Value Assessment and Market Analysis of Jade in Chinese Domestic Market based on Economic Value Added (EVA) and Fama-French Five-Factor Models

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Value Assessment and Market Analysis of Jade in Chinese Domestic Market based on Economic Value Added (EVA) and Fama-French Five-Factor Models

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by

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Statement of Certification

I certify that the research, analysis and conclusions articulated in the thesis are the result of my own effort. I certify that the work is original and has not been previously submitted for any award.

Signature of Candidate: Weibin WANG **Date**: December 2020

Abstract

As one of the oldest gemstones in the world, jade has high cultural and commercial value worldwide, especially in China (Shan, 2018). However, unlike gold or silver with a fairly objective market price based on the weight and purity, jade is a high-risk asset for investors due to its violent price fluctuations caused by the quality variance of each product and the inconsistency of jade pricing (Chovanec, 2010).

To provide a clearer insight into the development trend of China's jade industry and practical investment suggestions for investors, this thesis conducted the quantitatively and qualitative analysis based on empirical data as follows:

In chapter one, this thesis reviews the background and development history of jade in China's domestic market and reviews relevant literature about important asset valuation methods and pricing models that applicable for China's domestic stock market.

In chapter two, this thesis's methodologies and theories are clarified, including the PESTLE model, value investing strategy, fundamental analysis, Fama-French five-factor model, absolute valuation and relative valuation, and the economic value added (EVA) approach.

In chapter three, this thesis analyzes the trend, status and potential risks of China's jade industry, using the PESTLE analysis method to discuss from political, economic, social, technological, legal and environmental factors. Compared with the traditional PEST model that just covers political, economic, social, and technical aspects, the advanced PESTLE model can provide a more comprehensive overview of China's jade industry's macro-environment.

In chapter four, this thesis conducts an empirical analysis of China's jade industry's investment value and individual stocks. This part compares the historical returns of China's jade industry with the market index (CSI 300) in the past ten years; conducts regression analysis on Fama-French five-factor model to evaluate influencing factors of the average return of China's jade industry and individual companies; uses the economic profit (EVA) analysis and the relative valuation indicators to compare the capital operation ability, market valuation and growth potential of each company.

According to the above analysis, China's jade industry has great expansion potential but with particular challenges in raw material scarcity, product quality control and stringent environmental protection policies. In addition, the Matthew effect is significant in China's jade industry: the stock performance of leading companies (Lao Feng Xiang and Chow Tai Seng) is significantly better than that of the non-leading companies.

In the last chapter, this thesis summarizes all findings, provides a range of investing implication for existing and prospective investors based on the value investing strategy, points out the limitations of this thesis, and offers perspectives on future research and China's jade industry.

Keywords: Economic Value Added (EVA), Fama-French Five-Factor Model, Matthew Effect, PESTLE Model, Relative Valuation.

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1 Introduction

1.1 Background and Research Objectives

1.1.1 Research Background

Since ancient times, jade has become an important part of human culture and civilization development and played a unique role in politics, religion, art, and culture (Wen and Jing, 1992). The earliest Chinese jade culture began from the early Neolithic period (about 7000–5000 BCE), since when jade played an extraordinary role in royal ritual contexts (Zhu, 2020). Jade was also found in present-day Guatemala (Motagua River Valley) and became an important part of the Olmec, Mayan and Aztec pre-Columbian civilizations (Wen and Jing, 1992).

In this thesis, jade refers to jadeite and nephrite according to the mineralogy classification proposed by Alexis Damour in 1863 (Shan, 2018). It's worth noting that the definition of jade is manifold and has evolved over centuries. Historically, the definition of jade is expanding and starts to include not only jadeite or nephrite but also chalcedony, Xiuyan jade, Nanyang jade, crystal, agate, amber, coral, turquoise, lapis lazuli and other gemstones (Qu and Chen, 2010).

The modern industrialization of jade and jewellery in China boomed from the early 1980s. At that time, the world's jewellery industry gradually shifted to Asia, and Hong Kong's jewellery manufacturing industry rose rapidly, occupying an important position in the world. Meanwhile, the low labour cost and huge market potential in China mainland have attracted well-known jewellers from developed countries to enter China. After nearly 40 years of development since China's reform and opening up, the jade jewellery industry has been extremely prosperous in recent years. At international and domestic jade jewellery auctions, the high-end jade products' transaction prices have continuously been refreshed, setting new highs repeatedly.

From the supply side, multiple channels for jade stone sales are growing in China, including jade exhibitions, auction agencies, wholesale trade centres, large retail centres and online sales. For example, the size of the Hetian jade market in China in 2016 was 30 billion US dollars according to the estimation of the auction price of master jade works, field sales and large-scale auctions (CCTION, 2020). Meanwhile, most jade suppliers and companies are expanding their sales, industrializing production, and standardizing and retail channels.

With the rapid growth of China's economy, more and more Chinese are fond of jade and purchase jade for collection or appreciation from the demand side. Since China's per capita GDP exceeded US$9,000 in 2018, the consumption structure of residents has faced a new round of transformation and the up-gradation: residents' consumption structure is more diverse, and the proportion of luxury goods in total consumption has gradually increased (NBS, 2018). Consumer demand changed from achieving physiological need only towards more psychological satisfaction and self-worth realization. Guo (2019) found that China's per capita jewellery consumption in 2016 was only US$54.11, which is much lower than that of the United States and Japan, US$306.7 and US$180.2 respectively. This data indicates China's jade jewellery market still has enormous room for development in the future.

In the meantime, private wealth management is gradually becoming a popular topic for high-net-worth and ordinary investors in China, with the accumulation of wealth and the awareness

of the importance of personal finance. To seek higher value-added investment assets or avoid asset depreciation under the inflationary economic environment, China's investors need more diverse investment strategies. Jade is a noteworthy investment option for both high-net-worth and ordinary investors.

1.1.2 Research Objectives

This thesis aims to evaluate China's jade industry's investment value, identify factors that impact the returns of the jade industry, and specify stocks worth investing based on the value investing strategy. Overall, by conducting empirical analysis on China's A-share listed companies in the jade industry, this thesis intends to provide investors with an overview on China's jade industry and a systematic, dynamic and bottom-up stock picking strategy that suitable for China's jade industry.

1.2 Literature Review

In public equity, studies on the valuation methods on stocks have emerged since the early 1990s. Williams (1938) proposed that assets' value should be calculated using "present value pricing rules". Therefore, for common stock, its inherent long-term value is the present value of its future net cash flow in the form of dividend distribution and sale price. Thus, under certain conditions, the stock's value is the discounted value of all future dividends. Although Williams did not initially define "present value", this theory confirmed the concept of discounted cash flow valuation and is widely regarded as the basis of the discounted dividend model (DDM).

In the book "Financial Statement Analysis", Steedle (2002) mentioned the evaluation of the value of a corporate investment based on financial statements ratios, such as short-term liquidity, short-term solvency, profitability and return on capital.

Graham et al. (1962) studied company management and company finance, proposed seven factors to measure the intrinsic value of stocks: corporate size, performance, financial status, dividends, price-to-earnings ratio, growth and price-to-book ratio. This finding had an essential influence on Wall Street investors who used Dow Theory as the primary investment analysis tool at that time and provided a more scientific theoretical basis for securities analysis.

Fama and Miller (1972) proposed the efficient market theory (EMT). The effective market has three forms: weak, semi-strong and strong. The EMT hypothesis holds that when all the information in the market can be fully reflected in the market price of stocks, it means that the market is strong effective, and all speculation is invalid.

Besides using accounting profits as the base to evaluate stocks' value, some scholars also proposed to use the economic profit as the start point of enterprise valuation.

Stewart (1991) proposed the economic value added (EVA) method and introduced it into enterprise value evaluation. He pointed out that EVA is the operating profit after tax minus the cost of debt and equity, and the residual income after deducting all costs. The EVA method measures a company's performance and its management through the idea that a business is only profitable when it creates wealth and returns for shareholders, and it has become one of the basic tools for western investment banks and multinational corporations to evaluate corporate value. However, the concept of economic added value has not yet formed a theoretical system or recognized operating method system, which restricts its application and development to a certain extent. Chen and Dodd (1997) compared and analysed EVA indicators

with other performance evaluation indicators and found that EVA maximization is consistent with financial management goals, and EVA can reflect the ability of an enterprise to create wealth for shareholders.

Chinese scholars' research on EVA is relatively late. The concept of EVA began to be introduced into China in the 1990s. With the publication of the thesis "Theoretical Analysis of EVA Financial Management System" (Gu and Yu, 2000), Chinese scholars started to research EVA theory.

Zhang and Wang (2004) focused on applying EVA in companies' incentive performance evaluation and demonstrated the role of economic value added in measuring the effect of equity incentives. Li (2018) used the EVA model to evaluate the performance of an airline and pointed out that the value creation of a company with a positive profit is not necessarily high, but a company with a higher EVA generally has a better profit creation ability". Dai and Zhng (2018) elaborated on the theory and empirical analysis of the EVA model in foreign countries, pointed out that the EVA model's theoretical development in China is not perfect and the EVA index as the management incentive mechanism of enterprises will become the mainstream in the future. Chen and Xie (2018) found that both net profit and EVA indicators can evaluate corporate deterioration, but EVA indicators are more evident in quantity than net profit.

Compared with developed countries, China's stock market has quite different characteristics and supervision mechanism, so it's unrealistic to directly copy asset pricing theories from foreign literature and imply them in China's market. With the standardization of China's stock market, some domestic scholars began to learn from foreign asset pricing theories and conduct research on China's stock market.

JIn and Liu (2001) used China's A-share data to study the applicability of the capital asset pricing model in the Chinese stock market and pointed out that CAPM has good explanatory power for the A-share market. Chen and Zhang (2001) used the transaction data of all stocks on the Shanghai Stock Exchange from July 1996 to June 1999 as a sample and found that the Fama-French three-factor model is applicable in my country's stock market. Li et al. (2017) conducted a study on the pricing factors of China's A-share market based on the Fama-French five-factor model, based on the data of all A-share listed companies from July 1994 to August 2015. This study found that the five-factor model has good explanatory power for the A-share market, the book-to-market ratio factor is more significant, and the profit factor and investment factor have an excellent explanatory power after adjustment.

According to the above literature review, both the EVA and Fama-French five-factor models are suitable for domestic capital market analysis. But existing literature mainly uses the CAMP model, instead of the Fama-French five-factor model, to predict the discount rate used in EVA analysis, and there is no existing literature that combines the two models to conduct empirical research on China's jade industry.

This thesis will fill the research gap from the following aspects:

(1) Use the Fama-French five-factor model to construct a regression model on the return rate of China's jade industry, and analyse the explanatory power of the five factors respectively;

(2) Use the Fama-French five-factor model to predict the discount rate of the industry, and use the predicted discount rate to calculate the EVA of each listed company in the industry.

2. Methodologies and Theories

2.1 Methodologies and Roadmap

To conduct a comprehensive analysis of the market characteristics of China's jade industry, this paper will use the PESTLE model as the main method to analyse related macro factors, including social culture, industry cycles, related environmental and legal policies, and industry technology development. In this part, this thesis summarizes the opportunities and challenges of China's jade industry.

Next, this thesis analyses the investment value of the China's jade industry A-share stocks through the following aspects: 1) the historical performance of the stocks of China's jade industry compared with the market index); 2) the explanatory power of each factor to the industry's rate of return based on the regression result of Fama-French five-factor model; 3) the operating capability of each listed company in the jade industry based on historical and forecasting EVA; 4) the investment value of each stock according to the historical and forecasting relative valuation indicators, including P/E ratio, EPS, PEG.

Finally, this thesis will summarize all the above analysis findings and give investment recommendations and perspectives.

