

The Study of Risk Management of Financial Derivatives

-Taking the Archegos Liquidation Event as Example

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Abstract: In recent years, the market economy has declined due to the impact of COVID-19. Whether the person is a consumer or an investor, they both want to get more out of it. However, people often may be blinded by this idea of quick success, and then lose a lot. Taking the Archegos liquidation event as an example, this article analyzes the risk management of financial derivatives and their effectiveness when the financial market fluctuates through case studies. Through analysis, it can know that when buying or investing in an aggressive investment company, it may bring them high returns and may also bring them huge risks. Because they obtain returns through some of the characteristics of financial derivatives, it is very risky. The impact of this event on Nomura was analyzed by using the method of event research. Furthermore, through this incident, it found some loopholes and problems in financial management and gave rationalization suggestions.

Keywords: financial derivatives, study event, Archegos, financial institution

1. Introduction

With the development of the financial industry, the scale of financial institutions continues to expand. Risk management is essential to optimize portfolio management and, in turn, the management of financial derivatives [1]. As an important tool for risk aversion and effective investment, the potential risks of financial derivatives are also revealed [2]. Losses caused by the financial derivatives business are not few. In every economic crisis, one or two large financial institutions fail. Moreover, some large financial events such as the Archegos liquidation event will affect more or less financial institutions. Through this incident, it can also be seen that some risk problems and loopholes in the supervision of financial derivatives and financial institutions. Therefore, this article analyzes the Archegos liquidation event as an example, hoping to enlighten the current standardized risk management of financial institutions and financial derivatives.

2. Case Description

2.1. Background

Archegos Capital Management is a Family Office-style hedge fund. Its predecessor was Tiger Asia. In 2012, Tiger Asia was involved in an alleged count of insider trading, resulting in a settlement with the U.S. Securities and Exchange Commission and payment of USD\$44 million in damages. Tiger Asia then returned its external capital to investors and changed its name to Archegos [3].

Its founder is South Korean Bill Hwang, who was the apprentice of renowned hedge fund pioneer Julian Robertson. He is a bold investment trader with ambition and a desire to capture more wealth. His investment style is also more radical [4]. He has always focused on and excelled in Asian equities.

2.2. Introduction event-Archegos

At the end of March 2021, Archegos exploded due to the sharp decline in the share price of Viacom, which was heavily invested in high leverage [5]. It collapsed in an instant, losing USD\$20 billion in 2 days [6]. For many years, Archegos has focused on investing in long positions in tech sector stocks. It uses total return swaps, which allows the company to gain leverage through synthetic prime brokerage [3]. Archegos buys CFD derivatives with high leverage and trades with major investment banks to gain profits from rising prices. Due to a series of unfortunate events, some of its basket of stocks began to fall. As share prices fell, Archegos faced unmet margin calls that led its major brokers to sell shares, estimated at over USD\$30 billion [7]. When the margin could not be replenished, it triggered the forced liquidation of its CFD contracts by traders, and at the same time, investment banks began to sell their shares in large quantities, passively reducing their asset exposure, and resulting in a sharp decline in the company's stock price. At the same time, it also depressed the value of Hwang's portfolio, which was unable to repay debts owed by creditors or pay the bank under the swap agreement. For banks, exposure is essentially unsecured due to high initial margin requirements [8]. When ACM events occur, some of the world's largest banks can have spillovers, with some facing billions of dollars in losses [7]. For example, Nomura lost USD\$2.9 billion and Credit Suisse lost about USD\$4.7 billion.

2.3. Event study

2.3.1. Determine the event window and estimate window

This article examines the impact of one of the companies that suffered the most in this event. For event studies, this paper needs to clearly the date of the event, and the event window. On March 26, 2021, this liquidation occurred at Archegos Capital Management. Therefore, this article chooses this date as the date on which the event occurred. Further, 30 days before and after the event date is selected as the event window. So, the event window is 61 days, from t-30 days to t+30 days. The event window for this study was from 24 February 2021 to 25 April 2021. The estimated window is generally considered to range from 120 to 255 working days [9]. The estimation window is mainly used to determine the relationship between individual stocks and the market. The estimation window for this study was from 28 July 2020 to 23 February 2021. From t-210 to t-31, the estimated window is 210 days. This work only considers the analysis of the trading day.

2.3.2. Calculate expected return, abnormal return (AR) and cumulative abnormal return (CARs)

By fitting a linear regression using the least squares method to expect a rate of return, the calculation formula is the formula below.

$$E(R_t) = Y_t = \beta I_i + \alpha \quad (1)$$

In this formula, $E(R_t)$ is the expected return on the t trading day, Y_t is the company's stock yield on the t trading day, I_i is the market yield on the t trading day, according to the data in the Wind financial terminal data, Nomura is listed on the New York Stock Exchange in the United States and belongs to one of the top ten securities companies in the United States. The data used for the analysis are all from Wind Financial Terminal data, and since it is a US stock listing, the market yield is using the Dow Jones Industrial Index. Fitted regression is performed by Excel data analysis.

