.8909
CD_LVS*CD_PD	0.003769	0.004517	0.834492	0.4119
CD_LVS*CD_UA	0.000663	0.003831	0.172995	0.8640
CD_LVS*GDP_LN	-0.002554	0.004151	-0.615269	0.5439
CD_LVS	0.064326	0.100727	0.638617	0.5289
CD_PD^2	-0.001343	0.002017	-0.666056	0.5115
CD_PD*CD_UA	0.001807	0.007281	0.248163	0.8060
CD_PD*GDP_LN	-0.014519	0.008972	-1.618228	0.1182
CD_PD	0.408268	0.246232	1.658066	0.1098
CD_UA^2	0.004379	0.003589	1.220179	0.2338
CD_UA*GDP_LN	0.005948	0.006269	0.948842	0.3518
CD_UA	-0.163927	0.163829	-1.000602	0.3266
GDP_LN^2	0.000177	0.000355	0.500429	0.6211
R-squared	0.852053	Mean dependent var	0.003366	
Adjusted R-squared	0.420047	S.D. dependent var	0.004711	
S.E. of regression	0.003588	Akaike info criterion	-8.303761	
Sum squared resid	0.000322	Schwarz criterion	-6.363975	
Log likelihood	485.0362	Hannan-Quinn criter.	-7.518921	
F-statistic	1.972319	Durbin-Watson stat	2.065974	
Prob(F-statistic)	0.029581			

The Heteroskedacity White test is showing that the model is heteroskedastic.

3.8.2. Model 1: Correlation matrix [-1,0]

	CAR__1_0_	DUMMY_MA	DUMMY_SA	DUMMY_TR	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC
CAR__	1.000000	0.071462	0.015801	0.136347	-0.011819	-0.100374	0.123316	0.155068
DUMMY	0.071462	1.000000	0.559431	3.63E-17	0.004082	-0.079263	0.004530	0.333474
DUMMY	0.015801	0.559431	1.000000	0.057496	-0.017021	0.048781	-0.001981	0.327608
DUMMY	0.136347	3.63E-17	0.057496	1.000000	0.136939	0.062626	-0.080069	-0.021983
RELATI	-0.011819	0.004082	-0.017021	0.136939	1.000000	-0.035738	-0.117886	0.056046
WGI_C	-0.100374	-0.079263	0.048781	0.062626	-0.035738	1.000000	0.109859	-0.021807
CD_FVM	0.123316	0.004530	-0.001981	-0.080069	-0.117886	0.109859	1.000000	-0.057453
CD_IVC	0.155068	0.333474	0.327608	-0.021983	0.056046	-0.021807	-0.057453	1.000000
CD_LVS	-0.019485	0.083354	0.084541	-0.047292	-0.062397	-0.258833	-0.033865	0.547797
CD_PD	0.026640	0.252519	0.307634	-0.035908	0.174324	0.364857	0.051658	0.588560
CD_UA	0.054897	0.279609	0.151344	-0.046674	0.060505	-0.467096	0.193641	-0.090869
GDP_LN	0.206107	0.243693	0.193983	-0.035962	-0.034690	-0.080532	-0.235869	0.733279

	CD_LVS	CD_PD	CD_UA	GDP_LN
CAR__	-0.019485	0.026640	0.054897	0.206107
DUMMY	0.083354	0.252519	0.279609	0.243693
DUMMY	0.084541	0.307634	0.151344	0.193983
DUMMY	-0.047292	-0.035908	-0.046674	-0.035962
RELATI	-0.062397	0.174324	0.060505	-0.034690
WGI_C	-0.258833	0.364857	-0.467096	-0.080532
CD_FVM	-0.033865	0.051658	0.193641	-0.235869
CD_IVC	0.547797	0.588560	-0.090869	0.733279
CD_LVS	1.000000	0.180693	-0.150952	0.450480
CD_PD	0.180693	1.000000	-0.089669	0.421803
CD_UA	-0.150952	-0.089669	1.000000	-0.139501
GDP_LN	0.450480	0.421803	-0.139501	1.000000

3.8.3. Model 1: Regression output [-1,1]

Dependent Variable: CAR 1 1				
Method: Least Squares				
Date: 01/11/21 Time: 16:43				
Sample: 1 99				
Included observations: 99				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.265156	0.252789	-1.048922	0.2971
DUMMY MANUFACTURI	0.023780	0.024892	0.955332	0.3421
DUMMY_SAME_INDUST	-0.024492	0.025782	-0.949980	0.3448
DUMMY_TRADING_HALT	0.018767	0.020157	0.931083	0.3544
RELATIVE_DEAL_VALUE	-0.018294	0.044227	-0.413624	0.6802
WGI COMPOSITE	-0.012004	0.008889	-1.350492	0.1804
CD FVM	0.012260	0.008094	1.514678	0.1335
CD_IVC	0.004134	0.005538	0.746505	0.4574
CD_LVS	-0.005450	0.003772	-1.444582	0.1522
CD PD	-0.003915	0.007153	-0.547317	0.5856
CD UA	-0.003250	0.006613	-0.491439	0.6244
GDP LN	0.011866	0.009152	1.296599	0.1982
R-squared	0.119731	Mean dependent var	0.023124	
Adjusted R-squared	0.008433	S.D. dependent var	0.096361	
S.E. of regression	0.095954	Akaike info criterion	-1.736693	
Sum squared resid	0.801016	Schwarz criterion	-1.422133	
Log likelihood	97.96632	Hannan-Quinn criter.	-1.609422	
F-statistic	1.075769	Durbin-Watson stat	2.253595	
Prob(F-statistic)	0.390054			