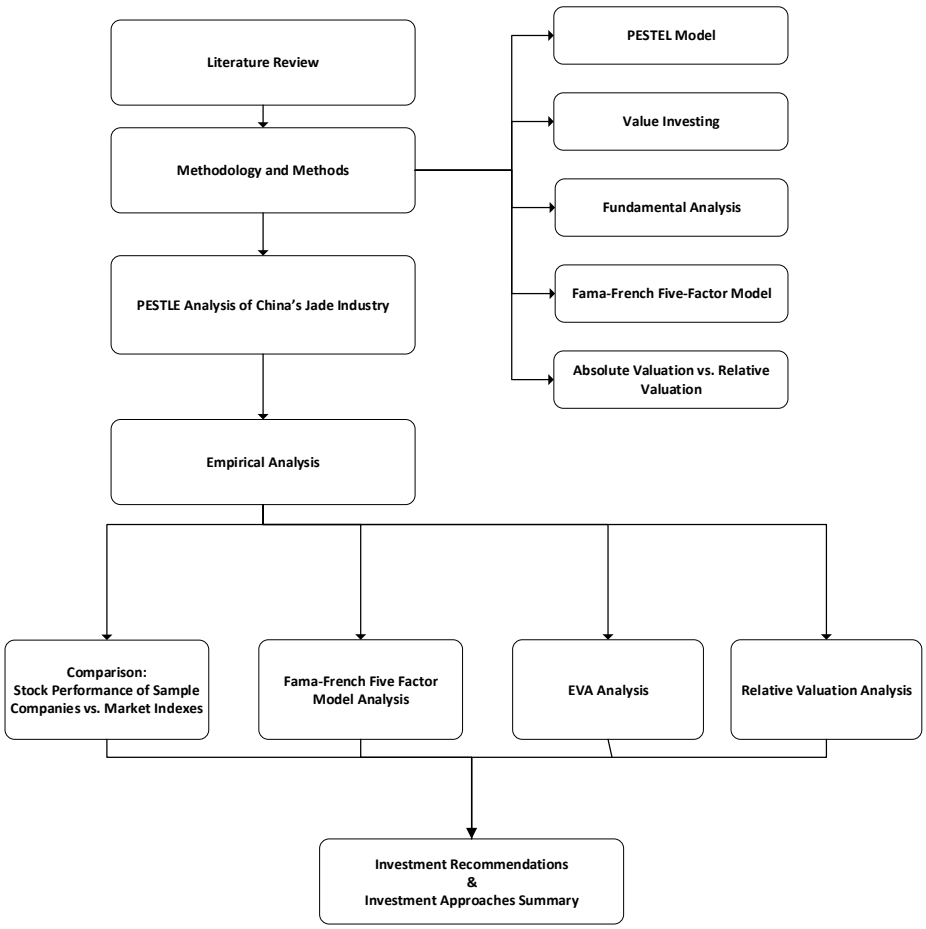

Figure 1: Methodology Roadmap

2.2 Theories and Models

2.2.1 PESTLE Model

PESTEL analysis model, also known as macro-environment analysis, is an effective tool to analyse the macro-environment. It can not only analyse the external environment but also identify all forces that have an impact on the organization. PESTEL is formed by adding environmental factors and legal factors on PEST analysis, which covers political, economic, and technological factors. PESTLE is a method of investigating the external influence factors of the organization. Each letter represents a factor:

(1) Political factors: Refers to political forces and related policies, laws, and regulations that have an actual and potential influence on the organization's business activities. The political environment includes a country's social system, the nature of the ruling party, and the government's guidelines, policies, and laws.

(2) Economic factors: Refers to the external economic structure, industrial layout, resource conditions, economic development level, and future economic trends of the organization. The economic environment includes both macro and micro levels. These factors directly determine the current and future market size of the company.

(3) Social factors: Refers to the historical development, cultural traditions, values, education level, customs, and other factors of the members of the society where the organization is located.

(4) Technological: Technological factors include not only those inventions that cause revolutionary changes, but also the emergence and development trends and application prospects of new technologies, new processes, and new materials related to enterprise production.

(5) Environmental factors: This factor focuses on an organization's activities, products, or services that have impacts on the environment, including the natural environment and public opinion environment. Potential determinants are ethical standards, media attention, development sustainability, energy consumption, resource recycling, etc.

(6) Legal factors: Refers to a comprehensive legal system composed of external laws, regulations, judicial conditions, and citizens' legal awareness, including labour protection law, company law, contract law, industry competition law, environmental protection law, consumer rights protection law, industry conventions, etc.

2.2.2 Value Investing

Value investing is the investment philosophy of buying stocks that at a significant discount to their intrinsic value.

Value investing strategy is subject to the following two assumptions:

1) EMH is in the weak form, thus the fundamental analysis is effective.

2) The stock price is mean reversion to its instinct value.

The core of this strategy is to detect and invest in stocks whose "intrinsic value" is underestimated by observing signs such as high dividend yield, low price-to-earnings ratio, and

low stock/book ratios. The intrinsic value of stocks refers to the present value of future cash inflows from stocks, which includes expected dividends and income from the stock sale. The prevailing calculation methods of the intrinsic value are the dividend discount model (DDM), the Gordon growth model (GGM), and the discounted cash flow (DCF).

2.2.3 Fundamental Analysis

Fundamental analysis is the analysis of corporate financial statements (usually the analysis of corporate assets, liabilities and earnings) based on the historical and current data and makes financial forecasts. Fundamental analysis considers macro and microeconomic conditions, such as interest rates, production, income, employment, gross domestic product, housing, manufacturing, and company management.

Enterprise fundamental analysis includes financial analysis and non-financial analysis. Non-financial factors include management capabilities, operational capabilities, economic scale analysis, market share, brand strategy, etc. Financial factors include a company's profitability, liquidity, leverage, operating efficiency, etc.

Besides the financial status of an individual company, industry life cycles are also critical determinants of the investment value forecasts result. The industry life cycle is divided into the start-up phase, growth phase, mature phase, and decline phase. Investing in companies at the start-up and growth phase could earn a massive excess return but with high risk. Seed investors and angel investors are the main actors during these periods. As the industry enters a mature phase, industry development is relatively stable, and the entire market is saturated. Companies' growth rate is lower whereas the investment risk is less.

In short, fundamental analysis can help investors with:

- Valuating the company's stock and predict its possible price change;
- Forecast business performance;
- Evaluate its management and make internal business decisions and/or calculate its credit risk;
- Find out the intrinsic value of the stock.

2.2.4 Fama-French Five-Factor Model

Markowitz (1952) published a landmark paper in the history of modern finance theory, "Portfolio Selection", which marked the beginning of modern portfolio theory. This thesis expounded the quantitative method to measure the level of return and risk, and for the first time simplified the return and risk decisions faced by individual investment decisions into two specific mathematical concepts of mean and variance.

Specifically, Markowitz (1952) assumes that the return of securities is normally distributed. Investors use the expected return of the securities to measure the overall level of future actual return, and the variance of the return to measure the investment risk of the portfolio. At the same time, investors maintain a state of risk aversion, thus they will choose securities with the highest returns under the same risk level. When the number of invested stocks increases, the risk will be diversified. However, even the number of securities tends to infinity, there will be risks cannot be eliminated, that is, system risks.

Markowitz established a coordinate system with the expected return on the vertical axis and the standard deviation of the return on the horizontal axis. Each point in the coordinate system represents an investment portfolio, and the collection of all such possible portfolios defines a region in this space. The left boundary of this region is parabolic, and the upper part of the parabolic boundary is the efficient frontier in the absence of a risk-free asset (Markowitz, 1952). Combinations along this upper edge give portfolios that have the lowest risk for a given level of expected return.

Based on Markowitz's portfolio theory, Sharpe (1964) formed the CAPM model, using empirical research and analysis. This model fully reflects the correlations between the returns of each security and the market returns. This model has three hypothetical conditions for the corresponding capital market:

(1) Investors are rational and choose a portfolio of securities based on the expected rate of return and standard deviation;

(2) Investors have the same expectations for the securities market in the same period in the future;

(3) The capital market is frictionless and perfectly competitive.

The CAPM model mainly uses the variance of the securities returns to measure its risk. The risk is mainly divided into systemic and unsystematic risks. Unsystematic risks can be diversified in the optimal portfolio, but systemic risks that inherent to the entire market or market segment is undiversifiable.

However, the CAPM model also has certain limitations. A series of assumptions of the model are difficult to meet. In reality, it is almost impossible to achieve a perfectly competitive market and the frictionless market as the transaction costs and taxes are also not negligible. The assumptions on investors are also impractical as humans always have some emotional or cognitive biases. Therefore, the CAPM cannot fully explain the portfolio investment returns in practice.

The Fama-French three-factor model was proposed on the basis CAPM in 1992 (Fama and French, 1992). Fama and French (1992) found that the beta value of the stock market cannot explain the difference in the return of different stocks. They believed that the excess returns of each stock are compensation for risk factors besides market factors in CAPM.

Fama and French established a three-factor equilibrium pricing model as follows:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + e_{it} \quad \cdots\cdots ①$$

This model tries to explain the stock's excess return by its exposure to three factors: market asset portfolio ($R_{Mt} - R_{Ft}$), market size factor (SMB_t) and book-to-market value ratio factor (HML_t).

Fama and French analysed and studied Miller and Modigliani's valuation discount models and found that the expected return rate of stocks is related to the book-to-market value ratio, earnings and investment of listed companies. The market value of listed companies in *t* period can be expressed by the following formula:

$$Mt=\sum_{t=1}^{\infty} E(Y_{t+\tau} - dB_{t+\tau})/(1+r)^{\tau} \quad \cdots\cdots ②$$

Among them, "*Mt*" is the market value of the listed company at period t, $dB_{t+\tau} = B_{t+\tau} - B_{t+\tau-1}$is the change in book value, $Y_{t+\tau}$ is The equity income of listed companies during the $t+\tau$ period; r represents the internal rate of return or expected rate of return of a listed company's stock.

Dividing the formula ② with B_t gives the following formula:

$$Mt/B_t = \sum_{t=1}^{\infty} E(Y_{t+\tau}/B_t - dB_{t+\tau}/B_t)/(1+r)^{\tau} \quad \cdots\cdots ③$$

It can be seen from the formula ③ that the expected rate of return *r* is affected by three factors: 1) when $Y_{t+\tau}/B_t$ and $dB_{t+\tau}/B_t$ remain unchanged, B_t/Mt is positively proportional to the expected rate of return (*r)*, which means the higher book to market value (B_t/Mt) the higher rate of return; 2) when $dB_{t+\tau}/B_t$ and Mt/B_t are constant, the profitability ($Y_{t+\tau}/B_t$) is positively proportional to the expected rate of return (*r)*, that is, the higher profitability the higher expected rate of return; 3) when Mt/B_t and $Y_{t+\tau}/B_t$ remain unchanged, $dB_{t+\tau}/B_t$ is inversely proportional to the expected return rate (*r)*, that is, the higher the investment level ($dB_{t+\tau}/B_t$), the lower the expected return rate.

In order to justify the relationship represented by the valuation discount model, Fama and French (2015) added profit factors and investment factor to the original Fama-French three-factor model and conducted empirical testing. They found that the goodness of fit of the five-factor model is higher than the three-factor model, and it can better explain the changes in the return rate of the US stock market. The formula of the five-factor asset pricing model proposed by Fama and French is as follows:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad \cdots\cdots ④$$

Among formula ④, the profit factor (RMW_t) is the difference between the return rate of a stock portfolio with robust operating profit and a stock portfolio with weak operating profit; the investment factor (CMA_t), is the difference between the return rate of the stock portfolio with conservative investment level and the stock portfolio with an aggressive investment level; e_{it} is the residual with an expected value of zero. If the excess return rate of stock or portfolio (*i)* can be fully explained by the five factors, then the intercept term a_i should equal to zero, which is the zero-intercept assumption of the five-factor model.

Compared with traditional CAPM which uses only one variable, the Fama-French five-factor model has stronger explanatory power to the rate of return of a portfolio or stock. Therefore, this thesis will use the Fama-French five-factor model to analyse the sensitivity of the rate of return of China's jade industry to five factors as well as predict the discount rate of the industry.

2.2.5 Absolute Valuation and Relative Valuation

The absolute valuation is a method to determine the intrinsic value of the enterprise based on the discounted future cash flows. The future cash flows are predicted through fundamental analysis according to the enterprise's history and current financial performance and non-financial factors like management capability and customers' loyalty.

However, absolute value measures the intrinsic value of the target company only, with no comparison with competitors or industry average. In addition, it's a great challenge for analysts to forecast cash flows, predict accurate growth rates, and evaluate appropriate discount rates.

Relative value method compares financial multipliers or other ratios with other similar companies to determine whether the target company is over or undervalued. This method is relatively simple and does not require assumptions on financial indicators, so it is widely adopted by investors.

With CSRC's increasingly strict requirements for information disclosure of listed companies, it's easier for investors to access public financial data and obtain more reliable results through relative valuation methods.

The popular relative value indicators include the price-to-earnings ratio (P/E), earnings per share (EPS), price-to-earnings ratio to earnings growth ratio (PEG), price-to-sales ratio (P/S ratio) and price-to-book ratio (P/B).

2.2.6 Economic Value Added (EVA)

EVA, or economic profit, is the residual wealth calculated by deducting its cost of capital from its operating profit, adjusted for taxes on a cash basis.

According to the explanation of EVA's founder, Stern Stewart & Co in New York, EVA represents the return on capital (ROC) of a company after deducting the cost of capital (COC). In other words, the economic added value of a company is the difference between the company's capital gains and the cost of capital. From the perspective of shareholders, a company can only bring value to its shareholders when its capital gains exceed the total cost of the capital invested to obtain the proceeds. Therefore, the higher the economic value-added, the higher the value of the company, and the higher the shareholder's return. The higher the shareholder's return, the better the company's stock performance in the secondary market.

In the 1980s, with the upsurge of advocacy to protect the rights and interests of shareholders, the idea of maximizing shareholders' benefits was strengthened. The concept of EVA quickly became popular in Europe and the United States. In many large international companies, EVA is replacing traditional accounting performance evaluation indicators as the main standard for measuring business performance. EVA can not only accurately measure the actual operating income obtained by the enterprise, but also has remarkable results in helping enterprise managers to manage assets. Investors in developed capital markets also use EVA indicators as an important basis for predicting future performance and evaluating company value.

