Buffet's Alpha: An Empirical Study of Mutual Funds in China

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Buffett's Alpha: An Empirical Study of Mutual Funds in China

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by

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Abstract

This work investigates the characteristics of industry preferences in Buffett's investment style, which is an equally important source of Buffett's Alpha. A five-factor model (CH-5) that consists of three factors for China's market (CH-3) and the factors betting against beta (BAB) and quality minus junk (QMJ) is constructed to empirically analyze A-shares in China's stock market and China's mutual funds. The findings of the research are as follows: (i) BAB and QMJ, which represent Buffett's investment style, have significant returns in China's A-share market; (ii) compared with the CH-3 model, the CH-5 model that incorporates BAB and QMJ has a more explanatory power for mutual fund returns in China; (iii) the Alpha under the five-factor model (CH-5) developed in this work has a significant predictive effect for the cross-sectional returns of China's mutual funds.

Key words: Buffett's industry preference in investments; five-factor model (CH-5); China's mutual funds

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Glossary

China Stock Market & Accounting Research (CSMAR):

The CSMAR database mainly serves academic research purposes. It is a refined database in the fields of economics and finance that was developed by referring to the professional standards of renowned databases, such as the Center for Research in Security Prices (CRSP) database, Compustat, the Trade and Quote (TAQ) database, and THOMSON, and by taking into consideration the circumstances in China.

CEIC:

The CEIC global economy database contains macroeconomic data of 117 countries. The database on China's economy offers 190,000 pieces of information that are tailored to the Chinese market. The economic database provided by CEIC in mainland China is widely used by security brokers and research institutes.

Wind Information Inc. (WIND):

WIND is the largest and most prominent financial data provider in China and serves 90% of China's financial institutions and 70% of the Qualified Foreign Institutional Investors (QFII)

Wind Overall A-Index:

This index represents market trend conditions provided by China's domestic data provider, WIND. The index displays all A-shares listed on the Shanghai and Shenzhen stock exchanges as sample stocks, weighted by free-float capital.

CAPM:

The Capital Asset Pricing Model was developed by American scholars William Sharpe, John Lintner, Jack Treynor, and Jan Mossin in 1964 based on portfolio theory and capital market theory. It is primarily used to study the expected rate of return and risk of assets in the securities market. The model is the pillar of the modern financial market price theory and is widely used in investment decision-making and corporate finance.

Fama-French Model:

The Fama-French model used in this work refers to the three-factor model proposed by Fama and French in 1993. By regressing the portfolio returns against the three factors market risk premium, small minus big (SMB) and high minus low (HML) and testing the t-value for the residuals, it is possible to discern whether the constructed portfolio can historically provide a significant Alpha, so as to determine whether the factors used to build the portfolio will have stock return predictability.

CH-3:

Based on China's market, Jianan Liu, Robert F. Stambaugh and Yu Yuan constructed a three-factor model that consists of MKT (market), SMB, and VMG (value minus growth). The model eliminates the "shell companies" with a market capitalization (market cap) within the bottom 30% of all market caps to construct the size factor SMB and uses earnings-to-price (EP) to replace book-to-market (BM) to construct the value factor VMG. Compared to the three-factor Fama-French model, the CH-3 model has a more explanatory power in interpreting the rates of return of A-shares in China's stock market.

Fama–MacBeth

The Fama–MacBeth regression is a method used to estimate parameters for asset pricing models such as the capital asset pricing model. The method estimates the betas and risk premia for any risk factors that are expected to determine asset prices.

t-test:

A common method of inferential testing for statistical significance. This work indicates t-test significance in the tables as follows:

(*) represents t-test significant at a confidence level of 90%;

(**) represents t-test significant at a confidence level of 95%; and

(***) represents t-test significant at a confidence level of 99%.

Abbreviations

CAPM	Capital asset pricing model
EMH	Efficient markets hypothesis
FAER	Factor-adjusted expected returns
FRR	Factor-related return
FOF	Fund of fund
QARP	Quality at the right price
QMJ	Quality minus junk
BAB	Betting against beta
SMB	Small minus big
HML	High minus low
UMD	Up minus down
MKT	Market
VMG	Value minus growth
fundret	Fund return
ln_fundsize	Unit net value of a fund multiplied by the number of shares of the fund, then taken as the natural logarithm
ret_L1	Fund's rate of return in the previous month
fee_pershare	Fund management fee divided by the number of shares of the fund
fundage	Total number of months between the establishment of the fund and the current month divided by 12
past_std	$\sqrt{52}$ multiplied by the standard deviation of the fund's rates of return during the past 52 weeks
Buffettlike	$t(BAB) + t(QMJ) - \lvert t(Alpha) \rvert$
Buffettlike2	$(\beta_{BAB} + \beta_{QMJ} - \lvert\alpha\rvert) \times 1_{(t_{BAB}>1.5, t_{QMJ}>1.5, t_a>0)}$

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Buffett's Alpha: An Empirical Study of Mutual Funds in China

1. Introduction

Forecasting and pricing have always been a challenge in asset management.

Between 1965 and the end of 2021, Berkshire Hathaway share price experienced an annualized compound growth of 20.1%, while the S&P 500 index had a growth rate of 10.5% in the same period. Between 1964 and 2021, the market capitalization (market cap) of Berkshire Hathaway realized astounding growth (36,416×), while that indicator for the S&P 500 index during the same period was (302×). The growth rate recorded by Berkshire Hathaway is 120 times that of the S&P 500 index. At the beginning of January 2022, the total market cap of Berkshire Hathaway exceeded $700 billion, ranking among the top listed companies in the United States (US).

With regard to forecasting and pricing in investing, Buffett has been influenced by the Kelly criterion - he estimates the probability and the odds first, and then determines the proportions of investments. At the shareholders' conference in 1989, he made the following statement:

Take the probability of loss times the amount of possible loss from the probability of gain times the amount of possible gain. That is what we're trying to do. It's imperfect, but that's what it's all about.

Within his "circle of competence," to address the issue of probability, Buffett invests in industries and companies with which he is familiar. The forecasting of the amount of possible gain or loss, namely, the odds, is a matter of valuation, and Buffett employs the discounted cash flow (DCF) model in valuations.

As standard academic factors such as MKT (market), SMB, HML and UMD (up minus down) cannot fully explain Buffett's Alpha, the success of Buffett's active investments has become an anomaly in the efficient market. Berrada and Hugonnier (2013) pointed out that despite the textbook asset pricing theory, which holds that only when investors bear the aggregate risk will they be rewarded with excess returns, numerous recent empirical studies have identified a relationship between stock returns and idiosyncratic volatility. Frazzini and Pederson (2013) proposed the BAB (betting against beta) factor, i.e., buying low-Beta assets and shorting high-Beta assets will generate relatively high risk-adjusted returns. Asness,

Frazzini and Pedersen (2018) proposed the QMJ (quality minus junk) factor, i.e., to buy high-quality stocks and sell low-quality stocks. Based on a thorough empirical analysis of Berkshire Hathaway's performance between 1976 and 2017, Frazzini, Kabiller and Pedersen (2018) concluded that Buffett's excess returns are not magic but rewards for investing in inexpensive, safe, and high-quality stocks and that Buffett's Alpha can be explained through the exposure of QMJ and BAB as well as the average leverage ratio of 1.7:1. Buffett's Berkshire Hathaway achieved a Sharpe ratio of 0.76, the highest among all stocks and mutual funds with at least a 40-year history.

QMJ and BAB are important factors in Buffett's investment style and major drivers of his investment returns. This work proposes that Buffett's industry preference is also a major characteristic of his investment style and a guarantee for Buffett's Alpha to persist across time. This work collects and arranges the statistical data for the major common stocks that Buffett invested in between 1976 and 2020 according to the Global Industry Classification Standard (GICS) and conducts quantitative analyses to identify the significant characteristics of the industries in which Buffett invested, thereby revealing his industry preference in making investments. The research finds that Buffett prefers investing in consumption-oriented industries that are closely related to living and financial service industries. The high-quality companies in these industries demonstrate persistence in maintaining profitability, growth, and safety while their Beta is generally lower. Buffett's industry preference has resulted in low turnover rates and a high degree of concentration of investments, which is conducive to reducing transaction costs and increasing leverage through deferred income taxes on capital gains, thereby improving Alpha, i.e., the excess return.