3.8.4. Model 1: Correlation matrix [-1,1]

	CAR__1_1_1_	DUMMY_MA	DUMMY_SA	DUMMY_TR	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC
CAR__	1.000000	0.115853	-0.016262	0.061407	-0.046681	-0.162259	0.079352	0.135911
DUMMY	0.115853	1.000000	0.559431	0.014976	0.004082	-0.079263	0.004530	0.333474
DUMMY	-0.016262	0.559431	1.000000	0.101503	-0.017021	0.048781	-0.001981	0.327608
DUMMY	0.061407	0.014976	0.101503	1.000000	0.140929	0.008556	-0.069380	-0.021962
RELATI	-0.046681	0.004082	-0.017021	0.140929	1.000000	-0.035738	-0.117886	0.056046
WGI_C	-0.162259	-0.079263	0.048781	0.008556	-0.035738	1.000000	0.109859	-0.021807
CD_FVM	0.079352	0.004530	-0.001981	-0.069380	-0.117886	0.109859	1.000000	-0.057453
CD_IVC	0.135911	0.333474	0.327608	-0.021962	0.056046	-0.021807	-0.057453	1.000000
CD_LVS	0.012917	0.083354	0.084541	-0.076167	-0.062397	-0.258833	-0.033865	0.547797
CD_PD	-0.021781	0.252519	0.307634	-0.034038	0.174324	0.364857	0.051658	0.588560
CD_UA	0.070706	0.279609	0.151344	0.030261	0.060505	-0.467096	0.193641	-0.090869
GDP_LN	0.173752	0.243693	0.193983	-0.084081	-0.034690	-0.080532	-0.235869	0.733279

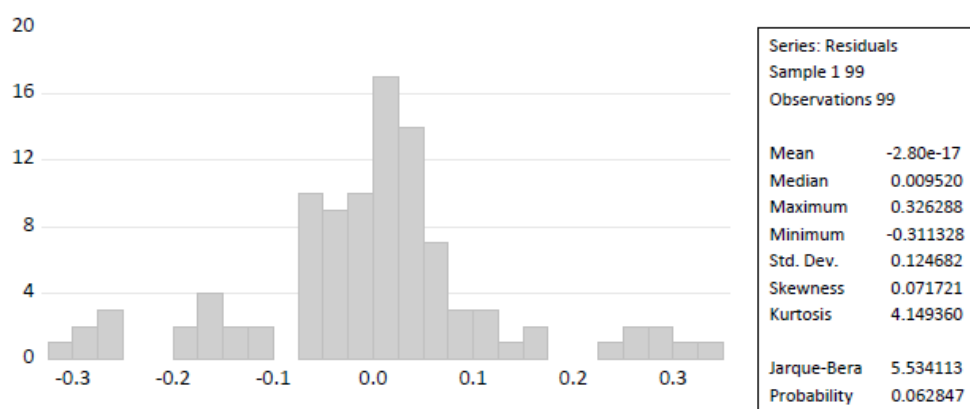
	CD_LVS	CD_PD	CD_UA	GDP_LN
CAR__	0.012917	-0.021781	0.070706	0.173752
DUMMY	0.083354	0.252519	0.279609	0.243693
DUMMY	0.084541	0.307634	0.151344	0.193983
DUMMY	-0.076167	-0.034038	0.030261	-0.084081
RELATI	-0.062397	0.174324	0.060505	-0.034690
WGI_C	-0.258833	0.364857	-0.467096	-0.080532
CD_FVM	-0.033865	0.051658	0.193641	-0.235869
CD_IVC	0.547797	0.588560	-0.090869	0.733279
CD_LVS	1.000000	0.180693	-0.150952	0.450480
CD_PD	0.180693	1.000000	-0.089669	0.421803
CD_UA	-0.150952	-0.089669	1.000000	-0.139501
GDP_LN	0.450480	0.421803	-0.139501	1.000000

3.8.5. Model 1: Regression output [-2,2]

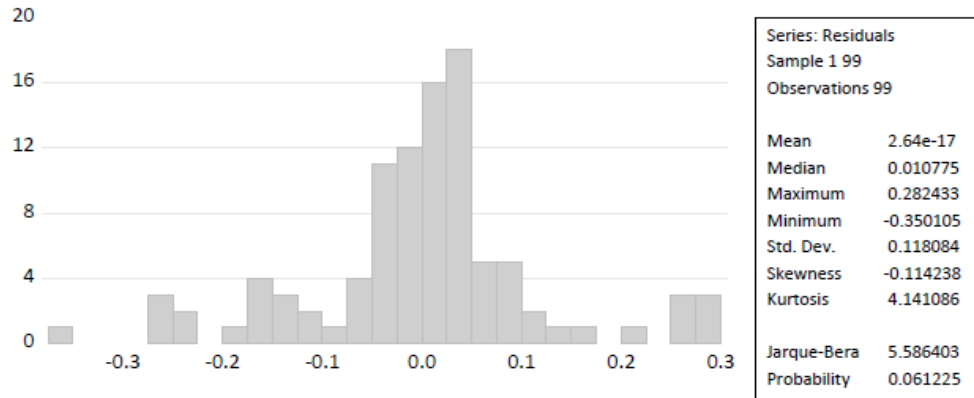
Dependent Variable: CAR__2_2_WIN				
Method: Least Squares				
Date: 01/11/21 Time: 17:36				
Sample: 1 99				
Included observations: 99				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.219087	0.341999	-0.640606	0.5235
DUMMY_MANUFACTURING_WIN	0.018451	0.033449	0.551616	0.5826
DUMMY_SAME_INDUSTRY_WIN	-0.017578	0.033729	-0.521153	0.6036
DUMMY_TRADING_HALT_WIN	0.019661	0.028054	0.700841	0.4853
RELATIVE_DEAL_VALUE_LN_W	0.008321	0.014056	0.592044	0.5554
WGI_COMPOSITE_LN_WIN	-0.022917	0.012795	-1.791065	0.0768
CD_FVM_LN_WIN	0.008922	0.012925	0.690289	0.4918
CD_IVC_LN_WIN	0.011663	0.016875	0.691127	0.4913
CD_LVS_LN_WIN	-0.007852	0.009450	-0.830890	0.4083
CD_PD_LN_WIN	-0.001967	0.015729	-0.125029	0.9008
CD_UA_LN_WIN	-0.010169	0.009409	-1.080764	0.2828
GDP_LN_WIN	0.009413	0.012355	0.761918	0.4482
R-squared	0.069796	Mean dependent var	0.022510	
Adjusted R-squared	-0.047816	S.D. dependent var	0.122994	
S.E. of regression	0.125900	Akaike info criterion	-1.193447	
Sum squared resid	1.379017	Schwarz criterion	-0.878887	
Log likelihood	71.07564	Hannan-Quinn criter.	-1.066176	
F-statistic	0.593446	Durbin-Watson stat	2.054136	
Prob(F-statistic)	0.829398			

The regression output after making the residuals normally distributed.