3. Analysis of China's Jade Industry

3.1 Overview of China's Jade Industry

China's jade jewellery industry started booming since the reform and opening up in 1978 and experienced three stages of development:

The first stage is from 1980 to 1996. This period is the recovery period of the jade industry, during which China moved from a planned economy to a market economy (Gold Jewellery Website, 2019). During this period, the overall industry grew rapidly, but the level of artistry was relatively low. The second stage was from 1996 to 2002. At this stage, China's jade industry experienced rapid development and entered a period of industrial structural adjustment. With the improvement of living standards, Chinese have higher quality requirements for jade products. Some low-end products were eliminated, while those with exquisite craftsmanship and rich cultural connotations stood out (Gold Jewellery Website, 2019). The third stage is after 2002. With the development and transformation of China's economy, Chinese jade products have entered a new era (Gold Jewellery Website, 2019). Advanced product craftmanship attracts more customers. At the same time, the increasing scarcity of jade raw materials led to the jade industry shift from extensive development to refined management, and the proportion of the added value of products is increasing.

(1) Scale and Growth Rate

The jade jewellery industry has a long history, and the beauty-loving nature has made human beings yearn for jewellery since ancient times. The global jewellery sales area is relatively concentrated. About half of the sales are concentrated in the United States, China and India. Among them, the United States is the world's largest consumer of jewellery, while China is the fastest-growing consumer. In recent years, the consumption of luxury goods has gradually become popular and stimulated the development of the jewellery and jade industry.

As shown in figure 2, from 2015 to 2019, the scale of the jade industry in China has increased from CNY 50,412 billion to CNY 73,661 billion, with a growth rate of 146%. However, the growth rate is declining, indicating that the jade jewellery industry in China is moving from the growth phase to the mature phase (CCTION, 2020).

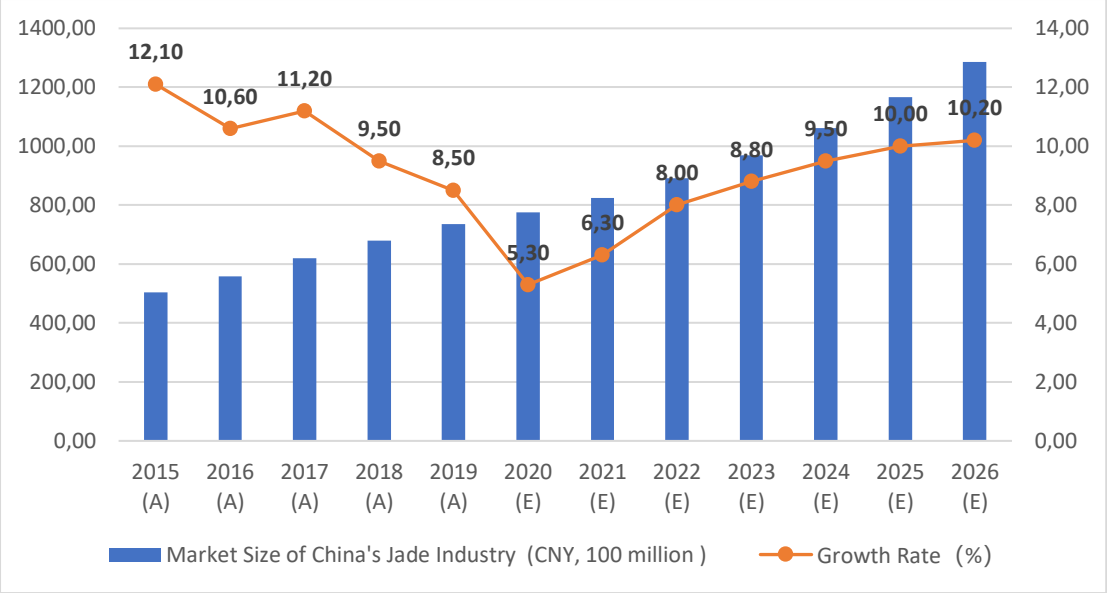

Figure 2: Market Scale and Growth Rate of China's Jade Industry (2015–2026)

In 2020, the growth rate of China's jade market is showing a downward trend, mainly due to the impact of the Covid-19 on the macroeconomy. CCTION (2020) industry research institute predicted that after the epidemic, the growth rate of the market scale will increase to 6.3% in 2021 with the economic recovery, and the market size of China's jade industry will reach CNY 128.6 billion in 2026 (CCTION, 2020).

Generally speaking, the growth rate of the jade market in China is declining in recent years, due to the global economic slowdown and industry mature, but the market still has huge growth potential along with the revival of traditional Chinese culture, the standardization of the production and the supporting policies that stimulate the economy and the development of the industry.

(2) Products Differentiation

Product differentiation is a major factor that determines the market structure and determines the level of market concentration. Enhancing the product difference will reduce the substitutability of similar products, increase the company's competitiveness and sustainability. Chen et al. (2017) mentioned in the thesis that the homogeneity of products in the entire jade industry in China is serious, and consumers are not satisfied with old-fashioned designs of jade jewellery.

At present, China's jade industry is gradually moving towards differentiated competition. According to different target consumer groups, companies position their products as high-end and mid-end level and add western and traditional Chinese elements into the design to diversify styles (Peng and Kang, 2019). But more innovation in designs and techniques are required for the whole industry to win more customers.

(3) Supply and Demand

According to the statistics from CCTION industry research institute, as shown in figure 3, the demand has always been greater than the supply of jade, and both are increasing in the past few years. In 2020, as impact by the epidemic, the demand and supply are affected and decrease to

7.7000 tons and 6.9000 tons respectively. CCTION predicts that in 2021, jade demand and supply will jump up to 8.8900 tons and 7.9700 tons with the economic recovery and the surge of weeding demand that are backlogged due to COVID-19. After 2021, the demand and supply will return to stable increasing rate.

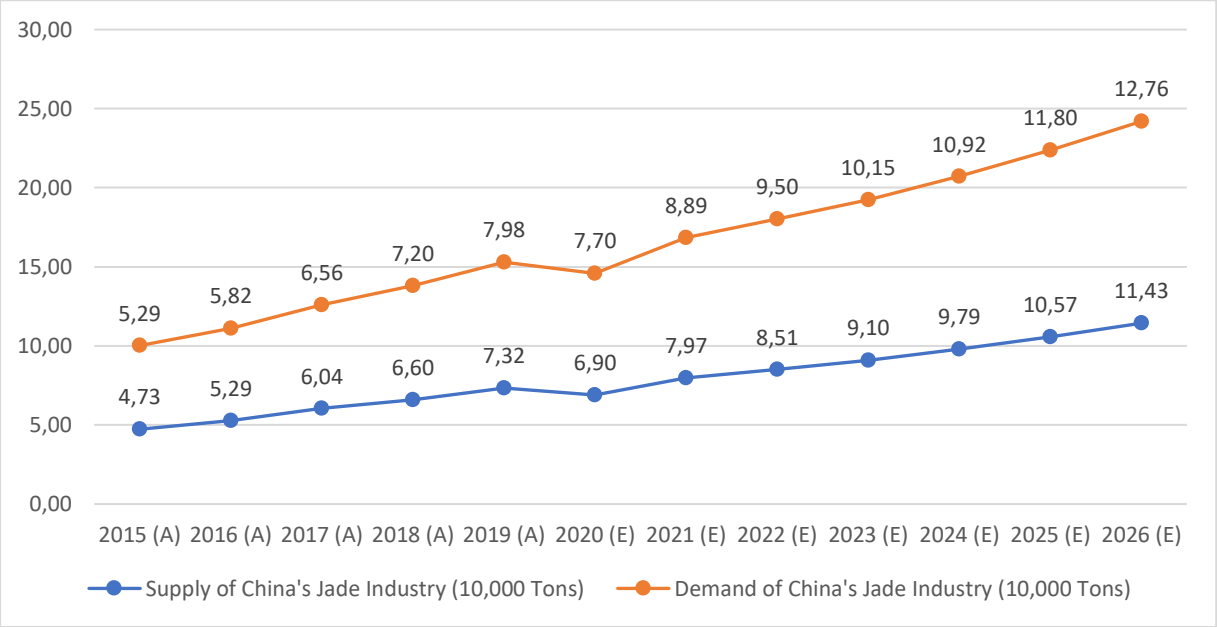

Figure 3: Supply and Demand of China's jade industry (2015–2026)

However, the growth rate of supply of jade is slower than that of demand. Many factors are influencing the jade production, three most important factors are raw material, qualified labours and technologies. The upstream raw material product market development factors directly affect the production cost of jade and the profit margin of jade manufacturers. It is expected the market price of the raw material of jade will rise from 2020 to 2026, as the raw materials are increasingly scarce (CCTION, 2020). The jewellery industry is labour- and technology-intensive industry, requiring a large number of professionals in style design and jewellery manufacturing. At present, there are no specialized training institutes for jade manufacturing, and insufficient educational resources on the training in design and craftsmanship. This leads to a shortage of professionals and techniques in the jade industry supply side (Chen et al., 2017).

In short, according to the demand and supply forecast, China's jade market has great expansion room. However, labour and techniques shortage needs to be overcome in the short future to guarantee the jade supply can meet the demand.

(4) Industry value chain and investment opportunities

The upstream of the jade industry value chain is jade mining. The main origin of nephrite is Hetian city, Xinjiang Province and the main origins of jadeite are Yunnan Province and Myanmar (CCTION, 2020). Jade mining is often described as "gambling" because of the uncertainty of the quality and quantity of output, risks to property and life, the change of local policies on mining and environmental protection (Gold Jewellery Website, 2019).

The midstream is jade manufacturing, which is labour- and technology-intensive. The jade manufacturing industry requires a large number of professionals in design and craft. At present, there lacks professional school for jewellery manufacturing training in China, and the cost of training technical workers within the enterprise is extremely high, causing the shortage of professionals.

The downstream are wholesalers and retailers. The downstream mainly includes auction agency, big and small store sellers and online shops. In current China's market, jade jewellery sold in-store and online shops are mainly middle-and-low-end products with standard designs. High-end jade pieces with excellent craftsmanship are usually sold through an auction.

For high-net-worth investors, investing in the high-end jade piece through auction could be one kind of alternative investment to seek a high return. Collecting high-end jade could increase the comprehensive return of individual investment portfolios by reselling them at an ultra-high price.

However, investing in in-kind jade faces a very high risk. The main investment risks come from the following three aspects: 1) The jade's international pricing is not consistent and standard like gold. Besides public auctions, the price of jade jewellery is usually determined by private deals between buyers and sellers, depending on the quality of the jade as well as the buyer's personal. 2) The counterfeiting technique of jade is increasing, making it difficult for non-professionals to distinguish. The qualification of different verification agencies on the market are varied, some of them are not reliable. 3) The market for jade is less liquid and transparent than ordinary financial assets like stocks or bonds. The illiquidity of jade could erode the investment return (Yang, 2011).

For ordinary investors with limited risk tolerance levels and wealth, investing in in-kind jade is not very practical. Therefore, ordinary investors who want to seize the investment opportunity in the jade industry with less risk can choose investment vehicles like bonds and stocks.

Compared with investing in in-kind jade, stocks and bonds requires less expertise and provides more liquidity. But concerns about the insufficient effectiveness of China's bond ratings to reflect corporate financial risks and few jade companies issue bonds in the secondary market, bonds are less desirable vehicles than stocks which are publicly traded with strict and comprehensive supervision and can be valuated relatively more fairly (Kruger, 2020).

To sum up, China's jade industry booms in recent years. Investing opportunities exist in the whole industry chain, including jade mining, manufacturing, jade in in-kind jade through auction and investment vehicles like bonds and stocks. Considering about risks, investment threshold, transparency, liquidity and feasibility of fair valuation, this thesis choose China's jade industry A-share stocks to analyse corresponding investment strategies.

3.2 PESTLE Analysis of China's Jade Industry

3.2.1 Political Factors

China's jade jewellery industry is dominated by small and medium-sized enterprises. With the changes in the international and domestic market environment, small and medium-sized enterprises are facing increasing production costs, expensive financing cost, and insufficient innovation capabilities. In 2019, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Guiding Opinions on Promoting the Healthy Development of Small and Medium-Sized Enterprises" (the Opinion) (CSC, 2019a).

The launch of the Opinion is beneficial to China's jade industry in solving the problem of financing difficult and expensive financing cost, improving fiscal and taxation support policies, enhancing innovation and development capabilities. In short, the "Opinions" provided supporting policies for the jade industry and solved the practical difficulties in development.