As two factors with a strong explanatory power for Buffett's excess returns, BAB and QMJ can effectively depict Buffett's style in selecting stocks in the US stock market (Frazzini et al.,2018). As a master in investing with worldwide recognition, Buffett's investment style has had far-reaching influences on a large number of professional investors. This work uses China's A-shares between 2005 and 2020 as the sample and conducts empirical analyses of the weekly rates of return of BAB and QMJ as well as the cumulative data on these factors' annual performances. The findings indicate that BAB and QMJ, which represent Buffett's investment style, have significant returns in China's A-share market. Concurring with Hu et al. (2008), this work proposes that Buffett's investment strategy is well applicable to China's stock market.

Based on China's stock market, Liu et al. (2019) constructed a CH-3 model consisting

of MKT, SMB, and VMG. In this model, "shell companies" in the bottom 30% of market caps were eliminated to construct the size factor SMB, and BM was replaced by EP to construct the value factor VMG. Compared to the three-factor Fama-French model, the CH-3 model has more explanatory power for interpreting stock returns in China's A-share market (Liu et al., 2019). This three-factor model tailored to China's market is more powerful in explaining anomalies in the A-share market and has become a benchmark model in the study of China's stock market. However, a widely recognized factor model for analyzing the large number of mutual funds in China's A-share market has yet to be developed. Both the five-factor Fama-French model (2015) and the four-factor Carhart model (1997) fall short in terms of the explanatory power for interpreting the equity funds and balanced funds that invest in China's stock market.

This work incorporates QMJ and BAB into the three-factor model that was developed for China's market (CH-3, which comprises MKT, SMB, and VMG) to develop a five-factor model (CH-5) that consists of MKT, SMB, VMG, QMJ, and BAB. It then compares, among Model 1 (CH-3), Model 2 (adding QMJ and BAB to MKT), and Model 3 (incorporating QMJ and BAB into CH-3), the explanatory power for interpreting the performance of mutual funds that invest in the A-share market, resulting in the following findings: the average α and average t statistic in all three models demonstrate a declining trend, and a high proportion of BAB and QMJ factors are significant. It can be concluded that the revised CH-5 model is a better fit for China's mutual fund market and has a more explanatory power for interpreting the returns of mutual funds in China; therefore, it is a new, effective factor model for explaining equity and balanced mutual funds in China.

This work attributes the returns of mutual funds in China to two components – Buffettlike stock selection and excess returns. The former is factor-related return (FRR), while the latter is the intercept α of the regression. Empirical studies indicate that excess returns have a significant impact on future rates of return in panel regressions; after control variables are added to Fama–MacBeth regressions, the results are still significant. Further, in group tests, the average rate of return demonstrates a growing trend, and the combinations of buying and shorting have significant positive returns. It can be concluded that the Alpha under the five-factor model (CH-5) developed in this work has a strong capability to predict the cross-sectional returns of mutual funds in China.

Under the five-factor model (CH-5), this work defines the indicator $Buffettlike = t(BAB) + t(QMJ) - |t(Alpha)|$ according to the t-value of fund returns' which can be

decomposed into BAB and QMJ factors to describe the similarity between the mutual funds' investment style and Buffett's style. The Buffettlike value has strong explanatory power for "Buffett-type" 5-year (2016-2020) funds and fund managers. This work also defines $Buffettlike2 = (\beta_{BAB} + \beta_{QMJ} - |\alpha|) \times 1_{(t_{BAB}>1.5, t_{QMJ}>1.5, t_a>0)}$ which account for the level of Beta (exposure) of QMJ and BAB, to indicate top Buffettlike funds' relative performance.Section 2 of this work is a literature review. Section 3 analyzes Buffett's investment style; building on QMJ and BAB, which represent Buffett's academic style, this work proposes that industry preferences in Buffett's investments are also a component of his Alpha. Section 4 discusses the data and research design. Section 5 presents the results of the empirical study. The findings prove that BAB and QMJ generate significant returns in China's A-share market and substantiate the effectiveness of the model that incorporates BAB and QMJ in explaining mutual fund returns in China; the results also confirm that the excess return α under the five-factor model developed in this work has a significant predictive capability for mutual funds' future returns. Section 6 provides Robustness check when considering momentum factor. Section 7 concludes the research.

2. Literature Review

The controversy over whether active investors have the ability to gain returns above index fund returns has always existed, and there always have been doubts about whether mutual fund managers can maintain persistent performance. At the famous 1984 conference at Columbia Business School to celebrate the 50th anniversary of the classic work Security Analysis, by Graham and Dodd, Michael Jensen argued that fund managers do not have the ability to outperform the market and that Buffett is just a lucky winner in a coin-flipping contest. Buffett countered at the conference that it is no coincidence that nine winners in the stock market are all from the same knowledge hub – "Graham-and-Doddsville" (Buffett, 1984).

2.1. Fund Managers' Capability

Sharp (1964), Linter (1965), and Mossin (1966) proposed the classic capital asset pricing model (CAPM). Fama (1964, 1970) put forward the "efficient market hypothesis" (EMH), which holds that under efficient market conditions, the market is frictionless, individuals are rational, and the market mechanism is always efficient; in this market, the asset price completely reflects all information available in the market, and investors cannot gain excess returns – rather, they can only gain more returns by bearing more risk. In reality, however, there are deviations from these theories, and scholars have been trying to find the

cause. Building on the CAPM model that incorporates the market factor MKT, Fama and French introduced a size factor (SMB) and value factor (HML) to propose the three-factor FF-3 model. From the momentum premium perspective, Carhart (1997) added the momentum factor UMD into the three-factor Fama-French model, that is, stock returns will continue with the existing trends. Fama and French (2014) added the profitability factor RMW (robust minus weak) and investment factor CMA (conservative minus aggressive) to the three-factor model to build the FF-5 model.

Regarding the development of the behavioral finance theory, Keynes proposed the “beauty contest” concept, and Buffett’s teacher, Benjamin Graham, proposed the "Mr. Market" idea. With the development of behavioral finance that followed, Kahneman and Tversky (1979, 2000) proposed the prospect theory, which introduces psychology research into economics and examines irrational psychological factors that influence behavioral choices from the perspectives of people’s psychological attributes and behavioral characteristics; this theory holds that investors usually do not consider issues from the wealth perspective – rather, they consider an issue from the gain or loss perspective and care about the amount gained or lost. Richard Thaler (1980) first proposed the endowment effect, which holds that in decision-making, people value “gains and losses” differently and that “loss aversion” far outweighs “gain seeking” in their consideration. Robert J. Shiller (2014) argued that there has been wide acceptance that the market is substantially driven by psychological factors and that the proof of market efficiency, which is built on diligent data analysis and appears impressive, is not invincible. Behavioral finance argues that the market is not completely efficient and that investors can gain excess returns through errors in pricing in the market.

Berrada (2008) also pointed out that in model building, economists traditionally assume participants in the financial market as rational entities who make investment and consumption decisions with an aim of maximizing their own goals. However, the rational expectation assumption is inconsistent with the behavioral theory; in psychology literature, the rational construct based on the view of optimal data use has been seriously questioned, and many deviations and idiosyncrasies at different levels of decision-making processes have been documented.