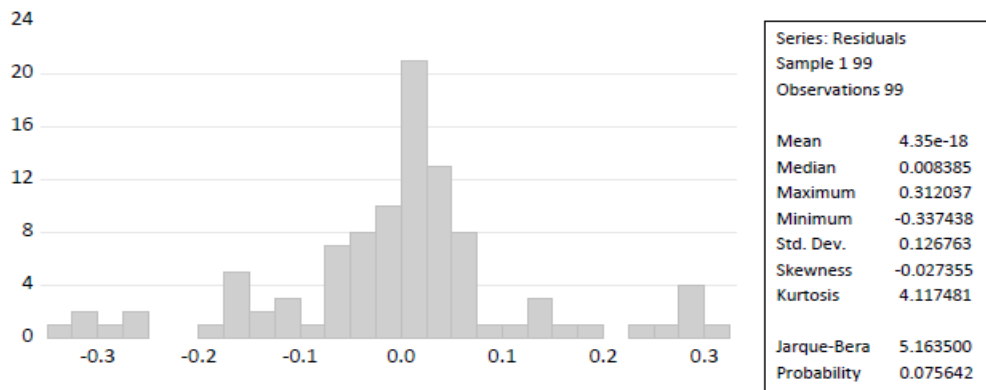
3.8.5.1. Model 1: Normality test [-2,2]



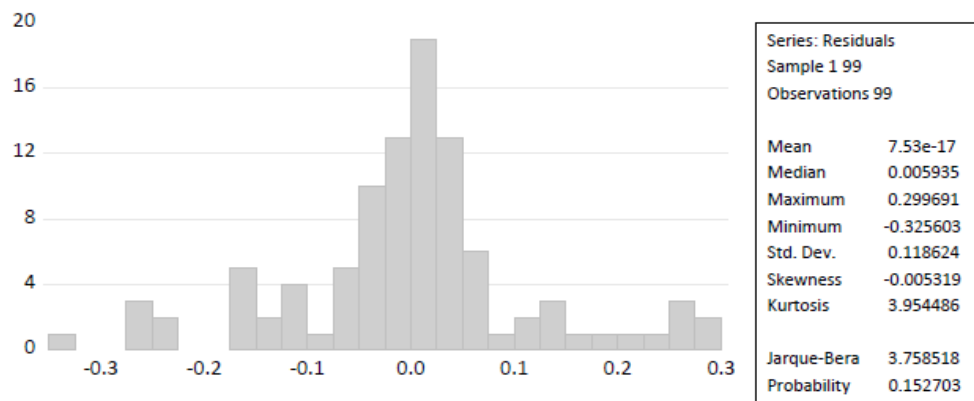
The residuals in the untransformed data set are not normally distributed.



When winsorizing all the variables, the residuals are still not normally distributed.



When logging all the independent continuous variables, the residuals are still not normally distributed.



When doing both logarithmizing and winsorizing, the residuals are normally distributed.

3.8.6. Model 1: Correlation matrix [-2,2]

	CAR__2__2_	DUMMY_MA	DUMMY_SA	DUMMY_TR	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC
CAR__	1.000000	0.086830	-0.007574	0.063439	-0.075053	-0.160923	0.057384	0.100540
DUMMY	0.086830	1.000000	0.559431	0.066023	0.004082	-0.079263	0.004530	0.333474
DUMMY	-0.007574	0.559431	1.000000	0.165456	-0.017021	0.048781	-0.001981	0.327608
DUMMY	0.063439	0.066023	0.165456	1.000000	0.094000	0.009860	-0.118684	0.053575
RELATI	-0.075053	0.004082	-0.017021	0.094000	1.000000	-0.035738	-0.117886	0.056046
WGI_C	-0.160923	-0.079263	0.048781	0.009860	-0.035738	1.000000	0.109859	-0.021807
CD_FVM	0.057384	0.004530	-0.001981	-0.118684	-0.117886	0.109859	1.000000	-0.057453
CD_IVC	0.100540	0.333474	0.327608	0.053575	0.056046	-0.021807	-0.057453	1.000000
CD_LVS	0.007588	0.083354	0.084541	-0.045698	-0.062397	-0.258833	-0.033865	0.547797
CD_PD	-0.065338	0.252519	0.307634	0.022121	0.174324	0.364857	0.051658	0.588560
CD_UA	0.053786	0.279609	0.151344	0.009134	0.060505	-0.467096	0.193641	-0.090869
GDP_LN	0.116009	0.243693	0.193983	0.013450	-0.034690	-0.080532	-0.235869	0.733279

	CD_LVS	CD_PD	CD_UA	GDP_LN
CAR__	0.007588	-0.065338	0.053786	0.116009
DUMMY	0.083354	0.252519	0.279609	0.243693
DUMMY	0.084541	0.307634	0.151344	0.193983
DUMMY	-0.045698	0.022121	0.009134	0.013450
RELATI	-0.062397	0.174324	0.060505	-0.034690
WGI_C	-0.258833	0.364857	-0.467096	-0.080532
CD_FVM	-0.033865	0.051658	0.193641	-0.235869
CD_IVC	0.547797	0.588560	-0.090869	0.733279
CD_LVS	1.000000	0.180693	-0.150952	0.450480
CD_PD	0.180693	1.000000	-0.089669	0.421803
CD_UA	-0.150952	-0.089669	1.000000	-0.139501
GDP_LN	0.450480	0.421803	-0.139501	1.000000