In the same year, the Central Committee of the Communist Party of China and the State Council issued "Guangdong-Hong Kong-Macao Greater Bay Area Development Plan Outline" (the Outline) (CSC, 2019b). The Guangdong-Hong Kong-Macao Greater Bay Area covers 9 cities, including Guangzhou, Foshan, Zhaoqing, Shenzhen, Dongguan, Huizhou, Zhuhai, Zhongshan, Jiangmen and two special administrative regions of Hong Kong and Macau. Most jade and jewellery companies are located in the Great Bay Area, the most representative industry clusters and distribution centres include Shenzhen Water Shell Jewellery Circle and Guangzhou Panyu Jewellery Circle.

The release of the "Outline" provides more opportunities and greater momentum for deepening communication and cooperation between the Mainland and Hong Kong and Macao. The jade industry can take advantage of the "Outline" to achieve the integration of resources and cultures and build a closer business combination with domestic and international enterprises.

The introduction of the "Opinions" and the introduction of the "Outline" is excellent policy opportunities for the jade and jewellery industry. In the context of the country's efforts to optimize the business environment, what gold and jewellery companies need to do is to seize this opportunity, take supply-side structural reform as the mainline, and focus on improving the quality and efficiency of development, and further stimulate the company itself. The vitality and motivation of the development, thereby accelerating the upgrading and transformation of the entire jade jewellery industry.

3.2.2 Economic Factors

According to China's National Bureau of Statistics (NBS, 2020), statistic data shows that GDP kept stable increase from 2015. However, in the first quarter of 2020, the year-on-year growth rate of GDP fell sharply in the first quarter, mainly due to the impact of Covid-19, then resumed growing since the second quarter.

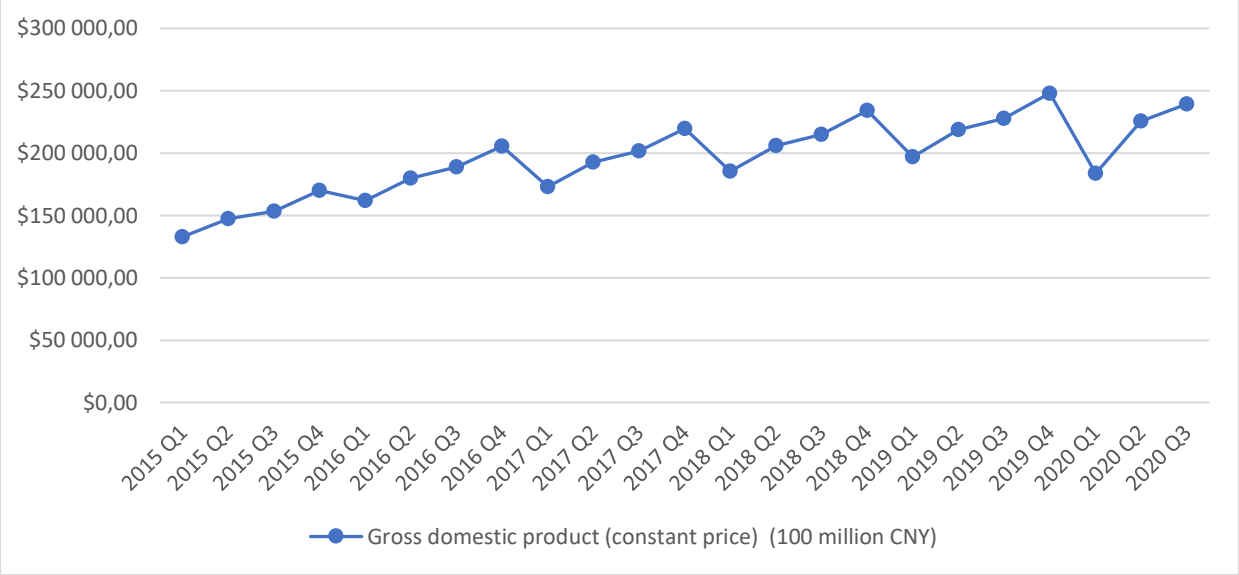

Figure 4: Quarterly Gross Domestic Product of China (2015–2020)

Source: http://www.stats.gov.cn/tjsj/

In the meantime, China's year-on-year consumer price index (CPI) surge at the beginning of 2020, and gradually decrease since March 2020. The main cause of the sudden increased CPI is the panic shopping during the Covid-19 lockdown period, and the national production activities were suspended for almost two to three months.

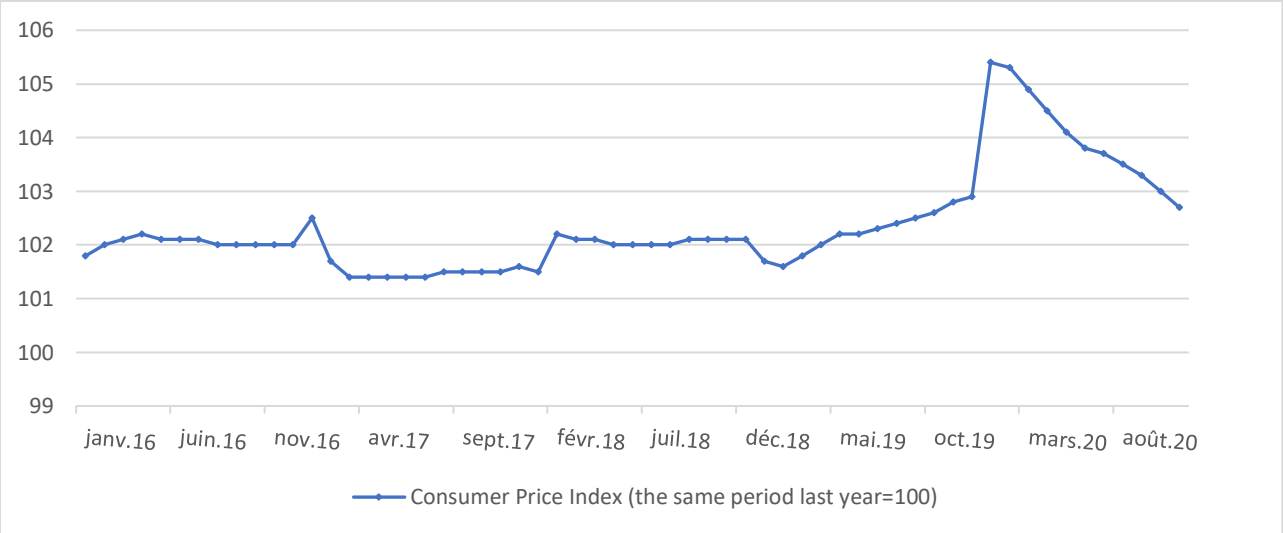

Figure 5:Consumer Price Index of China (2016–2020)

Source: http://www.stats.gov.cn/tjsj/

According to figure 6, under the impact of the epidemic in the first half of the year, the urban unemployment rate areas increased, the number of newly employed people was 5.64 million in the first two quarters, only completing 62.7% of the annual target. From June 2020, most industries resume production and urban unemployment gradually decrease towards the historically normal level.

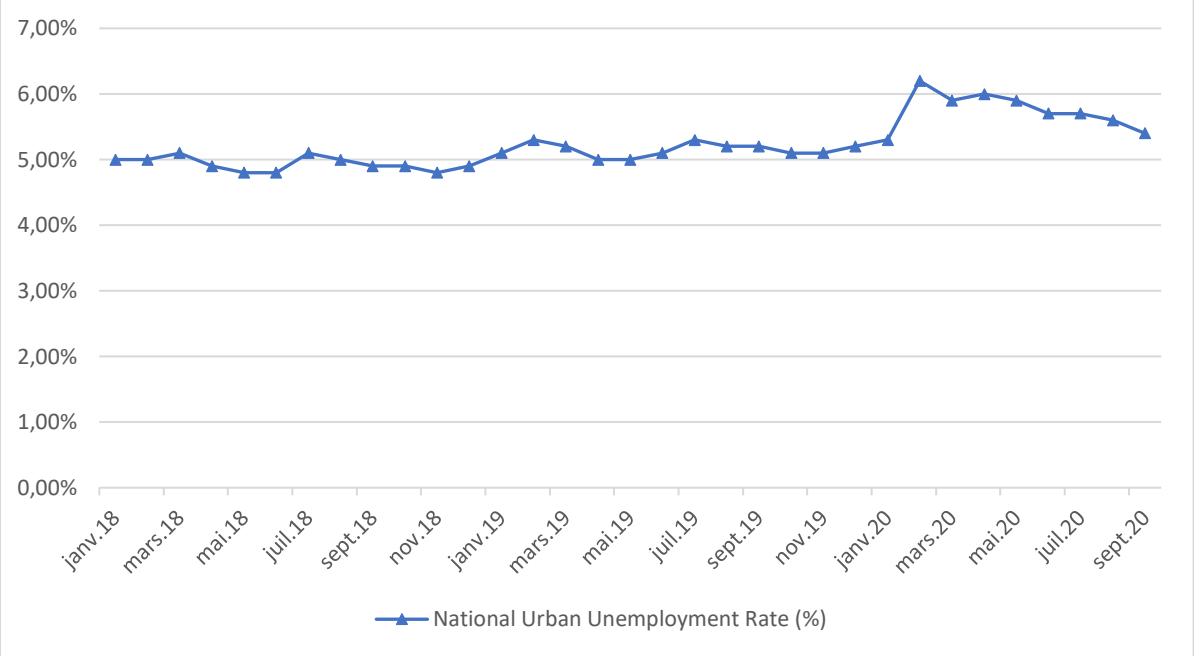

Figure 6: The Urban Unemployment Rate of China (2016–2020)

Source: http://www.stats.gov.cn/tjsj/

While the unemployment rate fell from May, the downward momentum of the real income of Chinese residents slowed, and the gap between urban and rural residents' per capita disposable income narrows. In the first half of the year, the residents' disposable income per capita was CNY 15,666, with a year-on-year nominal increase rate of 2.4%. At the same time, the per capita income ratio of urban and rural residents was 2.68, a decrease of 0.06 compared with the same period last year; the median of national residents' per capita disposable income was CNY 13,347, with a year-on-year nominal increase of 0.5%.

Generally speaking, in the first half of the year, China's economy has been seriously hit by the epidemic. In the near future, domestic economic recovery is still under pressure and faces significant external risks as the Covid-19 spread globally. But China's economy has shown a steady recovery tendency and has gradually overcome the adverse effects of the epidemic.

3.2.3 Social Factors

China has formed the jade culture since the Neolithic Age. For thousands of years to the present, the jade culture has become one of the important components of Chinese culture (Zhu, 2020). Jade culture played a pivotal role in traditional Chinese culture. It has a long history of tens of thousands of years, and the industrialization and commercialization developed rapidly in the past 30 years.

In recent years, Chinese jade jewellery has undergone two major changes:

(1) Increased Productivity of Jade Carving Craftsmanship, and Production of More Diverse and More Exquisite Styles And Design

In the early 1950s, China established the Central Handicraft Administration, and on this basis, the Handicraft Industry Association was established. The association invited old artists who were living abroad back to China to revival traditional Chinese handcraft cultures. The

association provided funds and venues and organized people in the same industry to cooperate in production and formed production cooperation groups. This is a subversion of the family heritage of traditional craftsmanship that has lasted for thousands of years. However, the reform and opening up in 1978, Chinese people's lives standard is still low and most jade manufacture is in small-scale.

With the reform and opening up, China's jade industry has developed rapidly. On the basis of inheriting traditional craftsmanship, the jade craftsmanship began to absorb the western culture. Advanced technologies were introduced from aboard, such as electric motors, screw machines, and ultrasonic. To solve various difficulties in jade carving, artists continue to introduce advanced technology and promote technological innovation.

Nowadays, the number of employees in the jade industry has increased rapidly, and craftsmanship has continued to improve. The products that originally took a month to be carved can be completed in only 10 days. In addition, the design of jade carvings tends to be more exquisite and personalized. Although the processing methods of jade jewellery materials are still the same, the design tends to be diversified. It has both very traditional national western elements. With more advanced technologies and more unique and tailored design, the industry shows a bright prospect.

(2) Quality Variance of Jade Products

While the jade carving craftsmanship has improved and the consumption of the jade products has increased, many problems occurred at the same time. With the rapid development of the jade carving industry, the demand and price of jade raw materials are rising, and the unite of jade sale have changed from catty to gram. The increasing prices of jade attracted a large number of profits seekers poured into the jade industry. As a result, the jade market has become very chaotic. Some junior artisan promoted their works on the market and labeled themselves as masters. This phenomenon disrupts the normal market order, and make the quality of jade products unguaranteed.

3.2.4 Technical Factors

According to the survey results of Chen et al. (2017), 58. 74% of consumers are concerned about the authenticity of jade products, indicating the prevalence of fraud products and the difficulty of quality verification for consumers.

With the improvement of people's living standards, jade jewellery is more popular in different populations for the collection value and decoration value. Many manufacturers take this advantage to deceive consumers, leading to chaos in the jewellery market.