In terms of the explanatory power of factors and firms’ characteristics, Brennan, Chordia and Subrahmanyam (1998) found that firms’ characteristics such as the BM ratio, market cap, and historical return have significant predictive capabilities for risk-adjusted

returns; furthermore, regardless of whether a principal component-based factor model (Connor and Korajczyk, 1988) or a firm characteristic-based factor model (Fama and French, 1993) is used to adjust returns, firms' characteristics have significant explanatory power for risk-adjusted returns, indicating that it is unlikely that the explanatory power is due to the fact that firms' characteristics reflect loadings on systemic risk factors. Novy-Marx (2013) argued that using net profits to measure firms' profitability will underestimate the profitability of firms with high R&D and advertising expenses; further, the net profit at the bottom of the income statement is more likely to be manipulated, and therefore, the gross profit further up the income statement can more reasonably measure a firm's profitability; the author also found that firms with higher gross profits have significantly higher excess returns than those with lower gross profits and that this excess return cannot be explained by the CAPM and three-factor Fama-French model or other models. In the cross-sectional regression of individual stocks' returns, Chordia, Goyal, and Shanken (2015) included both firm characteristics and risk factor loadings as explanatory variables; the research found that all firm characteristics are significant and that their signs are consistent with expectations, while the regression coefficients of factor loadings are essentially not significant.

In terms of the characteristics of factors of Buffett's investment style, Frazzini and Pederson (2013) proposed the BAB factor; namely, buying low-Beta assets and shorting high-Beta assets will generate relatively high risk-adjusted returns. The difference in returns between high-quality and low-quality firms (QMJ) is also considered an important factor in pricing (Asness, Frazzini, and Pedersen, 2018).

In terms of fund returns and managers' capability, Song (2020) argued that based on the factor model, expected fund returns can be decomposed into two components: factor-adjusted expected returns and FRRs. Muller (2020) proposed that fund managers can choose among a true active strategy a, a factor strategy, and the market portfolio (indexing).

2.2. Persistence in Fund Performance

Is there persistence in mutual funds' performance? If the answer is yes, what are the factors that maintain the persistence? To answer these two questions, scholars across countries have conducted studies on the persistence of mutual funds' performance. In the research, they collect data on a specific type of fund in the hope of finding some common characteristics of performance persistence via big data mining.

In the US market, Jensen (1968) conducted a rank correlation test for the performance

of 115 funds between 1945 and 1964, and the results indicate that persistence in fund performance does not exist in the long run. Using 157 mutual funds in the US between 1975 and 1984 as a sample, Grinblatt and Titman (1992) regressed the excess returns for the early years of the sample period against excess returns for the later years of the period and found that funds' performance only showed persistence during certain time periods. Goetzmann and Ibbotson (1990) divided funds into winners and losers to observe the difference in their performance during the next period and found that 62% of winners continued to be winners while 63% of losers were still losers, thereby concluding that certain funds followed the laws of investing and their performance persisted. Brown and Goetzmann (1995) further converted the winner-loser approach to contingency tables and proposed using the cross-product ratio method to test performance persistence; based on an empirical study of the performance of 839 funds during the 1976-1988 period, they found that there was one-year performance persistence during approximately half of the years studied and persistence continued to decline year-over-year. Daniel, Grinblatt, Titman and Wermers (1997) found that the majority of excess returns of mutual funds in the US is driven by the characteristics of the stocks in which the funds invest and that the average return of stocks held by mutual funds that adopt the value investing strategy is higher than that for passive stock indices.

Closed-end funds and active open-end funds in China do not have significant positive Alpha returns. Xiao (2005) employed the performance dichotomy method and regression coefficient method to test absolute returns and risk-adjusted returns and could hardly find any evidence of persistence; rather, there was a reverse in the short term. Fang et al. (2017) studied the Jensen α indicator of open-end equity funds and star funds that invest heavily in stocks and found that star funds do indeed generate short-term excess returns but that the returns' long-term persistence is weak. Based on data on China's mutual funds between 2012 and 2013, Yang and Liu (2017) employed the bootstrap method and four-factor model to estimate the Alpha of China's mutual funds and found that China's mutual funds generally do not have positive Alpha returns, that is, funds cannot outperform the market. Jun Gao (2019) used weekly data on China's open-end mutual funds between 2002 and 2014 and employed the conditional and unconditional model to perform tests; the research found that China's open-end mutual funds do not have significant stock selection ability, nor do they have a significant ability to determine the investment timing in the market.

2.3. Buffett's Alpha in China

Hu and Gu (2018) tested the efficacy of Buffett's value investing strategy in China's

stock market, and the comprehensive indicators they developed from the dimensions of safety, convenience, and quality have strong predictive ability for future returns of China's A-share stocks. Li and Feng (2019) studied the role that the factor firm quality plays in pricing in China's A-share market, and the empirical tests indicated that high-quality A-share stocks have higher risk-adjusted returns. Wang (2019) found that the three factors quality, value, and risk a have strong ability in selecting stocks and that investing based on fundamental analysis, which in turn is based on the value investing strategy, is effective in China.

2.4. Contributions of This Work

In Common Sense on Mutual Funds, John Bogle pointed out that mutual fund performance should be evaluated from four dimensions – return, risk, time, and cost. Frazzini et al. (2018) explained Buffett's Alpha from the perspective of the "Sharpe ratio" of risk-adjusted returns.

Using empirical data, Asness et al. (2018) demonstrated that quality is a persistent characteristic and that, conditional on survival, high-quality firms today will still be high-quality firms 5-10 years down the road. In both US market and other countries' market, and in the long run, profitability is the most persistent while growth and safety are the least. When constructing the QMJ factor, the issue of persistence of quality growth and safety was addressed. Then, how can the persistence of Buffett's performance be analyzed? In Buffett's investment style, what other factors can explain the time and cost dimensions of Buffett's Alpha?

Contribution 1: In response to the question raised by Asness et al. (2018), this work further analyzes the persistence of quality across time and proposes that high-quality firms in the industries preferred in Buffett's investments (consumption-oriented industries and financial services industry) have stable profitability, growth, and safety, constituting a strong "moat" that ensures Buffett can hold stocks over a long time to reduce turnover and transaction costs and to use the deferred income taxes on capital gains as free leverage; furthermore, he can concentrate holdings on stocks of high-quality firms to gain returns that exceed the market average. Therefore, like QMJ and BAB in his investment style, industry preference is also an important component in Buffett's Alpha. Analyzing Buffett's Alpha as measured by cost and by Alpha's persistence from the perspective of industry preference in his investment style is the first contribution of this work.

Contribution 2: Frazzini et al. (2018) proved that QMJ and BAB are effective in the US market, and Hu and Gu (2018), Li and Feng (2019), and Wang (2019) empirically analyzed the effectiveness of the value investing strategy based on quality and Beta in China's stock market. The contributions of this work in this regard are as follows. First, this work proves that QMJ and BAB are effective in China's stock market. Second, building on the research by Liu et al. (2019), this study incorporates QMJ and BAB into the three-factor CH-3 model (MKT, SMB, and VMG) tailored for China's market to construct a five-factor (MKT, SMB, VMG, QMJ, and BAB) model, i.e., CH-5; the empirical analysis indicates that this modified CH-5 model is a better fit for the mutual fund market in China and has more explanatory power for China's mutual funds. Third, the Alpha value under the five-factor model (CH-5) developed in this work has significant predictive capability for the cross-sectional returns of China's mutual funds.

Contribution 3: Berkshire Hathaway's performance is a result of Buffett's investments. Research models usually focus on stocks instead of fund managers. However, things tend to be easier said than done – fund managers' mental state and emotions may have a tremendous effect on investment outcomes. This work studies superstar fund managers who managed hybrid and stock mutual funds during the period between January 1, 2016, and December 31, 2020. In this research, the indicator Buffettlike is defined according to the t-value of fund returns that can be explained by BAB and QMJ factors to help identify "Buffett-type" top investors who are capable of integrating theories and investment practices; the research finds that these "Buffett-type" top investors have brought in significant excess returns in comparison with the performance of the CSI 300 Index during the same time period. This work also constructs a new indicator, Buffettlike2, which accounts for the level of Beta (exposure) of QMJ and BAB, and can provide a better indicator of relative performance within the top performance mutual funds.

3. Buffett's Alpha: Investment Style

3.1. Characteristics of QMJ and BAB in Buffett's Investment Style

Traditional factors such as MKT, SMB, HML, and UMD cannot fully explain Buffett's excess returns; therefore, is his success due to luck or capability? This has become a focus in the debate on the "market efficiency" theory.