3.9. Regression: Model 2

3.9.1. Model 2: Regression output [-1,0]

Dependent Variable: CAR__1_0_ Method: Least Squares Date: 01/11/21 Time: 20:04 Sample: 1 44 Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.094026	0.118491	-0.793530	0.4333
DUMMY_MANUFACTURI	-0.036769	0.015905	-2.311838	0.0274
DUMMY_SAME_INDUST	-0.000930	0.014056	-0.066190	0.9476
RELATIVE_DEAL_VALUE	-0.028500	0.032691	-0.871806	0.3898
WGI_COMPOSITE	-0.015519	0.011308	-1.372328	0.1795
WGI_COMPOSITE^2	0.001488	0.001835	0.810982	0.4234
CD_FVM	0.009997	0.003890	2.569648	0.0150
CD_IVC	0.003490	0.003098	1.126808	0.2682
CD_LVS	-0.003473	0.001980	-1.754191	0.0890
CD_PD	0.007156	0.004864	1.471373	0.1510
CD_UA	-0.001690	0.003337	-0.506361	0.6161
GDP_LN	0.005016	0.004486	1.118184	0.2718
R-squared	0.372941	Mean dependent var		0.013599
Adjusted R-squared	0.157389	S.D. dependent var		0.033767
S.E. of regression	0.030996	Akaike info criterion		-3.882912
Sum squared resid	0.030744	Schwarz criterion		-3.396315
Log likelihood	97.42407	Hannan-Quinn criter.		-3.702459
F-statistic	1.730168	Durbin-Watson stat		2.401878
Prob(F-statistic)	0.111142			

The regression output after adjusting the model for linearity.

3.9.1.1. Model 2: Linearity test (before adjustments)

Ramsey RESET Test Equation: UNTITLED Omitted Variables: Squares of fitted values Specification: CAR 1 0 C DUMMY MANUFACTURING DUMMY_SAME_INDUSTRY RELATIVE_DEAL_VALUE WGI_COMPOSITE CD FVM CD IVC CD LVS CD PD CD UA GDP_LN				
	Value	df	Probability	
t-statistic	2.261053	32	0.0307	
F-statistic	5.112363	(1, 32)	0.0307	
Likelihood ratio	6.521426	1	0.0107	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	0.004322	1	0.004322	
Restricted SSR	0.031376	33	0.000951	
Unrestricted SSR	0.027054	32	0.000845	
LR test summary:				
	Value			
Restricted LogL	96.97649			
Unrestricted LogL	100.2372			
Unrestricted Test Equation: Dependent Variable: CAR 1 0 Method: Least Squares Date: 01/11/21 Time: 20:05 Sample: 1 44 Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.063053	0.107519	-0.586434	0.5617
DUMMY_MANUFACTURI	0.004340	0.023534	0.184399	0.8549
DUMMY_SAME INDUST	0.003169	0.013327	0.237763	0.8136
RELATIVE DEAL VALUE	-0.009657	0.031964	-0.302106	0.7645
WGI_COMPOSITE	-0.002131	0.004498	-0.473823	0.6388
CD_FVM	-0.006756	0.008343	-0.809677	0.4241
CD_IVC	-0.003223	0.004039	-0.798155	0.4307
CD_LVS	0.000829	0.002471	0.335531	0.7394
CD_PD	0.002607	0.005045	0.516679	0.6089
CD_UA	0.000482	0.003167	0.152200	0.8800
GDP_LN	0.002662	0.003992	0.666917	0.5096
FITTED^2	21.69580	9.595441	2.261053	0.0307
R-squared	0.448208	Mean dependent var	0.013599	
Adjusted R-squared	0.258529	S.D. dependent var	0.033767	
S.E. of regression	0.029076	Akaike info criterion	-4.010782	
Sum squared resid	0.027054	Schwarz criterion	-3.524185	
Log likelihood	100.2372	Hannan-Quinn criter.	-3.830328	
F-statistic	2.362986	Durbin-Watson stat	2.361425	
Prob(F-statistic)	0.028631			

3.9.1.2. Model 2: Linearity test (after adjustments)

Ramsey RESET Test Equation: UNTITLED Omitted Variables: Squares of fitted values Specification: CAR 1 0 C DUMMY MANUFACTURING DUMMY_SAME_INDUSTRY RELATIVE_DEAL_VALUE WGI_COMPOSITE WGI_COMPOSITE^2 CD_FVM CD_IVC CD_LVS CD_PD CD_UA GDP_LN				
	Value	df	Probability	
t-statistic	1.682567	31	0.1025	
F-statistic	2.831033	(1, 31)	0.1025	
Likelihood ratio	3.845218	1	0.0499	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	0.002573	1	0.002573	
Restricted SSR	0.030744	32	0.000961	
Unrestricted SSR	0.028171	31	0.000909	
LR test summary:				
	Value			
Restricted LogL	97.42407			
Unrestricted LogL	99.34668			
Unrestricted Test Equation: Dependent Variable: CAR 1 0 Method: Least Squares Date: 01/11/21 Time: 20:04 Sample: 1 44 Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.096324	0.115248	-0.835792	0.4097
DUMMY_MANUFACTURI	-0.005373	0.024237	-0.221697	0.8260
DUMMY_SAME INDUST	0.002781	0.013847	0.200864	0.8421
RELATIVE DEAL VALUE	-0.010956	0.033460	-0.327433	0.7455
WGI_COMPOSITE	-0.010481	0.011398	-0.919554	0.3649
WGI_COMPOSITE^2	0.001415	0.001785	0.792567	0.4341
CD_FVM	-0.002253	0.008205	-0.274573	0.7855
CD_IVC	-0.001223	0.004114	-0.297245	0.7683
CD_LVS	-0.000442	0.002637	-0.167646	0.8680
CD_PD	0.002897	0.005365	0.539915	0.5931
CD_UA	-0.000311	0.003347	-0.093023	0.9265
GDP_LN	0.004268	0.004386	0.973117	0.3380
FITTED^2	16.70765	9.929857	1.682567	0.1025
R-squared	0.425414	Mean dependent var	0.013599	
Adjusted R-squared	0.202993	S.D. dependent var	0.033767	
S.E. of regression	0.030146	Akaike info criterion	-3.924849	
Sum squared resid	0.028171	Schwarz criterion	-3.397702	
Log likelihood	99.34668	Hannan-Quinn criter.	-3.729358	
F-statistic	1.912656	Durbin-Watson stat	2.348391	
Prob(F-statistic)	0.072368			