The aim to detect the fraud products promote the development of the technology and instruments of the jade appraisal. Common jewellery appraisal technologies include infrared spectroscopy technology, ultraviolet fluorescence technology, Raman spectroscopy technology and X-ray. Instruments include scanning electron microscope, optical fiber spectrometers, portable polarizers, handheld beam splitter and so on. The evolution of appraisal technologies and instruments greatly improving the appraisal accuracy and efficiency.

However, the development of jewellery technology has also brought a large number of synthetic diamonds, synthetic gems and other products. With advanced scientific and

technological means, some synthetic diamonds gems look even more exquisite than a natural one. Unethical businesses take this advantage to profiteer from innocent customers.

In short, as technologies mature, opportunities and challenges coexist. While the appraisal accuracy has been improved, we must also be careful with the improvement of counterfeiting technology.

3.2.5 Environmental Factors

The upstream mining industry of the jade jewellery industry has inevitably caused environmental damage and pollution, also mining safety and health issues. The mining-related environmental pollution include air, water, and soil pollution; and the mining environment damage mainly refers to the ground collapse, the land destruction, landslides, mountain fractures, mudslides, soil erosion, land desertification, mining earthquakes, etc. With the continuous development and utilization of mineral resources, the environmental pollution problem becomes more and more severe, and the conflict between the environment and human being become increasingly prominent (Hao and Cheng, 2020). The economic losses and casualties caused by environmental problems are huge.

Since 2012, when President Xi Jinping took office, China has increasingly emphasized the issue of environmental protection. From the central to the local regions, ecological and environmental protection have been unprecedentedly stressed. In recent years, “Opinions on Accelerating the Construction of Ecological Civilization”, “Overall Plan for Ecological Civilization System Reform”, “Air Pollution Prevention and Control Action Plan”, and “Water Pollution Prevention and Control Action Plan” have been issued successively, and the top-level design of China’s ecological and environmental protection reform system has been initially completed. The issuance of the stringent new environmental protection law and the implementation of environmental protection inspector accountability systems show China’s determination to protect the ecology and environment (Yue, 2017).

The stricter environmental protection policies and the increasing shortage of mineral resources will result in higher political and economic costs for the jade mining industry, as more rigorous environmental assessment requirements make it more difficult for companies to obtain mining rights and paying more for environmental restoration in mining areas.

3.2.6 Legal Factors

The ministry of natural resources (formerly the Ministry of Land and Resources) is the authority that regulates and supervises jade processing, manufacturing and sales. Activities under the supervision of the Ministry of Natural Resources include the formulation of industry technical standards, jewellery import and export, technical supervision, information exchange and service consultation, quality inspection and professional skills appraisal, etc.

Related laws and policies related to the mining industry include: “Mineral Resources Law”, “Environmental Protection Law”, “Water and Soil Conservation Law”, “Solid Waste Pollution Prevention and Control Law”, “Water Pollution Prevention and Control Law”, “The Circular Economy Promotion Law of the People’s Republic of China” and the “Land Management Law”. Particularly, the “Mineral Resources Law” focuses on promoting the development of mining and regulating the overall activities of the mining industry.

The China Jewellery and Jade Jewellery Industry Association has also assisted the government in policies and regulations implication in the jade jewellery industry. The association assist the industry with promoting technological progress, promoting the sustainable development, conducting industry investigations and research, and investigating on the situation of supply and demand, resource utilization, product development, import and export policies, price policies, tax policies, law and regulations, and management systems of jewellery.

In short, China's jade industry legal and regulatory system is relatively comprehensive, but compared with developed countries, there are still many areas that need to be strengthened.

3.3 Opportunities and Challenges

According to the PESTEL analysis, China's jade jewellery industry is in the mature phase and has great expansion potential. There are many advocating factors for the industry: the support of regulations, the recovery of the economy and the social cultures that highly appreciate jade. In addition, China's jade supply and demand are outstanding. Along with the recovery of the economy after the epidemic, domestic jade demand is showing a rapid growth trend to meet the decoration, ceremony and collection needs.

However, the whole industry also faces the following challenges:

1) The Increasing cost of Jade Manufacturing

The increasing scarcity of jade minerals and stricter environmental protection regulations make it more costly and difficult to access to high-quality raw material. Moreover, the shortage of professionals due to the lack of educational resources increase the labour cost.

2) The Homogeneity of Products

Although the industry has realized the problem of product homogeneity and tried to design unique and personalized products, most jade products on the market have similar styles. Therefore, the industry should pay more attention to cultivate talent designers, integrate modern and traditional elements in designs, and increase product differentiation.

3) Product Counterfeit

To seek huge profits, unethical businesses are using advanced technologies to produce artificial gems and deceive consumers. To guarantee jade products' authenticity, increase customers trust, and create a well-ordered market, government and industry authorities should standardize market behaviour and crack down hard on fakes and shoddy products.

Because of above challenges and risks, customers are more willing to choose a brand with higher awareness, leading to the significant brand effect and Matthew effect in China's jade industry because the leading companies have a higher capability to access raw materials, diversify products, guarantee product quality, and attract more investors (Chen et al., 2017).

4. Empirical Analysis and Investment Recommendations

4.1 Sample Selection and Data Sources

The empirical study sample is A-share listed companies in China's jade industry, based on the 2020 Industry Classification Standards of the China Securities Regulatory Commission. Refer to the industry section classifications of Oriental Fortune website, there are 11 listed companies in the jade industry on June 30, 2020.

Table 1: A-Share Listed Companies of China's Jade Industry

A-share Listed Companies of China's Jade Jewellery Industry		
Code	**Company Name**	**IPO Date**
002867. SZ	CHOW TAI SENG	2017-04-27
002345. SZ	CHJ JEWELLERY	2010-01-28
000026. SZ	FIYTA	1993-06-03
002731. SZ	CUIHUA JEWELLERY	2014-11-04
002574. SZ	MINGR	2011-04-22
002740. SZ	IDEAL JEWELLERY	2015-01-22
000587. SZ	JINZHOU CIHANG Group (*ST)	1996-04-25
600,612. SH	LAO FENG XIANG	1992-08-14
002721. SZ	BEIJING KINGEE CULTURE	2014-01-27
600,086. SH	EASTERN GOLD JADE (*ST)	1997-06-06
603,900. SH	LEYSEN JEWELLERY	2016-11-23

This thesis selects monthly data from 1st January 2010 to 31st December 2018, amount to 108 months of the companies in table 1, since most of them are listed after 2010.

To guarantee the stability and constituency of data, this thesis excludes the following data:

(1) ST and *ST Stock:

ST stocks refer to stocks of listed companies whose financial status and other conditions are abnormal and are specially treated by Shanghai and Shenzhen Stock Exchange. If a stock was marked as ST, it means the company has suffered losses for two consecutive years and was treated specially; if a stock was marked as *ST, it means the company has been losing money for 3 consecutive years and has the risk of delisting.

ST and *ST stocks have large risks and large returns, the trading rules of this them are different from normal stocks. Compared with normal stocks, ST and *ST stocks face stronger supervision and cannot represent market conditions under normal conditions.

Among above China's A-share jade industry companies, the Eastern Gold Jade and Jinzhou Cihang Group have received the delisting warning from the China Securities Regulatory Commission more than once in the past few years.

The Eastern Gold Jade officially received a regulatory letter of termination of listing from Shenzhen Stock Exchange on 22nd December 2020, after the closing price of the company has been lower than CNY 1 for 20 consecutive trading days (Liu, 2020). The Eastern Gold Jade realized backdoor listing in 2003 and ushered in the first wave of stock price rise in 2010 caused by the surge in jade prices (Liu, 2020). However, in 2017, the Zhao Xinglong, the chairman of

the board of the company, was criminally sentenced and his son Zhao Ning took over the CEO position. What worse, the net profit of the company continued to decline to negative from 2015 to 2019 (Liu, 2020). On January 18, 2018, the Eastern Gold Jade launched a restructuring but failed because of its tremendous debts, and soon received the "Investigation Notice" from the China Securities Regulatory Commission. In June 2020, another "Investigation Notice" was issued because the company was suspected of violating laws and regulations in information disclosure, the China Securities Regulatory Commission decided to file an investigation into the company (Liu, 2020). According to the investigation result, the managed fictitious transactions, false records in operating income, operating costs, total profits and accounts receivable in the annual report for three consecutive years. In short, the Eastern Gold Jade was abandoned and punished by the capital market because of high debt, consecutive years of losses, and financial fraud.

As for Jinzhou Cihang Group, the Shenzhen Stock Exchange issued a letter of concern to the company and inquired about the risk of losing control of its subsidiary Huifeing Leasing Company on 29th January 2021 (eCompany, 2020). Previously, Jinzhou Cihang has been warned by the China Securities Regulatory Commission because of the substantial default on a debt of CNY 1.4 billion in 2019 (eCompany, 2020). In 2020, the company was warned again as its stock price has fallen below the CNY 1 for 11 consecutive trading days up to 21st June 2020 and the company's restructuring plan was forced to terminate (eCompany, 2020). In the past few years, Jinzhou Cihang faced significant operation problems especially liquidity crisis and expanding losses from 2018.

Because ST companies are generally poorly managed, it is difficult to make a profit with their own strength. If they can't make a profit, they will be suspended from listing until the final termination of listing. Because the audit system of China's A-share issuance and listing has many thresholds for new shares, the shell resources for listing are very valuable. In order to protect the shell company, ST companies usually carry out asset restructuring to reverse losses, and thus come asset restructuring investment opportunities.

Investors of ST company don't seek the intrinsic value of the stock, rather they seek one-off investment opportunities such as restructuring and reorganization. ST stocks are high yield with high risk, and suitable for investors with high-risk tolerance. The investing strategy of ST stock is not consistent with valuing investing strategy that followed by this thesis, wherefore the following analysis will exclude the Eastern Gold Jade and Jinzhou Cihang Group.

(2) Monthly Data with Missing Information.

There are some companies with incomplete data during this period as some of them went to the public after 1st January 2010, or some companies didn't disclose all required monthly information for some reason. If the information for some months is incomplete, the data for that month of the stock will be eliminated.

4.2 Stocks performance overview of China's jade industry

According to the industry analysis in chapter three, China's jade jewellery industry has entered a mature stage, during which the industry growth rate is gradually slow and market shares of each company are relatively stable.

As discussed in the summary part in chapter three, the brand effect and Matthew effect in the jade industry are significant. It means that the higher the brand awareness, the more loyal consumers and more high-quality investors. Conversely, the lower the brand reputation, the less customer attractiveness and the worse its financial performance. Therefore, when analysing China's jade industry, it is necessary to separately discuss the performance of leading companies and other companies.

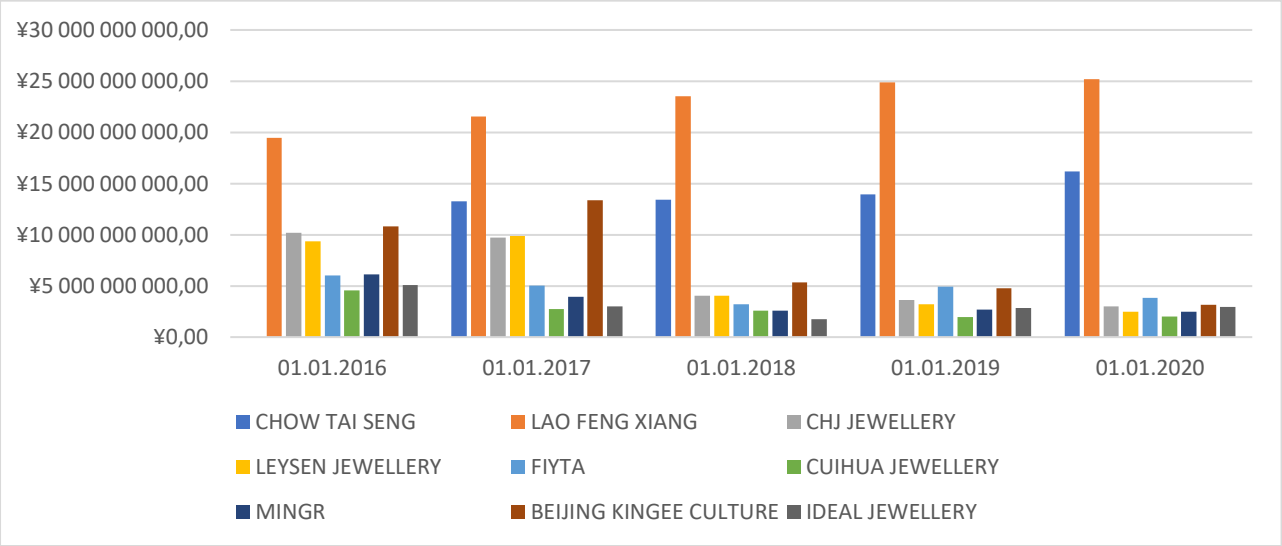

Figure 7: Market Value of Individual Stocks in China's Jade Industry (2016–2020)

Source: The Choice Financial Terminal Database

According to figure 7, since 2017, Chow Tai Seng and Lao Feng Xiang have accounted for more than 50% of the overall market value of China's jade jewellery industry in A-share. Kingee Culture had a relatively market value in 2016 and 2017 but plummeted since 2018. Therefore, this thesis defines Chow Tai Seng and Lao Feng Xiang as the leading companies and the remaining 7 companies as non-leading companies.