Frazzini and Pederson (2013) proposed the BAB factor and developed a model with constraints on leverage and margins; their research indicates that investors whose funds are

constrained will hold assets with higher Beta coefficients and risks. As investors continue to buy high-Beta assets, driving up their prices, high-Beta assets are linked with low-Alpha returns, that is, buying low-Beta assets and shorting high-Beta assets will generate relatively high risk-adjusted returns.

In the study of the capital market in the US and 24 other developed markets, Asness, Frazzini and Pedersen (2018) defined stock quality from four aspects, i.e., profitability, growth, safety, and payout, and proposed the QMJ factor. They pointed out that QMJ means buying and selling stocks based on quality characteristics, without considering the stock price, while HML means buying and selling stocks based on the stock price, without considering quality characteristics. The two concepts are integrated into QARP: "Buying high-quality stocks at reasonable prices." This is an improvement to the value investing theory.

Building on QMJ and BAB, Frazzini, Kabiller, and Pedersen (2018) conducted rigorous empirical analyses and concluded that Buffett's Alpha can be explained through QMJ and BAB as well as the leverage ratio of 1.7:1, thereby proving that Buffett's Alpha is a result of his capability, instead of luck.

Frazzini et al. (2018) pointed out that Berkshire Hathaway loads significantly on BAB and QMJ, indicating that Buffett likes to buy safe, high-quality stocks. Controlling for these factors drives the alpha of Berkshire's public stock portfolio down to a statistically insignificant annualized 0.3%. That is, these factors almost completely explain the performance of Buffett's public portfolio. Hence, a significant part of the secret behind Buffett's success is the strategy of buying safe, high-quality, value stocks. Buffett's success indicates that the high returns for these academic factors are not only returns on paper; they can be realized in the real world after transaction costs and financing costs are deducted.

Buffett's value investing theory, which is based on the investment ideas of Benjamin Graham and Philip A. Fisher, consists of five major points: the first is that buying stocks means becoming the owner of a portion of a company's shares; the second is the circle of competence; the third is Mr. Market; the fourth is marginal safety; and the fifth is the moat. This work proposes that the QMJ factor represents the moat, that BAB represents marginal safety; and that the industry preference in Buffett's investment style is sustainability, which represents the QMJ factor - that is, the long-time dimension of "shareholders." This work creatively summarizes Buffett's investment strategy as follows: within the "circle of competence" and in preferred industries that have "moats," Buffett capitalizes on the "Mr.

Market" to invest in high-quality (QMJ), low-Beta (BAB) stocks at prices offering "marginal safety" and as the "shareholder" benefits from the compound-interest effect over a long time period thanks to extremely low turnover rates and a high concentration on stock holding. These factors work together to create Buffett's Alpha.

3.2. Characteristics of Industry Preferences in Buffett's Investment Style

In this section, this work collects the statistical data for main common stocks in which Buffett invested between 1977 and 2020 according to the GICS and performs quantitative and qualitative analyses to identify the prominent characteristics of the industries in which Buffett invested, so as to reveal the characteristics of industry preferences in Buffett's investment style.

Through empirical studies, Frazzini et al. (2018) found that Buffett's Berkshire Hathaway achieved a Sharpe ratio of 0.76. When compared with all stocks and mutual funds, this ratio ranks the 57th among all stocks with at least a 10-year history, and 11th among all funds with at least a 10-year history; it ranks second among all stocks with at least a 30-year history and 3rd among all funds with at least a 30-year history; and it ranks first among all stocks and mutual funds with at least a 40-year history. The longer is the holding time, the higher is the Sharpe ratio for Berkshire Hathaway, indicating that Buffett's investment capability has excessively long-term persistence.

In **Figure 1**, the performance of Buffett and other top investors is compared with the S&P 500 Index. Buffett's Alpha does not rank first based on a 10-year horizon; rather, it ranks first in the long term.

As such, this work suggests that Buffett's Alpha has clear time characteristics. What factors have driven the persistence of Buffett's investment capability across time? The research finds that Berkshire Hathaway prefers to invest in leading companies in the following GICS sectors: consumer staples, consumer discretionary, financials, and information technology. The high-quality firms in these industries can transcend business cycles and maintain advantages in terms of sales, profits, competitive edge, and combating inflation.

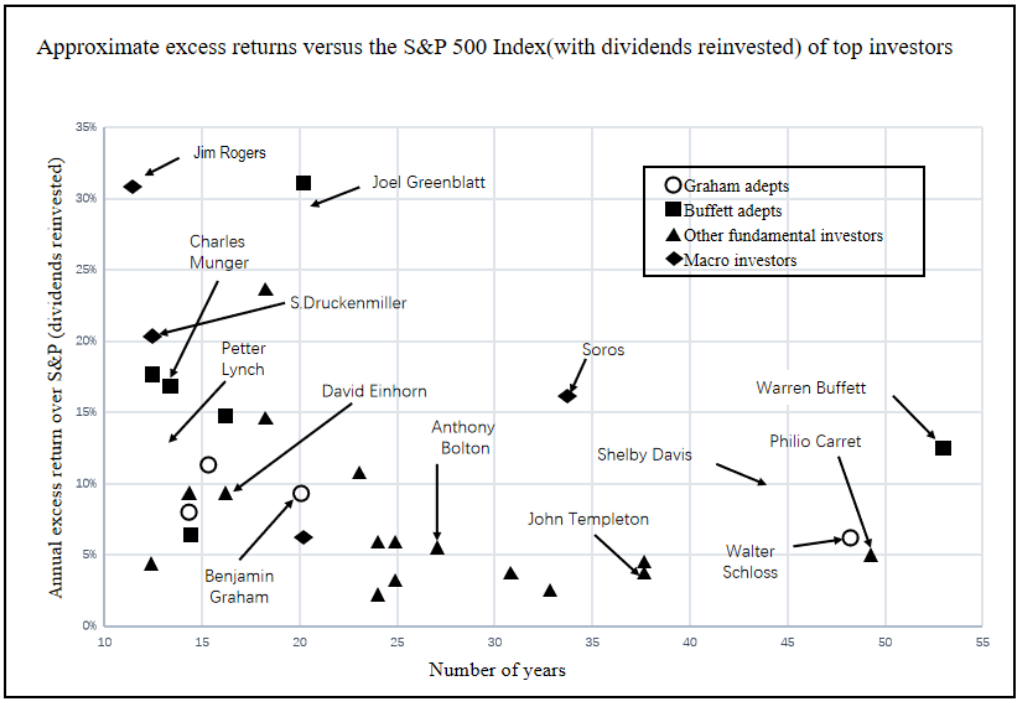

Figure 1 *Approximate Excess Return versus the S&P 500 with Dividend Reinvestment by Top Investors (Sources: Excess Returns: A Comparative Study of the Methods of the World's Greatest Investors)*

3.2.1. Buffett Prefers Consumption-Oriented Industries in Investing

In this work, the data on common US stocks held by Berkshire Hathaway are sorted and tabulated according to company name and main operations following the rules of the GICS level 1 industry classification for each year to analyze the industry characteristics in Buffett's investments. The annual reports released by Berkshire Hathaway between 1977 and 2000 disclose the top 10 or top 15 stocks held by the company. Data on US stocks held by Berkshire Hathaway between 2001 and 2020 were obtained from the website of the US Securities and Exchange Commission (SEC).

Figure 2 indicates that during the 24 years from 1977 to 2000, Berkshire Hathaway mainly invested in the financials, consumer staples, and consumer discretionary sectors; other sectors accounted for a relatively small portion. **Figure 3** presents the average proportion that common stock holdings in each sector by Berkshire Hathaway accounted for in the company's total holdings between 2001 and 2000; the proportions are as follows: financials, 40.37%; consumer staples, 33.18%; consumer discretionary, 11.02%; information technology, 5.36%; health care, 2.06%; industrials, 3.63%; energy, 2.88%; communication services, 1.02%; materials, 0.08%; real estate, 0.36%; and utilities, 0.05%. Therefore, Buffett prefers four major sectors in investing: financials, consumer staples, consumer discretionary, and information technology. In the information technology sector, his focus is heavily investing in Apple Inc., a consumer product company in the information

technology business. During his interview with CNBC in 2020, he said that "obviously, it's a consumer product company that uses technology."