3.9.2. Model 2: Correlation matrix [-1,0]

	CAR__1_0_	DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	-0.069737	-0.057658	0.002657	-0.010961	0.225848	0.183966	-0.038025
DUMMY	-0.069737	1.000000	0.638311	-0.168311	-0.037390	0.165562	0.574614	0.207876
DUMMY	-0.057658	0.638311	1.000000	-0.302054	0.124322	0.108821	0.372270	0.003629
RELATI	0.002657	-0.168311	-0.302054	1.000000	0.082057	-0.082723	-0.023992	0.046437
WGI_C	-0.010961	-0.037390	0.124322	0.082057	1.000000	-0.040433	0.067561	-0.289664
CD_FVM	0.225848	0.165562	0.108821	-0.082723	-0.040433	1.000000	-0.149860	-0.044461
CD_IVC	0.183966	0.574614	0.372270	-0.023992	0.067561	-0.149860	1.000000	0.546291
CD_LVS	-0.038025	0.207876	0.003629	0.046437	-0.289664	-0.044461	0.546291	1.000000
CD_PD	0.256815	0.415699	0.240950	0.410835	0.389016	-0.048723	0.618489	0.118554
CD_UA	-0.012814	0.192992	0.072058	-0.014433	-0.490791	0.313616	-0.255870	-0.154028
GDP_LN	0.165007	0.416479	0.152559	-0.012753	0.180201	-0.272575	0.711299	0.386826

	CD_PD	CD_UA	GDP_LN
CAR__	0.256815	-0.012814	0.165007
DUMMY	0.415699	0.192992	0.416479
DUMMY	0.240950	0.072058	0.152559
RELATI	0.410835	-0.014433	-0.012753
WGI_C	0.389016	-0.490791	0.180201
CD_FVM	-0.048723	0.313616	-0.272575
CD_IVC	0.618489	-0.255870	0.711299
CD_LVS	0.118554	-0.154028	0.386826
CD_PD	1.000000	-0.104437	0.539446
CD_UA	-0.104437	1.000000	-0.303573
GDP_LN	0.539446	-0.303573	1.000000

3.9.3. Model 2: Regression output [-1,1]

Dependent Variable: CAR__1_1_				
Method: Least Squares				
Date: 01/11/21 Time: 19:20				
Sample: 1 41				
Included observations: 41				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.034077	0.177722	0.191743	0.8492
DUMMY_MANUFACTURI	-0.009907	0.025569	-0.387475	0.7011
DUMMY_SAME_INDUST	-0.023967	0.022086	-1.085179	0.2865
RELATIVE_DEAL_VALUE	0.009921	0.052482	0.189045	0.8513
WGI_COMPOSITE	-0.004572	0.006289	-0.727006	0.4729
CD_FVM	0.009898	0.005782	1.711776	0.0973
CD_IVC	0.009051	0.005168	1.751477	0.0901
CD_LVS	-0.004368	0.002991	-1.460477	0.1546
CD_PD	-0.000420	0.007539	-0.055724	0.9559
CD_UA	0.003823	0.005097	0.750088	0.4590
GDP_LN	-0.000515	0.006568	-0.078378	0.9380
R-squared	0.263218	Mean dependent var	0.016122	
Adjusted R-squared	0.017624	S.D. dependent var	0.046267	
S.E. of regression	0.045858	Akaike info criterion	-3.102328	
Sum squared resid	0.063088	Schwarz criterion	-2.642589	
Log likelihood	74.59772	Hannan-Quinn criter.	-2.934916	
F-statistic	1.071763	Durbin-Watson stat	2.266355	
Prob(F-statistic)	0.412999			

3.9.4. Model 2: Correlation matrix [-1,1]

	CAR__1__1_DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	0.105306	-0.091600	0.027541	-0.136696	0.230754	0.198028
DUMMY	0.105306	1.000000	0.660307	-0.216956	-0.070466	0.189147	0.558969
DUMMY	-0.091600	0.660307	1.000000	-0.329597	0.180054	0.106864	0.389277
RELATI	0.027541	-0.216956	-0.329597	1.000000	0.115377	-0.095075	-0.063046
WGI_C	-0.136696	-0.070466	0.180054	0.115377	1.000000	-0.003513	0.055815
CD_FVM	0.230754	0.189147	0.106864	-0.095075	-0.003513	1.000000	-0.148854
CD_IVC	0.198028	0.558969	0.389277	-0.063046	0.055815	-0.148854	1.000000
CD_LVS	0.015304	0.246922	0.032444	0.055723	-0.313681	-0.054518	0.573717
CD_PD	0.173830	0.389280	0.252492	0.421056	0.366548	-0.025894	0.616625
CD_UA	0.186982	0.241767	0.010577	-0.033398	-0.427943	0.305459	-0.253938
GDP_LN	0.113609	0.422860	0.211292	0.008906	0.077903	-0.251214	0.749488