In the following three figures, this thesis compares the historical stock performance of the rate of return of China's jade industry average, the rate of return of China's jade leading companies, the rate of return of China's jade non-leading companies and the rate of return of the Shanghai Composite Index (SHCOMP).

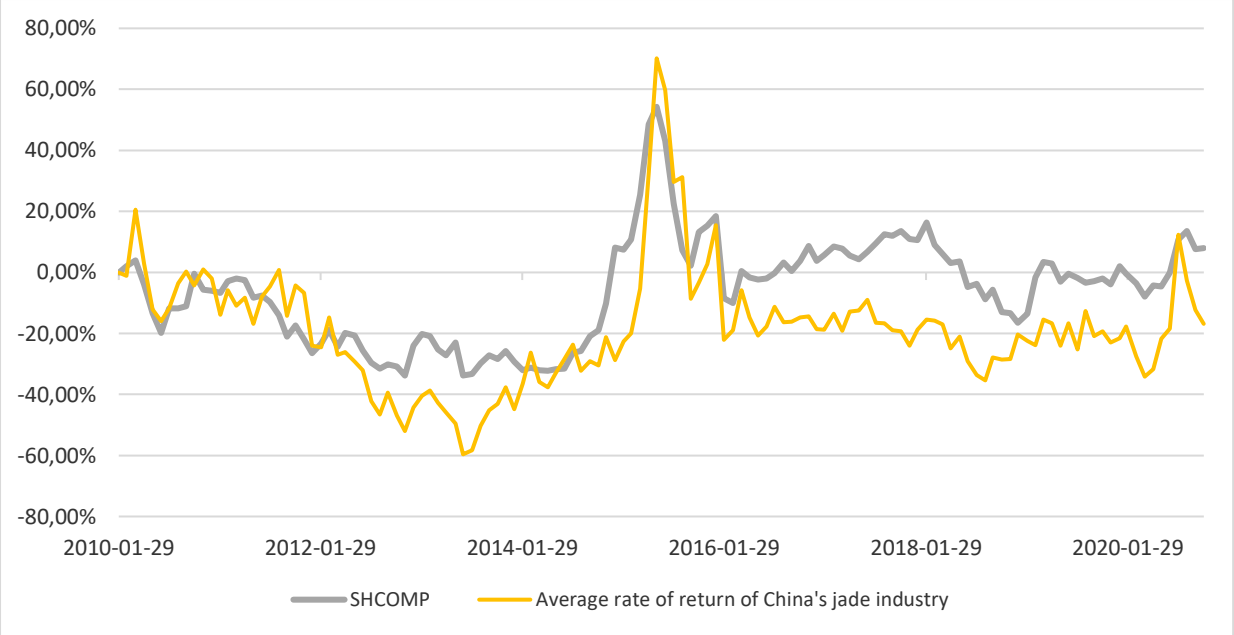

Figure 8: Comparison between SHCOMP and the Average Rate of Return of China's Jade Industry

Source: The Choice Financial Terminal Database

Note: The rate of return is weighted by the market value of individual stocks.

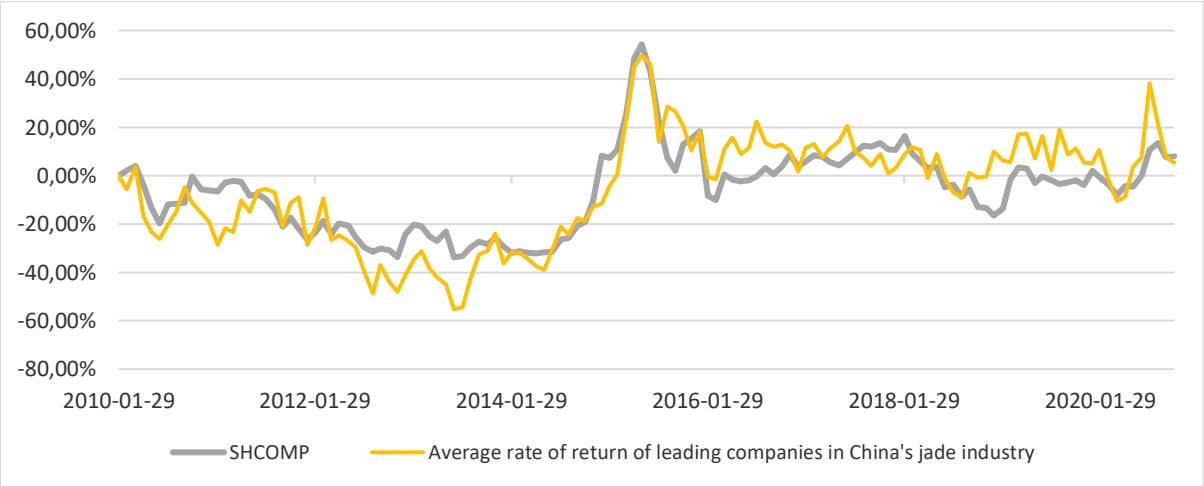

Figure 9: Comparison between SHCOMP and the Average Rate of Return of Leading Companies in China's Jade Industry

Source: The Choice Financial Terminal Database

Note: The rate of return is weighted by the market value of individual stocks.

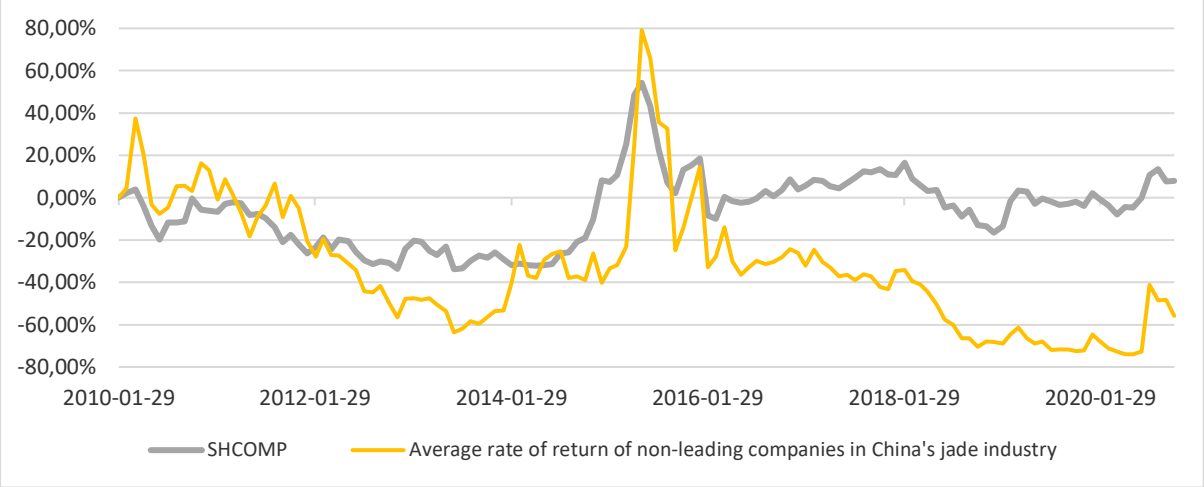

Figure 10: Comparison Between SHCOMP and the Average Rate of Return of Non-Leading Companies in China's Jade Industry

Source: The Choice Financial Terminal Database

Note: The rate of return is weighted by the market value of individual stocks.

From the figure 8, 9 and 10, it can be seen that the historical performance of the overall industry is relatively weaker than that of the market at most of the time, the leading companies have been outperformed the market since 2016 and keeping the trend, the non-leading companies underperform the market since 2012 and all the way down. The above analysis of the historical performance of the market and the jade industry further confirms the "Matthew effect" of the Chinese jade industry, that is, "the rich get richer and the poor get poorer".

4.3 Fama-French Five-Factor Model Analysis

This section aims to analyse the determinants of the excess return of the Chinese jade industry and the sensitivity of each factor, using the Fama-French five-factor model. This thesis uses data of all the stocks in CSI 300 from 1st January 2010 to 31st December 2018 to perform the regression of the five-factor model.

The data used in the model regression mainly includes the monthly average return rate of China's jade industry (R_{it}), the monthly risk-free rate (R_{Ft}), monthly market return rate (R_{Mt}), and the circulating market value, book value and operating profit of individual stocks, etc.

The average return rate of China's jade industry is constructed by the weighted average monthly return rate of each A-share stock in China's jade industry, and the weight is the individual stock's circulating market value.

The return rate of each stock (r_{it}) is calculated through the market value per share (MVPS), using the following formula:

$$r_{it} = \frac{MVPS_t - MVPS_{t-1}}{MVPS_{t-1}}$$

The Fama-French five-factor model is as follows:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

R_{it}: $the\ return\ on\ security\ or\ portfolio\ i\ for\ period\ t$

R_{Ft}: $the\ risk\ free\ return$

R_{Mt}: $the\ return\ on\ the\ value-weight\ (VW)\ market\ portfolio$

SMB_t: $the\ return\ on\ a\ diversified\ portfolio\ of\ small\ stocks\ minus\ the\ return\ on\ a\ diversified\ portfolio\ of\ big\ stocks$

HML_t: $the\ returns\ on\ diversified\ portfolios\ of\ high\ and\ low\ B/M\ stocks$

RMW_t: $the\ difference\ between\ the\ returns\ on\ diversified\ portfolios\ of\ stocks\ with\ robust\ and\ weak\ profitability$

CMA_t: $the\ difference\ between\ the\ returns\ on\ diversified\ portfolios\ of\ the\ stocks\ of\ low\ and\ high\ investment\ firms$

e_{it}: $is\ a\ zero-mean\ residual$

4.3.1 Factors Construction

(1) The Market Factor ($R_{Mt} - R_{Ft}$)

The market risk premium factor ($R_{Mt} - R_{Ft}$) in the model equals the market rate of return minus the risk-free interest rate. The risk-free rate of return (R_{Ft}) used in this thesis is China's 10-year Treasury bond yield (monthly data), and the market rate of return (R_{Mt}) uses the CSI 300 market return rate (monthly data).

(2) Other Factors

The other four factors are size factors (SMB), book-to-market value ratio factors (HML), profitability factors (RMW), and investment factors (CMA).

The construction method of the factors follows the paper of Fama and French (2015). Fama and French (2015) proposed three grouping methods: 2*3, 2*2 and 2*2*2*2. This thesis chooses the 2*3 grouping method as Yu (2018), Zhao et al. (2016), Li (2018), Li et al. (2017) and Wu (2016) have verified that 2*3 grouping method is most effective in China's A-share market. I used Python programming software to group all the stocks of CSI 300 (amount to 3925 stocks as of December 31, 2019) based on the following rules:

Table 2: The Construction Rule of Fama-French Factors

	Criteria	
Size	*Market Value> Median* *Market Value <Median*	*Big (B)* *Small (S)*
$B/M = BVPS_{t-1}/MVPS_{t-1}$	*B/ M <0.3 Quantile* *0.3 Quantile ≤B/M ≤0.7 Quantile* *B/M>0.7 Quantile*	*High (H)* *Neutral (N)* *Low (L)*
$OP = EPS_{t-1}/BVPS_{t-1}$	*OP<0.3 Quantile* *0.3 Quantile ≤OP ≤0.7 Quantile* *OP>0.7 Quantile*	*Robust (R)* *Neutral (N)* *Weak (W)*
$INV = \frac{Asset_{t-1} - Asset_{t-2}}{Asset_{t-2}}$	*INV <0.3 Quantile* *0.3 Quantile ≤INV≤0.7 Quantile* *INV>0.7 Quantile*	*Aggressive (A)* *Neutral (N)* *Conservative (C)*

Note:

(1) The values of the above quantiles are all sequences obtained by sorting from largest to smallest calculation result;

(2) The size of the company is categorized based on the circulation market value of the month;

(3) The stocks are divided into three groups according to the 0.3 and 0.7 quantiles B/M ratio, operating profitability (OP), and investment (INV), respectively.

Based on the monthly data, all the stocks of CSI 300 can be sorted into 18 groups of portfolios, as showing in table 3.

Table 3: Fama-French Portfolios Grouping

		Small (S)	*Big (B)*
B/ M	*High (H)*	*SH*	*BH*
	Neutral (N)	*SN*	*BN*
	Low (L)	*SL*	*BL*
OP	*Robust (R)*	*SR*	*BR*
	Neutral (N)	*SN*	*BN*
	Weak (W)	*SW*	*BW*
INV	*Conservative (C)*	*SC*	*BC*
	Neutral (N)	*SN*	*BN*
	Aggressive (A)	*SA*	*BA*

Monthly return of each portfolio is calculated through the weighted average method, using the market value of each stock as a weight.