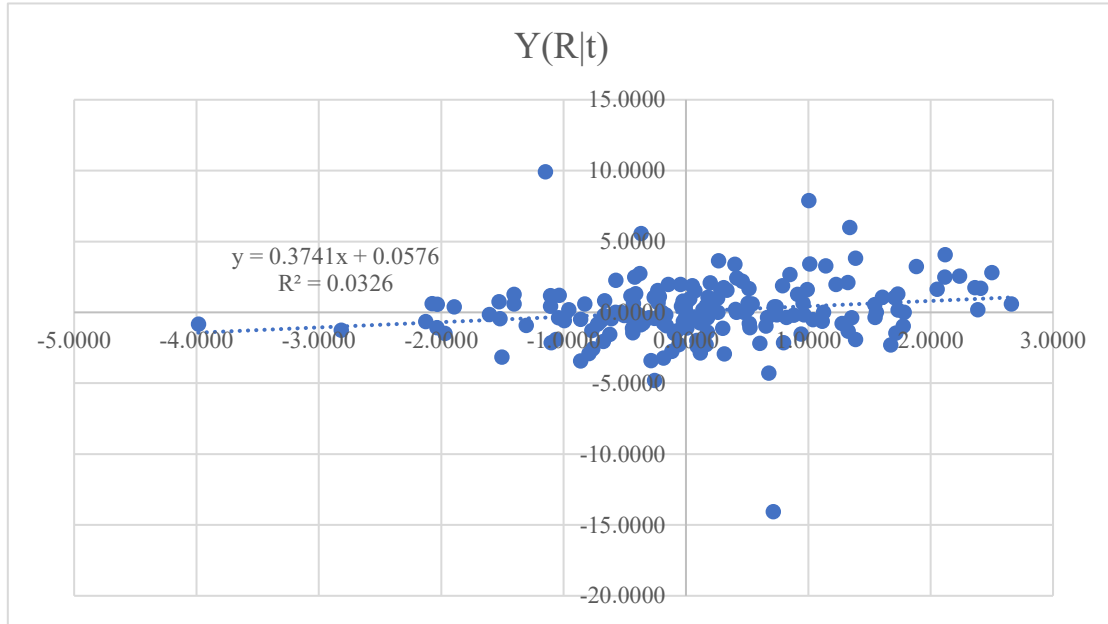


Figure 1: Chart of Nomura's individual stock yields and Dow Jones Industrial Index market returns.

Then, this function is obtained.

$$ER = Y = 0.3741x + 0.0576 \quad (2)$$

Secondly, the formula for the abnormal return (AR) is the calculation formula below.

$$AR_{it} = R_{it} - NR_{it} \quad (3)$$

Moreover, the formula for the cumulative abnormal return (CARs) is the calculation formula below.

$$CAR_t(r_1, r_2) = \sum_{t=r_1}^{r_2} AR_{it} \quad (4)$$

According to the above two formulas, the Nomura window period abnormal return and cumulative abnormal return can be calculated. Since there are weekends in the middle when the market is closed and no trading is held, the earnings do not change on weekends.

To determine whether the abnormal return is caused by random market fluctuations in the stock or by the Archegos liquidation event, a one-sample T-test is required for the cumulative abnormal return.

H_0 : $CAR=0$, the Archegos liquidation event does not affect Nomura's stock price changes.

H_1 : $CAR \neq 0$

By using STATA statistical analysis software for this one-sample T-test, the following results can be obtained.

Table 1: One-sample T test results.

Variable	t	degrees of freedom	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
CAR_1	5.5331	41	42	-6.96521	1.258821	8.158091	-9.50745	-4.42297

By calculation, $P=0.00$. It shows that the test results are very statistically significant, that is the test results are very valid, thus indicating that the Archegos liquidation event has a very large impact on the movement of Nomura's stock price.