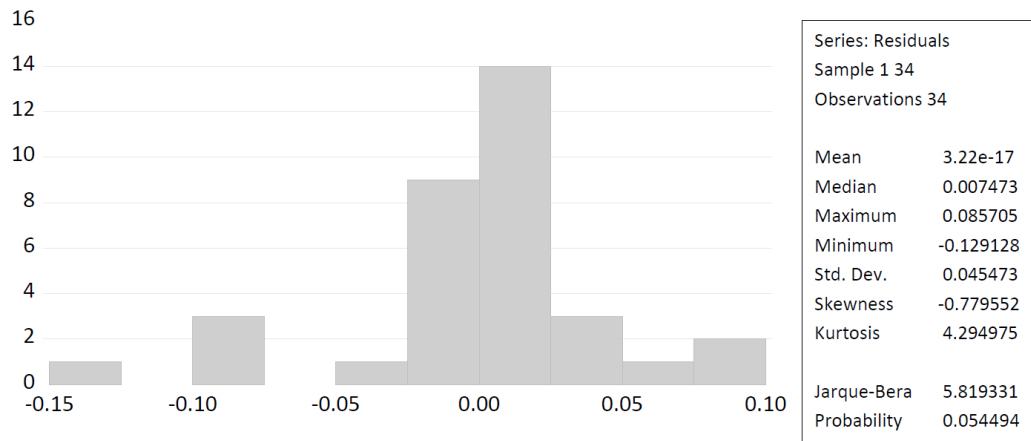
	CD_PD	CD_UA	GDP_LN
CAR__	0.173830	0.186982	0.113609
DUMMY	0.389280	0.241767	0.422860
DUMMY	0.252492	0.010577	0.211292
RELATI	0.421056	-0.033398	0.008906
WGI_C	0.366548	-0.427943	0.077903
CD_FVM	-0.025894	0.305459	-0.251214
CD_IVC	0.616625	-0.253938	0.749488
CD_LVS	0.144957	-0.146682	0.415517
CD_PD	1.000000	-0.063708	0.527709
CD_UA	-0.063708	1.000000	-0.211390
GDP_LN	0.527709	-0.211390	1.000000

3.9.5. Model 2: Regression output [-2,2]

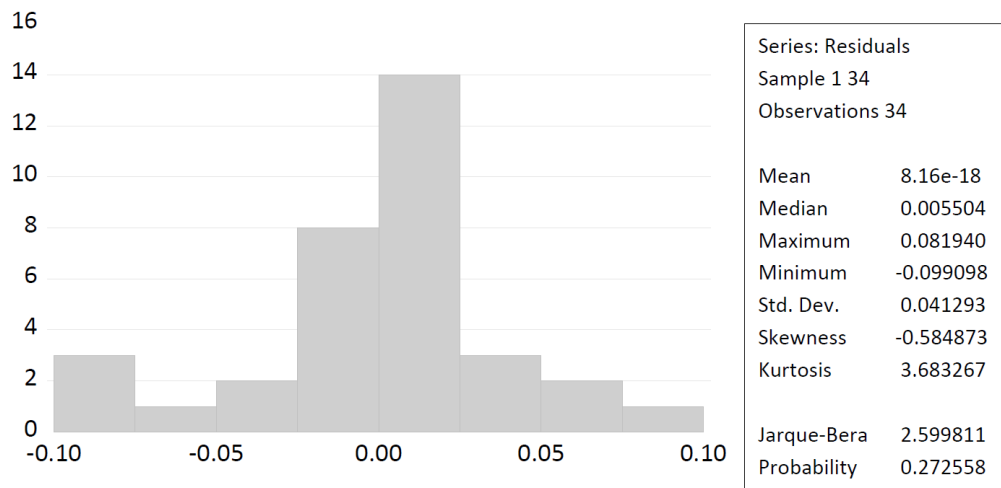
Dependent Variable: CAR__2__2__WIN				
Method: Least Squares				
Date: 01/11/21 Time: 19:24				
Sample: 1 34				
Included observations: 34				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.158688	0.224697	0.706233	0.4871
DUMMY_MANUFACTURING_W	-0.048380	0.037779	-1.280609	0.2131
DUMMY_SAME_INDUSTRY_W	0.003359	0.030248	0.111056	0.9125
RELATIVE_DEAL_VALUE_WIN	0.036123	0.069188	0.522097	0.6066
WGI_COMPOSITE_WIN	-0.004909	0.007380	-0.665236	0.5125
CD_FVM_WIN	0.013104	0.009989	1.311868	0.2025
CD_IVC_WIN	0.015604	0.007241	2.155021	0.0419
CD_LVS_WIN	-0.004959	0.003595	-1.379437	0.1810
CD_PD_WIN	-0.008186	0.011450	-0.714940	0.4818
CD_UA_WIN	0.004881	0.006003	0.813076	0.4245
GDP_LN_WIN	-0.005456	0.008428	-0.647357	0.5238
R-squared	0.245109	Mean dependent var	0.009330	
Adjusted R-squared	-0.083104	S.D. dependent var	0.047527	
S.E. of regression	0.049462	Akaike info criterion	-2.919025	
Sum squared resid	0.056270	Schwarz criterion	-2.425202	
Log likelihood	60.62342	Hannan-Quinn criter.	-2.750617	
F-statistic	0.746798	Durbin-Watson stat	2.398213	
Prob(F-statistic)	0.675255			

The regression output after making the residuals normally distributed.

3.9.5.1. Model 2: Normality [-2,2]



The residuals in the untransformed data set are not normally distributed.



When winsorizing all the variables, the residuals are normally distributed.

3.9.6. Model 2: Correlation matrix [-2,2]

	CAR__2__2_	DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	-0.009031	-0.040044	0.024180	-0.128688	0.364245	0.104225	-0.063298
DUMMY	-0.009031	1.000000	0.770054	-0.243475	-0.029377	0.230962	0.615089	0.240061
RELATI	-0.040044	0.770054	1.000000	-0.329669	0.119126	0.212640	0.353318	0.021231
WGI_C	0.024180	-0.243475	-0.329669	1.000000	0.140487	-0.118888	-0.067999	0.027942
CD_FVM	-0.128688	-0.029377	0.119126	0.140487	1.000000	0.039395	0.046989	-0.296335
CD_IVC	0.364245	0.230962	0.212640	-0.118888	0.039395	1.000000	-0.095522	-0.050612
CD_LVS	0.104225	0.615089	0.353318	-0.067999	0.046989	-0.095522	1.000000	0.549637
CD_PD	-0.063298	0.240061	0.021231	0.027942	-0.296335	-0.050612	0.549637	1.000000
CD_UA	0.059947	0.384509	0.195900	0.473353	0.354113	0.032790	0.599036	0.164135
GDP_LN	0.125798	0.213196	0.129447	-0.043343	-0.403945	0.275289	-0.212961	-0.122562
	-0.044678	0.373730	0.146653	0.017114	0.090517	-0.212607	0.720909	0.374390