Using the weighted average return rate of each portfolio, a set of factors can be constructed every month based on the following formulas:

1) Size Factor:

$$SMB_{INV} = \frac{1}{3}(SC + SN + SA) - \frac{1}{3}(BC + BN + BA)$$

$$SMB_{B/M} = \frac{1}{3}(SH + SN + SL) - \frac{1}{3}(BH + BN + BL)$$

$$SMB_{OP} = \frac{1}{3}(SR + SN + SW) - \frac{1}{3}(BR + BN + BW)$$

$$SMB = \frac{1}{3}\left(SMB_{B/M} + SMB_{OP} + SMB_{INV}\right)$$

2） Book-to-Market Value Ratio Factor:

$$HML = \frac{1}{2}(SH + BH) - \frac{1}{2}(SL + BL)$$

3）Profitability Factor:

$$RMW = \frac{1}{2}(SR + BR) - \frac{1}{2}(SW + BW)$$

4）Investment Factor:

$$CMA = \frac{1}{2}(SC + BC) - \frac{1}{2}(SA + BA)$$

In the above formulas, the size factor (SMB_t) equals to the difference between the return on diversified portfolios of small size and big size stocks; the book-to-market value ratio factor (HML_t) equals to the difference between the returns on diversified portfolios of stocks with high and low book-to-market value; the profitability factor (RMW_t) equals to the difference between the returns on diversified portfolios of stocks with robust and weak operating profits; the investment factor (CMA_t) equals to the difference between the returns on diversified portfolios of stocks with conservative and aggressive investment style.

4.3.2 Regression Result

From January 2010 to December 2018, 108 monthly data are input into the Python programming and 108 sets of each factor are output. Bring the dependent and independent variables for each month into the Fama-French five-factor results in the following regression results:

Table 4: Regression Result of Fama-French Five-Factor Model

	Coefficient	***Standard error***	***t***	***p>|t|***
Constant	*-0.1027*	*0.015*	*-6.867*	*0.000*
$\mathbf{R_{Mt} - R_{Ft}}$	*0.8928*	*0.067*	*13.419*	*0.000*
SMB	*-0.9102*	*0.243*	*-3.746*	*0.000*
HML	*-1.7386*	*0.926*	*-1.878*	*0.691*
RMW	*-2.7034*	*1.05*	*2.575*	*0.011*
CMA	*0.0837*	*1.991*	*0.042*	*0.967*

**Confidence level is 95% (two-tailed test).*

According to table 4, the regression equation of the excess return of China's jade industry can be expressed as:

$$R_{it} - R_{Ft} = -0.1027 + 0.8928 * (R_{Mt} - R_{Ft}) - 0.9102 * SMB_t - 1.7386 * HML_t - 2.7034 * RMW_t + 0.0837 * CMA_t$$

According to the results of the t-test and p-test, the market factor ($R_{Mt} - R_{Ft}$) can explain most of the fluctuations in the excess returns of China's jade industry; the explanatory power of size factors (SMB) and profitability factor (RMW) are also strong, whereas the book-to-market value ratio factor (HML) and investment factors (CMA) are insignificant.

The market factor is significant in the above regression model. The coefficient of market factor, b_i, measures of market systemic risk, reflecting the sensitivity of industry returns to market returns. It is reasonable that b_i is positive and close to 1, as the jewellery industry is a procyclical industry which is significantly influenced by the overall market performance which is affected by the macroeconomic situation and per capita income level.

The coefficient of the size factor is negative and significant, indicating that investors prefer big-size companies to small-size companies. Big-size companies have a greater brand effect and economic moat than small-size companies in China's jade industry, which is both capital and labour-intensive. This result can further reveal the Matthew effect and explain the significantly higher return of leading companies than non-leading companies in China's jade industry as depicted in the figures 9 and 10.

In terms of the profitability factor, its coefficient is negative and significant. This indicates that investors of China's jade industry tend to be more speculative than value investing. This result is consistent with the result of the book-to-market value ratio factor. The coefficient of the book-to-market value ratio factor is negative, which indicates that investors in China's jade industry require lower returns for companies with high book-market value than low book-to-market value. High BM companies are usually companies with poor fundamentals, and low BM companies are companies generally with better fundamentals. In other words, investors in China's jade industry somehow irrationally underestimate the risk of high BM companies and overstate their intrinsic value.

The investment factor is the least significant among the five factors. This means the different investment styles, either conservative or aggressive, are not the main reason for the excess returns in China's jade industry.

The following table decomposes the risk exposure factors of China's jade industry return by listing the regression results of individual companies.

Table 5: Fama-French Five-Factor Regression Results of the Individual Company in China's Jade Industry

	Coefficient					
	Constant	**$R_{Mt} - R_{Ft}$**	**SMB**	**HML**	**RMW**	**CMA**
CHOW TAI SENG	-0.0174	-0.0497	-0.0148	-0.3881	-0.4844	0.0982
	Significant	Significant	Insignificant	Insignificant	Insignificant	Insignificant
LAO FENG XIANG	0.0113	1.1701	0.0076	-0.0621	0.6928	0.5551
	Insignificant	Significant	Insignificant	Insignificant	Insignificant	Insignificant
CHJ JEWELLERY	-0.572	-0.1307	-0.8419	-3.102	-3.9931	-4.6726
	Significant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
LEYSEN JEWELLERY	-0.0467	-0.0355	0.125	-5.7426	-1.8696	-3.3043
	Significant	Insignificant	Insignificant	Significant	Insignificant	Insignificant
FIYTA	0.0232	0.9274	-0.9911	-3.2189	-2.0008	0.7043
	Insignificant	Significant	Significant	Significant	Insignificant	Insignificant
CUIHUA JEWELLERY	-0.2377	-0.6533	-0.579	-5.7767	-4.3903	-1.8425
	Significant	Significant	Insignificant	Significant	Significant	Insignificant
MINGR	-0.5095	-0.247	-1.0115	-4.2902	-5.4594	-1.8106
	Significant	Insignificant	Insignificant	Significant	Significant	Insignificant

BEIJING KINGEE CULTURE	0.3685	1.5861	-1.647	-8.6515	-8.9678	0.3061
	Significant	Significant	Insignificant	Significant	Significant	Insignificant
IDEAL JEWELLERY	-0.2237	-0.4846	-1.0891	-7.7917	-8.6374	-3.546
	Significant	Significant	Insignificant	Significant	Significant	Insignificant

Source: Appendix 1

From table 5, it can be found that some companies are highly sensitive to market risks, such as Lao Feng Xiang, FIYTA and Kingee Culture, whereas others have a low or negative correlation with market factors. As for the size factor and book-to-market factor, the coefficients of all companies are consistently negative. Lao Feng Xiang is the only company that has a positive profitability factor, it could be explained that Lao Feng Xiang is followed by many institutional investors, who are more rational and pay more attention to fundamentals than individual investors. The investment factors are insignificant for all companies and are consistent with the regression results of industry average return.

4.4 EVA Analysis of China's Listed Jade Companies

Economic value-added (EVA) or economic profit is usually used to evaluate corporate financial operating performance. Compared with accounting profits, economic profit deducts the cost of capital.

Management may not pay enough attention to the effectiveness capital use if they only focus on accounting profits and mistakenly believe that capital is free of cost. As for investors, EVA takes into account the time value and risk factors of capital, which is conducive to judging the company's long-term performance and sustainability.

To better help investors judge the investment value of China's jade industry, this section uses historical EVA to analyse each company's true economic profit.

The formula of EVA is as follow:

EVA = NOPAT - (Invested Capital * WACC)

Where:

NOPAT = Net operating profit after taxes

Invested capital = Debt + capital leases + shareholder's' equity

WACC =Weighted average cost of capital= $(K_e * W_e) + [K_d * (1 - t)] * W_d$

K_e: The cost of common equity;

K_d: The cost of debt;

t: The effective company tax rate;

W_e: Percentage of equity to total capital;

W_d: Percentage of debt to total capital.

The cost of debt (K_d) used in this thesis is the medium- and long-term loan interest rate of three to five years in the basic interest rate of RMB loans. Since the People's Bank of China adjusted the interest rate to 4.75% on October 24, 2015, it has remained unchanged until now.

The cost of equity capital (K_e) used in this thesis is the five-year annualized rate of return for China's jade industry, which is 8.379% and calculated by Fama-French five-factor regression models in section 4.3 based on the monthly data from January 2015 to December 2019.

The following table presents the historical EVAs of each listed company in China's jade industry:

Table 6: History EVA of Listed Companies in China's Jade Industry (100 Million CNY)

Year	CHOW TAI SENG	CHJ	LEYSEN	FIYTA	CUIHUA	MINGR	KINGEE	LAO FENG XIANG	IDEAL
2019	5.0333	-2.6287	-0.7710	-0.5719	-1.3013	-2.1507	-5.9241	8.3272	-4.6104
2018	3.6861	-2.7768	-0.1724	-0.7923	-1.3293	-2.0154	-7.2223	6.7422	-1.1027
2017	2.7001	-1.0951	0.9092	-1.0503	-0.9128	-1.9625	-5.7817	6.3853	-1.1675
2016	2.2298	-1.3989	0.3797	-1.6190	-0.9415	-2.9597	-2.7853	4.9522	-1.0453
2015	1.6558	-0.9240	0.7073	-1.6877	-0.7610	-2.6201	-2.0882	5.7703	-0.2063

Source: Choice Financial Terminal Database

For a more intuitive view, I use the following line chart to depict data in table 6:

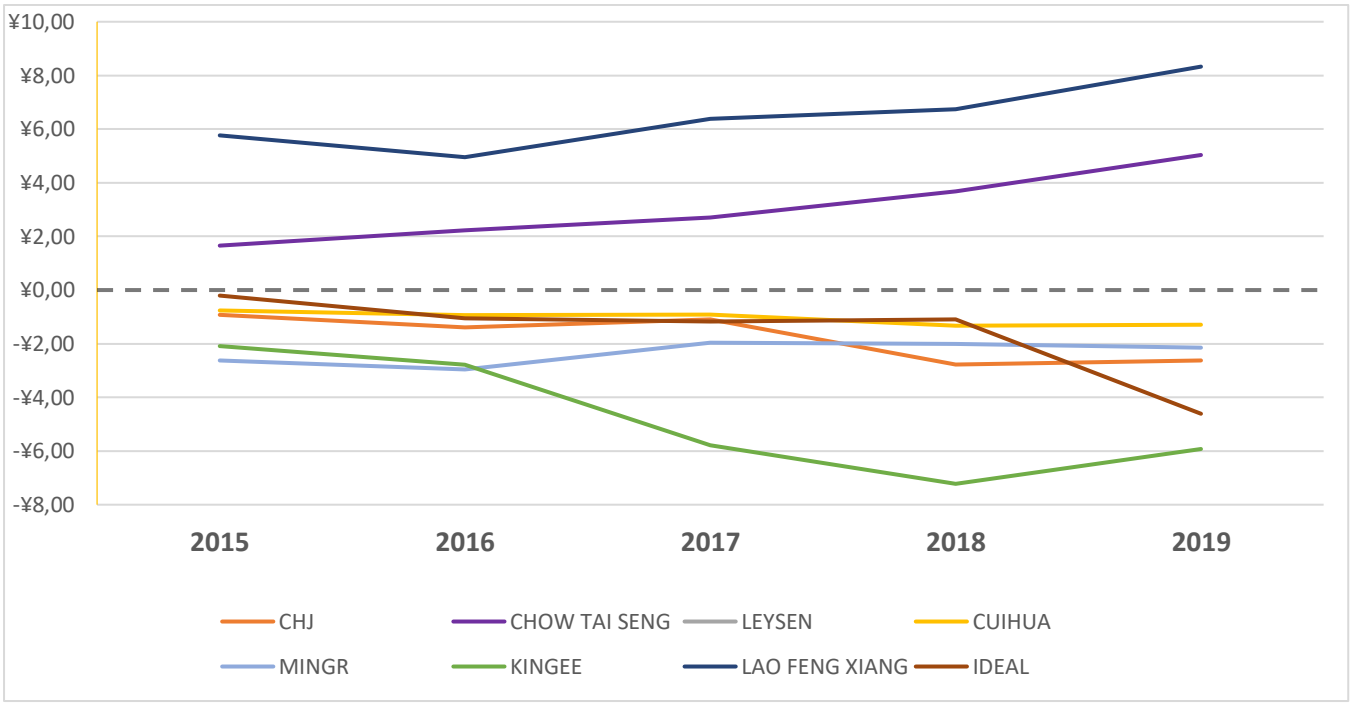

Figure 11: History EVA of Listed Companies in China's Jade Industry (100 Million CNY)

Figure 11 shows that the EVA of Chow Tai Seng and Lao Feng Xiang has been significantly greater than zero and other companies, with an upward trend. This indicates that these two companies' operating income is higher than the cost of capital invested, and created new value for shareholders. The EVAs of other companies are all below zero except for LEYSEN, which was slightly greater than zero before 2018. A company with a negative EVA indicates that the wealth of shareholders is decreasing.