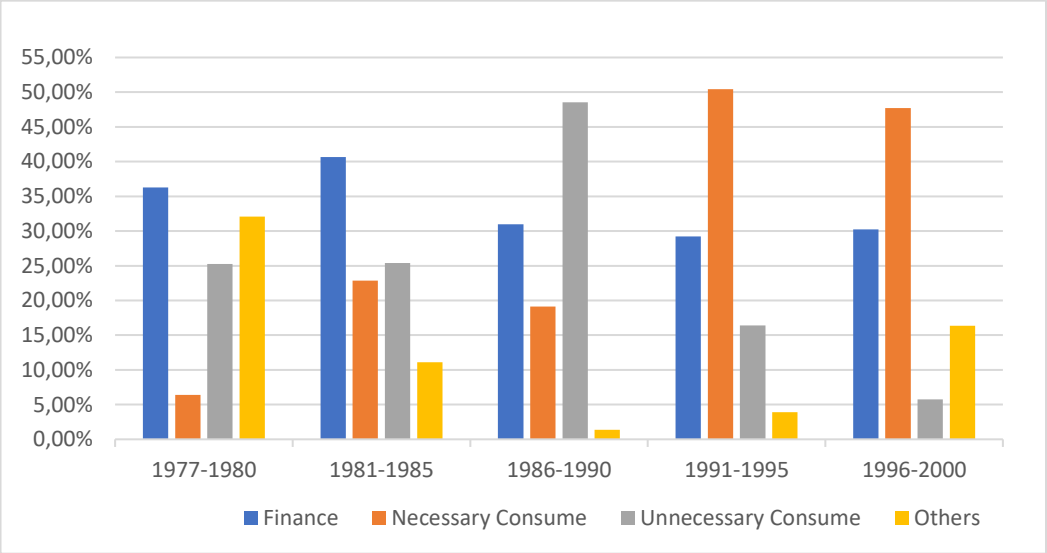

Figure 2 Common Stock Holdings by Berkshire Hathaway in Major Sectors as a Proportion of Total Holdings 1977-2000 (Source:Berkshire Hathaway annual reports)

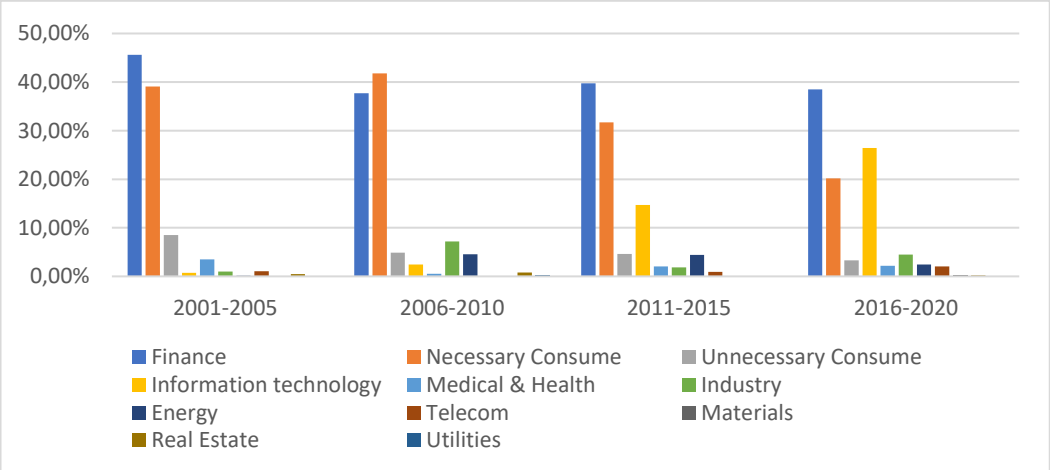

Figure 3 Common Stock Holdings by Berkshire Hathaway in Each Sector as a Proportion of Total Holdings 2001-2020 (Source: US SEC)

Overall, the combined investments in the consumer staples and consumer discretionary staples account for the largest portion among Buffett's total investments, followed by financials. Buffett prefers consumption-oriented industries and financial service industries; the companies in the financial sector that he invested in mainly include banks and payment companies that directly deal with consumers. During recent years, Buffett invested heavily in Apple Inc., a company in the information technology sector that specializes in manufacturing electronic consumer products. An obvious characteristic of Buffett's investment style is that he invests in companies that directly deal with consumers.

3.2.2 Buffett's Investments Are Characterized by Low Turnover Rates

With regard to turnover rates and transaction costs, Fisher (1994) argued that the equity premium should comprise two essentially different components: compensation for the risk and compensation for transaction costs. He proposed that the risk is not the only element of the expected rate of return; rather, the turnover rate and transaction costs are also related to the return. Morningstar Inc. (1997), a research institute that specializes in mutual fund studies, found that during a 10-year period, mutual funds with a turnover rate below 20% have a return that is 14% higher than that of funds with a turnover rate above 100%.

Frazzine, Asseness, Pederson(2018) proposed that Berkshire Hathaway has two low-cost, risk-free sources of financial leverage. The first is deferred income taxes, and the other is insurance float. In 2010, the deferred income tax liability on Berkshire Hathaway's financial statements was $36.4 billion, accounting for approximately 10% of the company's total assets, or 22% of its net assets. As of September 30, 2021, the total deferred income tax liability was $82.248 billion, accounting for 8.9% of the company's total assets or 17% of the net assets.

Of the 15 top stocks held by Berkshire Hathaway, as disclosed in its 2020 annual report, 10 stocks have been held for over 5 years, and they account for over 80% of the common stocks held by Berkshire Hathaway. The low turnover strategy not only reduces transaction costs but also enables the free use of leverage as a result of deferred income taxes; therefore, it creates a significant compound-interest effect (**Appendix Table 1**).

3.2.3 Buffett's Investments Are Characterized by a High Degree of Concentration

Figure 4 indicates that the top 10 stocks held by Buffett have been highly concentrated since 1977. As of the end of 2020, the top 10 BRK common stocks accounted for approximately 85% of the total holdings, and the 10^{th}-20^{th} stocks accounted for 9.5%. Combined, the top 20 stocks accounted for nearly 95% of the total holdings. Within the circle of competence, Berkshire Hathaway can precisely appraise the intrinsic value of the companies in which it invests and concentrate funds on these high-quality firms that outperform the market average; this strategy and the leverage ratio of 1.7:1 constitute important sources of Buffett's Alpha. For investors like Buffett who focus on long-term investments, concentration does not mean risk; instead, investing outside of the circle of competence is a risk. Rather than scattering funds into companies that are not within an investor's circle of competence, it is more advisable to concentrate funds in companies with

which the investor is familiar.