	CD_PD	CD_UA	GDP_LN
CAR__	0.059947	0.125798	-0.044678
DUMMY	0.384509	0.213196	0.373730
RELATI	0.195900	0.129447	0.146653
WGI_C	0.473353	-0.043343	0.017114
CD_FVM	0.354113	-0.403945	0.090517
CD_IVC	0.032790	0.275289	-0.212607
CD_LVS	0.599036	-0.212961	0.720909
CD_PD	0.164135	-0.122562	0.374390
CD_UA	1.000000	-0.036032	0.494348
GDP_LN	-0.036032	1.000000	-0.202882
	0.494348	-0.202882	1.000000

3.10. Regression Model 3

3.10.1. Model 3: Regression output [-1,0]

Dependent Variable: CAR__1_0_				
Method: Least Squares				
Date: 01/11/21 Time: 19:34				
Sample: 1 55				
Included observations: 55				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.459034	0.362983	-1.264614	0.2127
DUMMY_MANUFACTURI	0.026049	0.026085	0.998631	0.3234
DUMMY_SAME_INDUST	-0.002933	0.029460	-0.099570	0.9211
RELATIVE_DEAL_VALUE	-0.014130	0.047579	-0.296971	0.7679
WGI_COMPOSITE	-0.005923	0.011334	-0.522586	0.6039
CD_FVM	0.016092	0.009570	1.681456	0.0998
CD_IVC	0.002106	0.006972	0.302129	0.7640
CD_LVS	-0.005527	0.004395	-1.257607	0.2152
CD_PD	-0.006442	0.007660	-0.840956	0.4049
CD_UA	-0.003510	0.007815	-0.449172	0.6555
GDP_LN	0.018754	0.012874	1.456678	0.1523
R-squared	0.184681	Mean dependent var	0.030874	
Adjusted R-squared	-0.000619	S.D. dependent var	0.078891	
S.E. of regression	0.078915	Akaike info criterion	-2.064031	
Sum squared resid	0.274014	Schwarz criterion	-1.662564	
Log likelihood	67.76084	Hannan-Quinn criter.	-1.908780	
F-statistic	0.996661	Durbin-Watson stat	2.060905	
Prob(F-statistic)	0.460943			

3.10.2. Model 3: Correlation matrix [-1,0]

	CAR__1_0_	DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	0.127423	0.032279	-0.041522	-0.165155	0.119147	0.169118	-0.005669
DUMMY	0.127423	1.000000	0.495647	0.113744	-0.118619	-0.136072	0.128007	-0.021887
DUMMY	0.032279	0.495647	1.000000	0.157627	-0.030447	-0.093899	0.291519	0.161463
RELATI	-0.041522	0.113744	0.157627	1.000000	-0.139215	-0.128267	0.117421	-0.126732
WGI_C	-0.165155	-0.118619	-0.030447	-0.139215	1.000000	0.272709	-0.107286	-0.224868
CD_FVM	0.119147	-0.136072	-0.093899	-0.128267	0.272709	1.000000	0.024899	-0.031679
CD_IVC	0.169118	0.128007	0.291519	0.117421	-0.107286	0.024899	1.000000	0.548606
CD_LVS	-0.005669	-0.021887	0.161463	-0.126732	-0.224868	-0.031679	0.548606	1.000000
CD_PD	-0.039548	0.127047	0.366579	0.041597	0.352232	0.131389	0.564818	0.229274
CD_UA	0.099380	0.359874	0.232579	0.128566	-0.439229	0.069018	0.066672	-0.153168
GDP_LN	0.261904	0.086964	0.238777	-0.043495	-0.351640	-0.206940	0.755330	0.511013

	CD_PD	CD_UA	GDP_LN
CAR__	-0.039548	0.099380	0.261904
DUMMY	0.127047	0.359874	0.086964
DUMMY	0.366579	0.232579	0.238777
RELATI	0.041597	0.128566	-0.043495
WGI_C	0.352232	-0.439229	-0.351640
CD_FVM	0.131389	0.069018	-0.206940
CD_IVC	0.564818	0.066672	0.755330
CD_LVS	0.229274	-0.153168	0.511013
CD_PD	1.000000	-0.080757	0.319533
CD_UA	-0.080757	1.000000	0.026887
GDP_LN	0.319533	0.026887	1.000000

3.10.3. Model 3: Regression output [-1,1]

Dependent Variable: CAR__1__1__				
Method: Least Squares				
Date: 01/11/21 Time: 19:38				
Sample: 1 58				
Included observations: 58				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.358527	0.470033	-0.762771	0.4494
DUMMY_MANUFACTURI	0.045026	0.038326	1.174831	0.2460
DUMMY_SAME_INDUST	-0.009527	0.044190	-0.215582	0.8302
RELATIVE_DEAL_VALUE	-0.055095	0.071283	-0.772906	0.4434
WGI_COMPOSITE	-0.019236	0.016010	-1.201505	0.2356
CD_FVM	0.018466	0.014667	1.258996	0.2142
CD_IVC	0.005541	0.009888	0.560422	0.5779
CD_LVS	-0.007567	0.006574	-1.151011	0.2555
CD_PD	-0.008958	0.011674	-0.767386	0.4467
CD_UA	-0.010598	0.011754	-0.901654	0.3718
GDP_LN	0.016928	0.016796	1.007873	0.3187
R-squared	0.161320	Mean dependent var	0.028074	
Adjusted R-squared	-0.017122	S.D. dependent var	0.120008	
S.E. of regression	0.121031	Akaike info criterion	-1.216525	
Sum squared resid	0.688480	Schwarz criterion	-0.825751	
Log likelihood	46.27922	Hannan-Quinn criter.	-1.064311	
F-statistic	0.904046	Durbin-Watson stat	2.164724	
Prob(F-statistic)	0.537036			