The above EVA analysis shows the much stronger financial performance leading companies (Chow Tai Seng, Lao Feng Xiang) compared with non-leading companies. On the one hand, this analysis further reflects the Matthew effect in China's jade industry. On the other hand, it reminds investors should be more prudent when identifying investment opportunities as the polarization is very serious in the jade industry.

4.5 Relative Valuation Analysis of China's Listed Jade Companies

In the final section, this thesis uses relative valuation indicators to further compare the financial performance of each company in China's jade industry.

Table 7: Relative Valuation Indicators of Listed Companies in China's Jade Industry

Stocks	P/E			EPS			PEG		
	2019A	2020E	2021E	2019A	2020E	2021E	2019A	2020E	2021E
CHOW TAI SENG	14.04	19.39	15.94	1.36	1.45	1.76	0.61	2.89	0.74
CHJ	44.94	45.51	23.77	0.09	0.10	0.20	3.15	3.00	0.26
LEYSEN	22.02	-	-	0.43	-	-	-0.73	-	-
FIYTA	22.75	21.09	15.54	0.49	0.66	0.89	1.30	0.68	0.43
CUIHUA	53.04	-	-	0.15	-	-	2.01	-	-
MINGR	46.69	-	-	0.11	-	-	-1.27	-	-
KINGEE	76.78	-	-	0.07	-	-	0.36	-	-
LAO FENG XIANG	17.69	17.06	14.55	2.69	2.86	3.35	1.05	2.75	0.84
IDEAL	-9.51	-	-	-0.66	-	-	0.01	-	-
Industry Average	32.05	11.45	7.76	0.53	0.56	0.69	0.72	1.04	0.25

**Source：Choice Financial Terminal Databases*

This thesis selects P/E, EPS and PEG as representatives. Table 7 shows the historical and expected ratios from 2019 to 2021. Some of these companies do not have forecast data for 2020 and 2021 because they have a low degree of attention and do not have specific analysts or agencies to follow up.

First look at the P/E ratio. IDEAL's P/E ratio is negative in 2019 since its net profit is negative, so IDEAL is not included in the following. Among other companies except for IDEAL, Chow Tai Seng and Lao Feng Xiang are the two with the lowest P/E ratio from 2019 to 2021. Generally, the lower the P/E ratio of a stock, the lower the investment risk of the stock and the worthier of investment.

Earnings per share (EPS) is the reciprocal of the price-to-earnings ratio, which can more intuitively reflect the after-tax profits created by each company per share. The higher the ratio, the more profit is created. From 2019 to 2021, Chow Tai Seng and Lao Feng Xiang have higher EPS than others.

If only judged based on P/E and EPS ratio, Chow Tai Seng and Lao Feng Xiang are more profitable and less risky investment objects than other companies in China's jade industry.

In terms of price/earnings to growth ratio (PEG), this indicator equals to price-earnings ratio divided by the earnings growth rate. PEG can not only examine the company's current financial status through the P/E ratio, but also the company's growth and profit potential. Generally, if one stock's PEG is greater than 1, the value of the stock may be overvalued, or the market believes that the company's performance growth will be higher than market expectations; if the PEG of one stock is less than 1, either the market underestimates the value of the stock, or the market believes that its performance growth may be worse than expected.

The PEG of LEYSEN and MINGR are negative and incomparable with others. KINGEE and IDEAL have extremely low PEG, being 0.36 and 0.01 respectively in 2019. Combining the high P/E ratio and low EPS of KINGEE and IDEAL, it's safe to infer that the market doesn't have the confidence to the two companies' future performance and believes their growth rate will be lower than expected. On the contrary, the PEG of CHJ and CUIHUA are very high, being 3.15 and 2.01 respectively in 2019. However, both CHJ and CUIHUA have higher P/E than the industry average, indicating that their stocks are likely to be overvalued. The PEG of Chow Tai Seng, Lao Feng Xiang and FIYTA falls between 0.5-1.5, a normal PEG range. It means that the stocks of Chow Tai Seng, Lao Feng Xiang and FIYTA are reasonably valuated, and they have long-term growth and sustainable profitability.

Summarize the above analysis, based on the value investing strategy, Lao Feng Xiang and Chow Tai Seng have higher intrinsic value as they have the lowest price-earnings ratio, the highest earnings per share and most reasonable PEG among China's jade industry. This means that the two stocks have a shorter payback period, lower investment risk, stable long-term profitability growth, and higher investment value.

4.6 Discussion

This chapter analyses the investment value of China's jade industry using empirical data. Firstly, according to the line charts of returns in the past ten years of China's jade industry, the leading companies in the industry outperformed the market, while the non-leading companies underperformed the market and have fallen all the way.

Secondly, the Fama-French regression results indicate that the returns of China's jade industry are positively and significantly affected by the market factors and the profitability factor. The size factor and investment factor are relatively less significant, but have also positively correlated with jade industry returns, which reflects that market compensates more returns for companies with smaller-scale and conservative investment than larger scale and aggressive. The coefficient of book-to-market value ratio factor is negative with low significance, indicating that to some extent, Chinese investors irrationally chasing the market and failing to evaluate the intrinsic value of the company objectively. Finally, the EVA analysis and relative valuation indicators analysis both found that leading companies (Chow Tai Seng and Lao Feng Xiang) have superior financial performance than other companies.

In short, the leading companies in China's jade industry have higher intrinsic value and greater investment value based on the value investing strategy. This inference is consistent with the characteristics of China's jade industry: mature phase, stable market shares, and significant Matthew effect. Therefore, this thesis recommends that investors pick the stocks of leading companies when investing in China's jade industry.

5. Conclusion and Insights

5.1 Conclusion

China's jade market has revitalized since the reform and opening up in 1978 and experienced the recovery phase and rapid development phase and pushing to mature. According to the industry analysis, this thesis found ample expansion space of China's jade in the domestic market. However, the question has arisen is that how can investors share the benefits brought by the increasing jade market with manageable risks in a variable jade market? This thesis's primary objective targets answering this question with statistical and modeling evidence, specifically, to provide investors with a macro industry overview and some insights into the investment value of China's jade industry and specific stocks.

First, this thesis reviews the existing literature and finds a clear research gap in the investment value analysis of China's jade industry: no researchers use Fama-French Five-factor model in combination with EVA analysis to conduct an empirical analysis on China's jade A-share stock market despite with their effectiveness in investment value analysis. To address this research gap, this thesis is performed as follows:

In chapter three, this thesis uses the PESTLE model to explore industry lifecycle, opportunities and challenges of China's jade industry. From the perspective of politics, economy and society, China's jade industry is currently developing towards a healthy and rapid direction, and domestic jade demand is showing a rapid growth trend. In the meantime, the technologies and instruments of jade manufactures are advancing, but the counterfeiting technology is also developing. To crack down on fake products and regulate the market behaviours, more comprehensive laws and regulations are needed. In terms of environmental factors, China's environmental protection policies are becoming stricter, and mineral resources are becoming increasingly scarce. Jade mining is facing higher economic and political costs.

In chapter four, this thesis uses empirical data from 1st January 2010 to 31st December 2018 to analyse China's jade industry returns and investment value, using the line chart of historical industry return, Fama-French five-factor model, EVA analysis and the relative valuation method. There are two main findings in this chapter: 1) The Matthew effect is significant in China's jade industry, and leading companies vastly outperform the market and industry average; 2) The return of China's jade industry is highly sensitive to market factors and profitability factors, less sensitive to the size factor and investment factor, and least correlated with book-to-market value ratio factor. The Fama-French five-factor model's regression results also reflect that Chinese investors demand a higher return for small-scale and conservative investment companies but are irrationally chasing the market to some extent.

This thesis's novelty is shown in two perspectives:

(1) Combining the PESTLE model, Fama-French five-factor model, EVA method and relative valuation indicators. This combination enriches the traditional valuation systems and can be used in the empirical analysis of other industries.

(2) Using the Fama-French five-factor model to predict the cost of equity in EVA. Compared with the traditional CAPM model used by most scholars to predict the cost of equity, the Fama-French five-factor model improves the accuracy of prediction and better analyse the impact factors of return.

5.2 Limitations and Contributions

5.2.1 Limitations of Applied Research Methods

This thesis tried to conduct a thorough analysis of the investment value of China's jade industry, but there are still some limitations in the research:

1) This thesis only selects EVA and relative valuation indicators to analyse the investment value of the specific companies due to the limitation of time and research scope. If there is more chance in the future, more financial data should be analysed in-depth to improve valuation accuracy.

2) When using Python programming to construct the Fama-French five-factor model, this thesis doesn't test redundant variables. In future research, I will conduct more tests on the model's assumptions to improve the accuracy of the regression model and the estimated results.

3) Due to the limited time and resources, the time scope of the relative valuation analyses is 3 years (1 year of historical data and 2 years of expected data), which are less than 5 years of EVA analysis, 9 years of Fama-French five-factor model analysis, and 10 years of the historical industry return analysis. In future research, the time scope shall be enlarged to obtain more robust research results.

5.2.2 Insights for China's Jade Market

Chinese jade has both cultural and commercial value and has massive expansion potential. However, the following challenges need to be overcome for better development: raw material scarcity, product quality variance, ethical and irregular market behaviour and product homogeneity.

As for investors of China's jade industry, the following risks should be taken into account:

1. The global economic downturn due to the epidemic. The spreading of Covid-19 causes economic slump and affects residents' disposable income and consumer confidence. Contrary to necessities, luxury product consumption like jade will be frustrated during the decline of the economy.

2. The risk of raw material price fluctuations due to the scarcity of jade minerals and stricter environmental protection regulations.

3. Competition from international brands. International brands have certain advantages in brand operation and product design. The competitive environment will become increasingly fierce, with more well-known international jewellery brands are accelerating their expansion in China.

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Appendix

Appendix 1: Fama-French Five-Factor Model Regression Results of Individual Company on China's Jade Industry

Company		coef	std err	t	P>|t|
CHOW TAI SENG	const	-0.0174	0.005	-3.38	0.001
	x1	-0.0497	0.023	-2.168	0.033
	x2	-0.0148	0.084	-0.177	0.86
	x3	-0.3881	0.319	-1.217	0.227
	x4	-0.4844	0.362	-1.339	0.184
	x5	0.0982	0.686	0.143	0.886
LAO FENG XIANG	const	0.0113	0.014	0.827	0.41
	x1	1.1701	0.061	19.25	0
	x2	0.0076	0.222	0.034	0.973
	x3	-0.0621	0.845	-0.073	0.942
	x4	0.6928	0.959	0.722	0.472
	x5	0.5551	1.819	0.305	0.761
CHJ JEWELLERY	const	-0.572	0.031	-18.342	0
	x1	-0.1307	0.139	-0.942	0.348
	x2	-0.8419	0.507	-1.662	0.1
	x3	-3.102	1.929	-1.608	0.111
	x4	-3.9931	2.188	-1.825	0.071
	x5	-4.6726	4.151	-1.126	0.263
LEYSEN JEWELLERY	const	-0.0467	0.017	-2.802	0.006
	x1	-0.0355	0.074	-0.478	0.634
	x2	0.125	0.271	0.461	0.646
	x3	-5.7426	1.032	-5.563	0
	x4	-1.8696	1.171	-1.597	0.113
	x5	-3.3043	2.221	-1.488	0.14
FIYTA	const	0.0232	0.025	0.909	0.365
	x1	0.9274	0.113	8.187	0
	x2	-0.9911	0.414	-2.396	0.018
	x3	-3.2189	1.576	-2.043	0.044
	x4	-2.0008	1.787	-1.12	0.266
	x5	0.7043	3.39	0.208	0.836
CUIHUA JEWELLERY	const	-0.2377	0.024	-9.88	0
	x1	-0.6533	0.107	-6.105	0
	x2	-0.579	0.391	-1.481	0.142
	x3	-5.7767	1.489	-3.881	0
	x4	-4.3903	1.688	-2.6	0.011
	x5	-1.8425	3.202	-0.575	0.566

MINGR	const	-0.5095	0.032	-15.953	0
	x1	-0.247	0.142	-1.739	0.085
	x2	-1.0115	0.519	-1.95	0.054
	x3	-4.2902	1.976	-2.172	0.032
	x4	-5.4594	2.241	-2.436	0.017
	x5	-1.8106	4.25	-0.426	0.671
BEIJING KINGEE CULTURE	const	0.3685	0.064	5.752	0
	x1	1.5861	0.285	5.566	0
	x2	-1.647	1.041	-1.583	0.117
	x3	-8.6515	3.964	-2.183	0.031
	x4	-8.9678	4.496	-1.995	0.049
	x5	0.3061	8.526	0.036	0.971
IDEAL JEWELLERY	const	-0.2237	0.043	-5.254	0
	x1	-0.4846	0.189	-2.559	0.012
	x2	-1.0891	0.692	-1.575	0.118
	x3	-7.7917	2.635	-2.957	0.004
	x4	-8.6374	2.988	-2.89	0.005
	x5	-3.546	5.668	-0.626	0.533