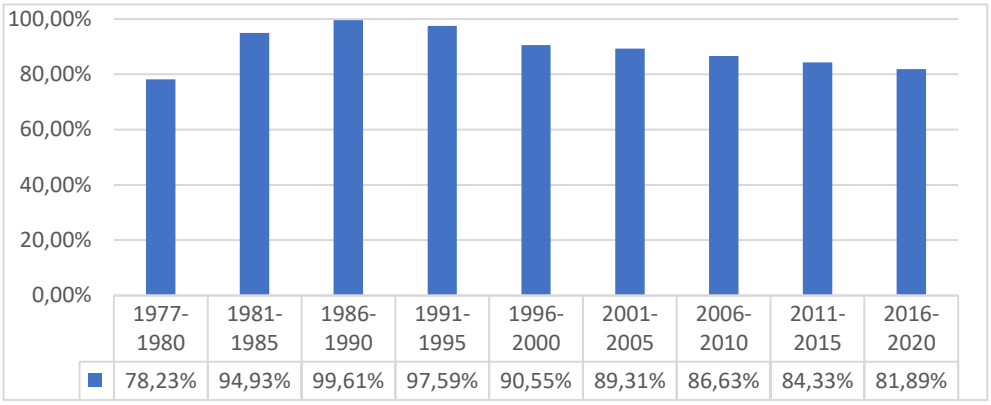

Figure 4 Top 10 Stocks as a Proportion of Total Holdings by Berkshire Hathaway 1977-2020 (Source: Berkshire Hathaway Annual Reports)

Analyzing the industry preference in Buffett's investments is one of the effective approaches to studying the long-term stability in Berkshire Hathaway's performance. The stability in the growth, profitability, and safety of companies in which Buffett invests is the foundation that ensures Berkshire Hathaway's compound returns, i.e., "snowballing." The characteristics of the industries in which Buffett invests explain the predictability of the quality factor QMJ, and the questions raised by Asness (2018) – "growth and safety are the least persistent" and "conditional on survival" – are answered. The castle is built (investing in high-quality companies) on solid ground (industries favored by Buffett such as the consumption-oriented industries). It is highly likely that the survival and safety, profitability, and growth of the companies in the preferred industries in Buffett's investments will not be affected within 5-10 years. The performance of companies with a "moat" has a higher degree of predictability.

The following findings are based on the above discussions. First, Buffett prefers investing in top companies in the consumer staples, consumer discretionary, financials, and information technology sectors. The preferred industries are all directly related to consumption, and this characteristic guarantees the persistence of high-quality companies' profitability, growth, and safety. Second, Buffett's industry preference enables him to invest in companies within his circle of competence that outperform the market average, thereby gaining excess returns. Third, Buffett's industry preferences in investments ensures that Berkshire Hathaway has low turnover rates, which not only reduces transaction costs but also provides large amounts of deferred income taxes that can be used as leverage.

This work makes the following propositions: QMJ and BAB in Buffett's investment style and a leverage ratio of 1.7:1 explain Buffett's Alpha returns, risks, and risk-adjusted

returns; the characteristics of industry preferences in Buffett's investment style explains the time and costs that drive long-term excess returns and therefore are an important component of Buffett's Alpha.

4. Data and Research Design

This section discusses the sources of data used in the research and the methods to construct the factors as well as determine their performance; the research also proposes two hypotheses and describes the methods for testing them.

4.1. Data Sources

The data used in the research is mainly from the CSMAR database, including the trading data of individual A-share stocks, financial statements of listed companies, and performance of mutual funds. The trading data of individual stocks between January 2005 and December 2020 and all the original data in the listed companies' financial statements in semiannual reports between 1998 and 2020 are used for constructing the weekly factors.

Mutual funds are the core subject of the study in this work. Given the significant variance in the type, investment target, and investment scope among mutual funds, the research only retains equity funds and balanced funds; further, ETFs, QDII funds, and index funds are excluded. As a result, the dataset only contains actively managed funds that mainly aim at investing in A-share stocks. The full sample period spans from January 2005 to December 2020, and funds with a total trading time less than 52 weeks are eliminated. As a result, a sample of 3,228 funds is obtained. A fund's weekly return is calculated by dividing the cumulative net value on the last trading day of the week by the cumulative net value on the last trading day of the previous week, then subtracting 1 from the quotient.

In addition, the monthly consumer price index (CPI) data used for constructing the QMJ factor is from the CEIC economic database; risk-free return rates are based on the one-year bank deposit interest rates in the CSMAR database; and the Wind All-A Index in the Wind database is used as the total market index.

4.2. Factor Construction

The factors used in this work include three factors that are aimed at China's market as well as BAB and QMJ. Given the unique type of "shell resource" formulated in China's stock market in the past, firms that are in the bottom 30% of market caps are eliminated to construct the size factor SMB and value factor VMG; these two factors have more

explanatory power for stock returns than does the three-factor Fama-French model (Liu et al., 2019). In constructing the three factors for China's market, the research only retains the A-share stocks in the Shanghai and Shenzhen stock exchanges as well as stocks in the Second-board Market; B-share stocks and stocks in the STAR Market are excluded. Furthermore, stocks with less than 120 valid trading days during the past 12 months and stocks with less than 15 valid trading days during the past month are excluded (if statuary holidays have resulted in less than 15 valid trading days in a month, then stocks with valid trading days less than 70% of all trading days are excluded). Stocks with an initial public offering date within a half year of this study are also excluded. These criteria for selecting stocks also apply to the construction of the BAB and QMJ factors.

The three factors for China's market are calculated as follows. MKT is the capitalization-weighted average of the rates of return of all stocks, excluding those with a market cap within the bottom 30% of all market caps, minus risk-free rate. The construction of the SMB and VMG factors is consistent with the method adopted by Fama-French (1993): the 70% of stocks that are retained are sorted into a small capitalization group S and a large capitalization group B based on the median of the market cap; using the reciprocal of the price-to-earnings ratio (earnings-to-price, EP), the top 30% of stocks are placed in value group V, the bottom 30% are placed in growth group G, and the 40% stocks in the middle are placed in group M. Building on this, the research constructs six value-weighted investment portfolios: S/V, S/M, S/G, B/V, B/M, and B/G. Factors SMB and VMG are defined as follows:

$$SMB = \frac{1}{3}(S/V + S/M + S/G) - \frac{1}{3}(B/V + B/M + B/G)$$

$$VMG = \frac{1}{2}(S/V + B/V) - \frac{1}{2}(S/G + B/G)$$

The construction of the BAB factor reflects the rate of return of the investment portfolio in which low-β assets are purchased while high-β assets are shorted (Frazzini and Pedersen, 2014). The β value of the time series is calculated as follows:

$$\hat{\beta}_i^{ts} = \hat{\rho}\frac{\hat{\sigma}_i}{\hat{\sigma}_m}$$

where $\hat{\sigma}_i$ and $\hat{\sigma}_m$ denote the standard deviation of the logarithmic return of stock i and the market index over the past 52 weeks, respectively; and $\hat{\rho}$ is the correlation coefficient

between stock i and the market index's three-day lag return $r_{i,t}^{3d} = \sum_{k=0}^{2} \ln(1 + r_{t+k}^{i})$ in the past 260 weeks (approximately 5 years). Adjust the β value of the time series, and let ω = 0.6, $\hat{\beta}^{xs} = 1$:

$$\hat{\beta}_i = \omega_i \hat{\beta}_i^{ts} + (1 - \omega_i)\hat{\beta}^{xs}$$

Let element z_i of vector $z_{n\times 1}$ denote the ranking of stocks based on the β-value, let vector $\bar{z} = 1_n' z/n$ denote the average ranking, and let n denote the number of stocks that are ranked each week. The weight of the portfolio is

$$w_H = k(z - \bar{z})^+$$

$$w_L = k(z - \bar{z})^-$$

where $k = 2/1_n'|z - \bar{z}|$, and x^+ and x^- denote positive or negative elements in vector x. The BAB factor is constructed as follows:

$$r_{t+1}^{BAB} = \frac{1}{\beta_t^L}(r_{t+1}^L - r^f) - \frac{1}{\beta_t^H}(r_{t+1}^H - r^f)$$

where $r_{t+1}^L = r_{t+1}' w_L, r_{t+1}^H = r_{t+1}' w_H, \beta_t^L = \beta_t' w_L, \beta_t^H = \beta_t' w_H$

The construction of the QMJ factor is based on the concept of buying "high-quality" assets and shorting "low-quality" assets (Asness et al., 2019). "Quality" is measured from the three dimensions of profitability, growth, and safety. The construction of the indicator is expressed by the following equations, in which Z denotes $Z(x) = Z_x = (r - \mu_r)/\sigma_r$,and μ_r and σ_r denote the mean and standard deviation in the ranking value r in the cross section, respectively.

$$Profitability = Z\left(Z_{gpoa} + Z_{roe} + Z_{roa} + Z_{cfoa} + Z_{gmar}\right)$$

$$Growth = Z\left(Z_{\Delta gpoa} + Z_{\Delta roe} + Z_{\Delta roa} + Z_{\Delta cfoa} + Z_{\Delta gmar}\right)$$

$$Safety = Z(Z_{bab} + Z_{lev} + Z_O + Z_Z + Z_{evol})$$

$$Quality = Z(Profitability + Growth + Safety)$$

The construction of each indicator is consistent with that in the original text. The construction of the QMJ factor is based on conditional grouping. First, the observations in the sample are divided into two groups based on the market cap; then, observations in each

group are divided into three groups based on quality (30%, 40%, and 30%). The QMJ factor is defined as

$$QMJ = 0.5(Small\ Quality + Big\ Quality) - 0.5(Small\ Junk + Big\ Junk)$$

The descriptive statistics of the weekly returns of the five factors are presented in **Table 1**. The average weekly returns of the five factors are all greater than 0; further, except for VMG, the weekly returns of the other factors are all statistically significant, and the absolute value of the correlation coefficient between any two factors is below 0.6.