2.3.3. Result analysis

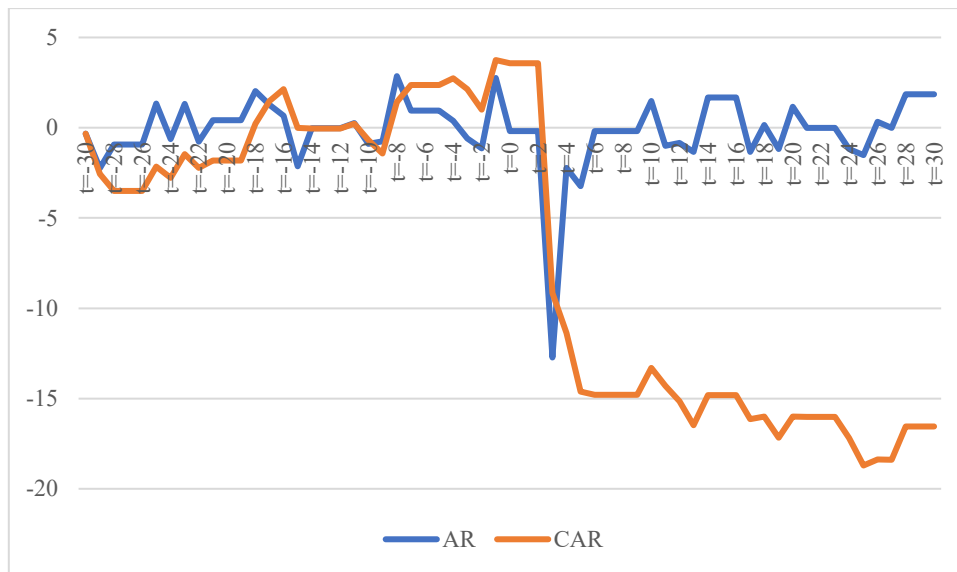


Figure 2: The trend of abnormal return and cumulative abnormal return during the event window.

According to Figure 2, it can be seen that the abnormal return throughout the event window period fluctuates around the zero point except for a sharp decline within 3 days of the event, in the range of -3.2328% and 2.8562%. When the incident occurred, whether it was from an abnormal return or a cumulative abnormal return, it was clear that Nomura was greatly affected. Within 2~3 days of the event, Nomura gave a very rapid and sharp downward response. Within 3 days of the event date, the abnormal return reached a minimum of -12.728%, and the cumulative abnormal return dropped from 3.5670% to -9.1610. On the tenth day, the abnormal return gradually recovered and approached 1.4845%. However, it still fluctuates around 0 as a whole. The cumulative abnormal return has been on a downward trend, and the downward trend only began to slow down around day 13. Therefore, the Archegos liquidation event had a very significant negative impact on Nomura, and it can be seen that it has brought significant losses.

3. Analysis On The Problems

3.1. Financing leverage is too high

When the stock price rises, high leverage can make a huge profit. However, when the stock price fell, the high leverage also brought him huge losses. Just as Archegos liquidation, it faced huge losses when most of the stocks in its basket were trending down.

At the same time, for banks, high leverage is also a state of coexistence of advantages and disadvantages. For example, Credit Suisse offers up to 300 times leverage with Archegos. It resulted in a loss of 4.4 billion Swiss francs (USD\$4.7 billion).

In the event with a low margin ratio required by the bank. The total yield swap deal structure for Archegos has provided him with great convenience. Not only did Archegos secure a lower margin ratio requirement, but it also allowed it to continue to increase its leverage. It has led to other hedge funds mainly using 2 to 3 times leverage, while Archegos usually reaches 5 to 6 times leverage [10].

3.2. High concentration, low liquidity, and high volatility

Archegos' exposure is highly concentrated in technology stocks, with individual stocks holding 5 to 10 times the average daily trading volume of the stock [4]. Therefore, it also has a higher historical rate of return. Highly concentrated funds have more divergence in performance, and their average volatility is higher. So, it needs to take greater risks.

3.3. Regulatory loopholes

Because Archegos is a Family Office-style hedge fund, despite its size, it is not required to disclose its portfolio to regulators. It leads to insufficient disclosure. In addition, Archegos indirectly holds shares through over-the-counter transactions with several investment banks through derivatives, circumventing the reporting requirements of US securities regulatory authorities [11]. Since there is no unified industry standard for CFD derivatives trading, the risks arising from them are difficult to be identified by the regulator promptly.

4. Suggestions

Through the analysis and research of this paper, the following three suggestions are provided for financial institutions. First of all, for the selection of customers, it is necessary to fully understand and rationally and objectively analyze the customer's history information [4]. Especially, the illegal and bad record it has appeared. People can't invest heavily just because it has good data and potential trends. Funds with high concentration do not necessarily have good long-term performance. While they achieve high short-term returns, they also hide huge risks. Therefore, when selecting the type of fund, it is necessary to analyze it according to the market phase. Secondly, financial institutions should quantitatively estimate the customer's financing leverage ratio and its potential losses on time, and make timely and corresponding adjustments to the financing leverage ratio. It allows some large losses to be avoided. Finally, financial institutions should improve their risk supervision capabilities, formulate good risk management policies to avoid loopholes and optimize their systematic analysis capabilities of risk exposure.

5. Conclusion

This article specifically analyzes the huge losses caused by a company that has been addicted to high-risk and high-yield operations through the radicalized use of financial derivatives. At the same time, from the partners with Archegos, through the method of event research, it understands how significant

the impact of this event is. Furthermore, it was found that financial derivatives have the problems of high leverage, low liquidity, and high volatility. Financial institutions have problems and loopholes in some reporting requirements, which enable some companies to obtain benefits through this problem to carry out non-standardized operations. As a result, regulators are unable to identify and mitigate their risks promptly. There are some drawbacks to this study, such as the selection of only one company as a representative for the study. In future research, more companies can be selected to jointly study to make their case analysis more in-depth and perfect.

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