3.10.4. Model 3: Correlation matrix [-1,1]

	CAR__1__1__	DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	0.129617	-0.005389	-0.077448	-0.192226	0.050786	0.137546	0.020735
DUMMY	0.129617	1.000000	0.485874	0.128557	-0.086460	-0.142899	0.160080	-0.041534
DUMMY	-0.005389	0.485874	1.000000	0.151700	-0.061080	-0.082886	0.283917	0.143516
RELATI	-0.077448	0.128557	0.151700	1.000000	-0.134179	-0.121389	0.138130	-0.121766
WGI_C	-0.192226	-0.086460	-0.061080	-0.134179	1.000000	0.211548	-0.087062	-0.212404
CD_FVM	0.050786	-0.142899	-0.082886	-0.121389	0.211548	1.000000	0.019978	-0.025917
CD_IVC	0.137546	0.160080	0.283917	0.138130	-0.087062	0.019978	1.000000	0.525861
CD_LVS	0.020735	-0.041534	0.143516	-0.121766	-0.212404	-0.025917	0.525861	1.000000
CD_PD	-0.073337	0.158370	0.358372	0.046114	0.365367	0.109465	0.568188	0.205031
CD_UA	0.043468	0.307253	0.258881	0.111891	-0.499836	0.104546	0.041967	-0.151239
GDP_LN	0.222688	0.109621	0.198531	-0.043645	-0.213052	-0.236189	0.721358	0.473575

	CD_PD	CD_UA	GDP_LN
CAR__	-0.073337	0.043468	0.222688
DUMMY	0.158370	0.307253	0.109621
DUMMY	0.358372	0.258881	0.198531
RELATI	0.046114	0.111891	-0.043645
WGI_C	0.365367	-0.499836	-0.213052
CD_FVM	0.109465	0.104546	-0.236189
CD_IVC	0.568188	0.041967	0.721358
CD_LVS	0.205031	-0.151239	0.473575
CD_PD	1.000000	-0.106994	0.340602
CD_UA	-0.106994	1.000000	-0.078094
GDP_LN	0.340602	-0.078094	1.000000

3.10.5. Model 3: Regression output [-2,2]

Dependent Variable: CAR__2__2__				
Method: Least Squares				
Date: 01/11/21 Time: 19:41				
Sample: 1 65				
Included observations: 65				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.064441	0.596089	-0.108107	0.9143
DUMMY_MANUFACTURI	0.046829	0.047019	0.995952	0.3237
DUMMY_SAME_INDUST	-0.004984	0.053285	-0.093542	0.9258
RELATIVE_DEAL_VALUE	-0.108698	0.091135	-1.192709	0.2382
WGI_COMPOSITE	-0.026048	0.020903	-1.246154	0.2181
CD_FVM	0.013361	0.018940	0.705444	0.4836
CD_IVC	0.012397	0.012155	1.019895	0.3123
CD_LVS	-0.010072	0.008129	-1.238904	0.2207
CD_PD	-0.014582	0.014929	-0.976743	0.3331
CD_UA	-0.013894	0.015027	-0.924618	0.3593
GDP_LN	0.007316	0.021254	0.344223	0.7320
R-squared	0.127158	Mean dependent var	0.028287	
Adjusted R-squared	-0.034480	S.D. dependent var	0.156168	
S.E. of regression	0.158837	Akaike info criterion	-0.688813	
Sum squared resid	1.362384	Schwarz criterion	-0.320839	
Log likelihood	33.38641	Hannan-Quinn criter.	-0.543624	
F-statistic	0.786686	Durbin-Watson stat	2.188349	
Prob(F-statistic)	0.641292			

3.10.6. Model 3: Correlation matrix [-2,2]

	CAR__2__2__	DUMMY_MA	DUMMY_SA	RELATIVE_	WGI_COMP	CD_FVM	CD_IVC	CD_LVS
CAR__	1.000000	0.107916	-0.015951	-0.105506	-0.191099	0.004649	0.105753	0.026118
DUMMY	0.107916	1.000000	0.433672	0.115450	-0.111958	-0.134129	0.174373	0.001890
DUMMY	-0.015951	0.433672	1.000000	0.125385	-0.000843	-0.125540	0.305879	0.137429
RELATI	-0.105506	0.115450	0.125385	1.000000	-0.137868	-0.103386	0.111652	-0.102183
WGI_C	-0.191099	-0.111958	-0.000843	-0.137868	1.000000	0.168644	-0.067054	-0.235107
CD_FVM	0.004649	-0.134129	-0.125540	-0.103386	0.168644	1.000000	-0.021338	-0.032262
CD_IVC	0.105753	0.174373	0.305879	0.111652	-0.067054	-0.021338	1.000000	0.552744
CD_LVS	0.026118	0.001890	0.137429	-0.102183	-0.235107	-0.032262	0.552744	1.000000
CD_PD	-0.098047	0.179079	0.376099	0.023449	0.372678	0.070229	0.582333	0.192028
CD_UA	0.044309	0.318135	0.166158	0.114469	-0.510189	0.139752	-0.019157	-0.167515
GDP_LN	0.160902	0.168698	0.224652	-0.064230	-0.195354	-0.254070	0.741490	0.497710

	CD_PD	CD_UA	GDP_LN
CAR__	-0.098047	0.044309	0.160902
DUMMY	0.179079	0.318135	0.168698
DUMMY	0.376099	0.166158	0.224652
RELATI	0.023449	0.114469	-0.064230
WGI_C	0.372678	-0.510189	-0.195354
CD_FVM	0.070229	0.139752	-0.254070
CD_IVC	0.582333	-0.019157	0.741490
CD_LVS	0.192028	-0.167515	0.497710
CD_PD	1.000000	-0.121702	0.379023
CD_UA	-0.121702	1.000000	-0.100450
GDP_LN	0.379023	-0.100450	1.000000