				Correlations				
Factor	Means	Std.Dev.	t-stat	MKT	SMB	VMG	BAB	QMJ
MKT	0.243	3.611	1.925	1.000				
SMB	0.337	2.127	4.533	0.186	1.000			
VMG	0.085	1.935	1.260	-0.198	-0.586	1.000		
BAB	0.272	0.999	7.781	0.292	-0.041	0.167	1.000	
QMJ	0.125	1.395	2.560	-0.229	-0.550	0.587	0.162	1.000

Table 1 *Descriptive Statistics of the Five Factors Based on the Full Sample*

The performance of the BAB and QMJ factors between 2005 and 2020 is presented in **Table 2**. During most of the years, the weekly returns of BAB and QMJ are greater than 0. Except for 2013, over 50% of the weekly returns of BAB are positive for each of the years. Between 2005 and 2009, the weekly values of the QMJ factor are all positive, and approximately 50% of the values during the other years are positive. In terms of the factors' cumulative returns (**Figure 5**), BAB and QMJ have significant positive returns for more than a decade.

	BAB			QMJ		
year	Means	Std.Dev.	> 0 (%)	Means	Std.Dev.	> 0 (%)
2005	0.118	1.186	72.92	0.242	1.648	100.00
2006	0.600	0.861	52.00	0.239	1.552	100.00
2007	0.803	1.208	50.00	-0.109	2.880	100.00
2008	-0.106	1.103	54.90	0.028	1.533	100.00
2009	0.363	1.057	54.90	0.068	1.107	100.00
2010	0.246	0.745	67.35	0.129	0.815	53.06
2011	0.107	0.676	71.43	0.243	0.880	57.14
2012	0.157	0.761	74.00	0.084	0.963	42.00
2013	0.499	0.610	42.31	0.152	0.820	46.15
2014	0.456	0.901	62.75	-0.197	0.992	50.98
2015	0.151	1.765	64.71	0.005	2.053	50.98
2016	0.123	0.914	52.94	0.124	0.906	56.86
2017	0.222	0.600	64.71	0.304	0.903	49.02
2018	-0.035	0.865	76.92	0.132	1.214	51.92
2019	0.309	0.754	64.15	0.250	1.300	41.51
2020	0.347	1.036	50.00	0.320	1.245	38.46

Table 2 *Weekly Performance of BAB and QMJ 2005-2020*

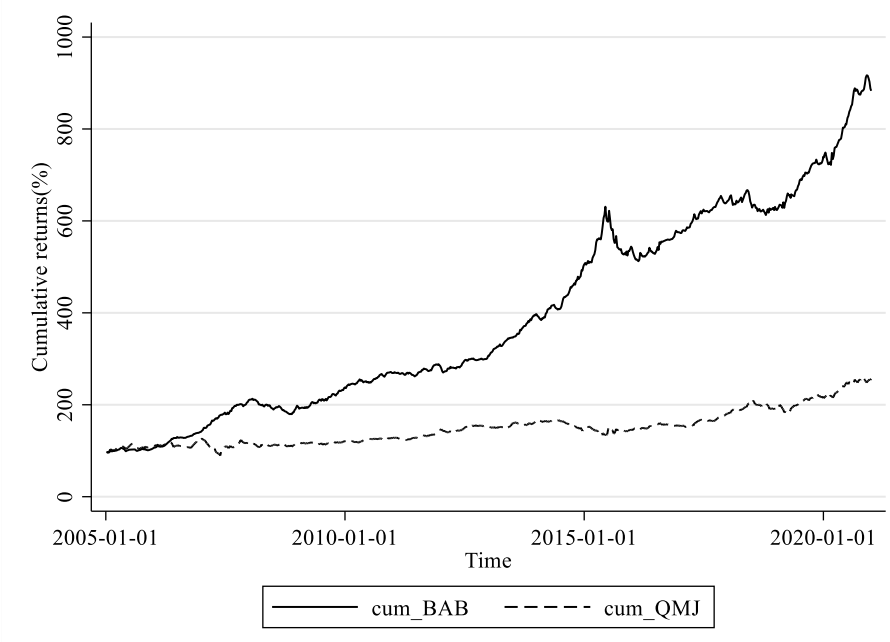

Figure 5 *Cumulative Returns of BAB and QMJ*

4.3. Hypotheses and Empirical Test Methods

The three-factor model developed for China's market shows strong explanatory power for anomalies in the A-share market and has become an important benchmark model for studying China's stock market. However, a widely recognized factor model for analyzing

the large number of mutual funds in China's A-share market has yet to be developed. Both the five-factor Fama-French model (2015) and the four-factor Carhart model (1997) fall short in terms of the explanatory power for interpreting the equity funds and balanced funds that invest in China's stock market.

As two factors with strong explanatory power for Buffett's excess returns, BAB and QMJ can effectively depict Buffett's style in selecting stocks in the US stock market (Frazzini et al., 2018). As a master investor with worldwide recognition, Buffett's investment style has exerted far-reaching influences on a large number of professional investors. As such, this work attempts to incorporate BAB and QMJ into the three-factor model developed for China's market; further, by comparing the explanatory power of models 1-3 presented below, the research attempts to construct a valid factor model and proposes Hypothesis 1.

Model 1:

$$R_{i,t} - R_f = \alpha_i + \beta_{i,1} MKT_t + \beta_{i,2} SMB_t + \beta_{i,3} VMG_t + \varepsilon_{i,t}$$

Model 2:

$$R_{i,t} - R_f = \alpha_i + \beta_{i,1} MKT_t + \beta_{i,2} BAB_t + \beta_{i,3} QMJ_t + \varepsilon_{i,t}$$

Model 3:

$$R_{i,t} - R_f = \alpha_i + \beta_{i,1} MKT_t + \beta_{i,2} SMB_t + \beta_{i,3} VMG_t + \beta_{i,4} BAB_t + \beta_{i,5} QMJ_t + \varepsilon_{i,t}$$

Hypothesis 1: In comparison with the three-factor model for China's market, overall, the model that incorporates BAB and QMJ will have more explanatory power for mutual fund returns.

Hypothesis 1 can be tested by comparing the average result when each of the three models is used to run a regression of the mutual funds' returns. If the average α and its t statistic in models 1-3 all demonstrate a declining trend and a high proportion of BAB and QMJ factors are significant, it can be concluded that the improved model is more applicable to China's market. Building on this, this work proposes Hypothesis 2.

Hypothesis 2: The Alpha in the five-factor model that incorporates BAB and QMJ has significant predictive power for mutual funds' cross-sectional returns.

If Hypothesis 1 is supported, then mutual fund performance can be attributed to two components: Buffettlike stock selection and excess returns. The former is the FRR, while the latter is the intercept α of the regression. Excess returns reflect fund managers' ability to select stocks and determine timing in addition to their stock selection following Buffett's style; therefore, this work argues that this ability has a significant impact on the persistence of fund performance. Hypothesis 2 is tested through panel regression, Fama–MacBeth (1973) regression, and single-variable group testing. If three conditions can be met in the tests - excess returns have a significant impact on future rates of return in the panel regression, the result of the Fama–MacBeth regression is still significant after control variables are added to the model, and the average rate of return demonstrates a growing trend and the combinations of buying and shorting have significant positive returns in group tests - then it can be concluded that Hypothesis 2 is supported.

5. Analysis of Empirical Test Results for the Validity of the Five-Factor Model

This section presents the results of the empirical study. The results confirm the validity of the five-factor model, which incorporates BAB and QMJ, in explaining mutual fund returns in China's market; prove that the excess returns under the five-factor model have strong predictive capability for mutual funds' future returns; and substantiate that the model has strong explanatory power for "Buffett-type" 5-year funds.

5.1. Test of Model Validity

For the equity funds and balanced funds that have more than 52 valid trading weeks, the research applies models 1-3 to run regressions for each fund, tabulate the average of each factor's exposure and its t statistic, and calculate the proportion of the cases in which the absolute value of the t statistic is greater than 2. The results are provided in **Table 3**.

Panel A of **Table 3** presents the results of the regression when the three-factor model for China's market is applied. It can be seen that 48.73% of the funds have significant excess returns under this model and that the average t statistic is 1.925, indicating that this model has large room for improvement in terms of describing the returns of China's mutual funds. The regression results using the market factor and the factors BAB and QMJ are presented in panel B. Under Model 2, the proportion of funds that have significant excess returns decreases to 37.39%, and the average t statistic decreases to 1.554, indicating significant improvement over Model 1. The results in panel C indicate that the five-factor model constructed for explaining mutual fund returns in China further reduces the proportion of

funds that have significant excess returns to 28.59% and reduces the average t statistic to 1.105. As such, Hypothesis 1 is supported, that is, the five-factor model proposed in this work has strong explanatory power for mutual fund returns in China.

Panel A: Model 1 MKT SMB VMG			
	Average Beta	Average t Statistic	Proportion of Funds with |T|>2
MKT	0.557	19.888	98.08%
SMB	-0.122	-1.795	57.93%
VMG	-0.186	-3.093	63.94%
Alpha 1	0.002	1.925	48.73%
Panel B: Model 2 MKT BAB QMJ			
	Average Beta	Average t Statistic	Proportion of Funds with |T|>2
MKT	0.635	18.833	97.61%
BAB	-0.177	-1.325	47.00%
QMJ	0.229	2.776	63.60%
Alpha 2	0.001	1.554	37.39%
Panel C: Model 3 MKT SMB VMG BAB QMJ			
	Average Beta	Average t Statistic	Proportion of Funds with |T|>2
MKT	0.582	17.266	97.46%
SMB	-0.010	0.097	37.45%
VMG	-0.207	-3.378	61.62%
BAB	-0.005	0.120	24.69%
QMJ	0.295	3.383	59.48%
Alpha 3	0.001	1.105	28.59%

Table 3 *Explanatory Power of Models 1-3 for Mutual Fund Returns in China*

5.2. Predictive Capability of Alpha and FRR for Mutual Fund Returns

The excess return α derived under the five-factor model that is proposed for the mutual fund market in this work reflects fund managers' ability to earn excess returns in addition to their stock selection according to Buffett's style; it is highly likely that this reflects the fund managers' ability to select the "safe margin." For a fund, when α is positive and significant, a higher α value indicates that the fund manager has a more ability in selecting the stock and determining the timing. In addition to historical performance, a mutual fund's excess return α is an important factor that investors have to consider when making investment decisions;

the indicator reflects the return to the fund manager in addition to the market risk compensation. Based on the five-factor model discussed above, this work decomposes mutual funds' historical performance (Song, 2020) into the FRR and the excess return α under the five-factor model and tests the two indicators' predictive capability for funds' returns in the future.

In this work, the FRR is defined as the arithmetic mean of the products of the returns of four factors (excluding MKT) and the exposure corresponding to each factor during the past m weeks. In the research, m is assigned a value of 25; this means that at the beginning of each week, a regression is run for the funds' returns during the past 25 weeks and the results are used to predict future returns. The excess return α is also derived using this regression equation. This work only selects the last week in a calendar month and uses the α and FRR values derived using the sample of the previous 25 weeks to predict the returns for the next month. This is because adjustments of funds in each month may be accompanied by fund inflows and major adjustments in holdings and because weekly fund returns are highly related to accidental factors.

$$\Delta_{i,t} = \frac{1}{m} \sum_{\tau=t-m}^{t-1} \left(\hat{\beta}_{2,i,t} SMB_{\tau} + \hat{\beta}_{3,i,t} VMG_{\tau} + \hat{\beta}_{4,i,t} BAB_{\tau} + \hat{\beta}_{5,i,t} QMJ_{\tau} \right)$$

This work employs both panel regression and Fama–MacBeth (1973) regression to test the predictive capability of α and FRR. Five variables are selected to describe the fund size, the rate of return for the previous period, fund management fee, the time length since the establishment of the fund, and return fluctuations. ln_fundsize is defined as the unit net value of the fund multiplied by the number of shares of the fund, then taken as the natural logarithm; ret_L1 is the fund's rate of return during the previous month; fee_pershare is the fund management fee divided by the number of shares of the fund; fundage is defined as the total number of months between the establishment of the fund and the current month divided by 12; and past_std is calculated by multiplying $\sqrt{52}$ by the standard deviation of the fund's rates of return during the past 52 weeks. Definitions for the control variables and their descriptive statistics are provided in **Table 4**. The results indicate that correlations between control variables are low, with the absolute values of the correlation coefficients all less than 0.3.

Variable	Means	Std.Dev.	Correlations				
ln_fundsize	19.886	1.905	1.000				
ret_L1	0.012	0.077	0.014	1.000			
fee_pershare	0.619	82.618	-0.047	-0.001	1.000		
fundage	4.520	3.565	0.271	-0.003	-0.007	1.000	
past_std	0.153	0.372	0.000	0.008	-0.001	-0.044	1.000

Table 4 *Definitions for Control Variables and Descriptive Statistics*

The results of the panel regressions for fund return fundret on the excess return α and FRR during the past 25 weeks are provided in **Table 5**. The results in column (1) indicate that the excess return α in the past has strong predictive capability for future fund returns and that the higher the excess return in the past, the better the future performance will be. Contrary to this finding, the results in column (2) indicate that the FRR is negatively correlated with a fund's future performance. The results in column (3) indicate that when the two indicators are included in the regression simultaneously, the conclusion is the same. These findings indicate that in China's market, the returns of active mutual funds resulting from factor exposure will reverse in the future, while funds with a high excess return α will have better performance in the future.

	(1) fundret	(2) fundret	(3) fundret
alpha_L1	2.376***		1.874***
	(20.09)		(14.98)
FRR_L1		-1.985***	-1.226***
		(-15.76)	(-9.219)
ln_fundsize	0.000502***	0.000379***	0.000482***
	(4.044)	(3.096)	(3.862)
past_std	0.00446***	0.00670***	0.00598***
	(2.965)	(2.808)	(2.817)
ret_L1	-0.0788***	-0.0628***	-0.0746***
	(-5.122)	(-4.232)	(-4.825)
fee_pershare	-7.16e-07**	-2.48e-07	-5.26e-07**
	(-2.061)	(-0.964)	(-2.367)
fundage	2.05e-05	-3.81e-05	1.68e-05
	(0.479)	(-0.869)	(0.390)
Constant	0.00262	0.00691***	0.00396*
	(1.186)	(3.182)	(1.772)
Observations	173,213	173,213	173,213
R-squared	0.013	0.011	0.015

Robust t statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 *Panel Regressions: Predictability of Fund Returns*

To further test the predictive capability of α and FRR on funds' future returns, this work also runs the Fama–MacBeth regression; the fund size ln_fundsize and the fund's return during the previous period ret_L1 are used as benchmark control variables, and the other variables are used as supplemental control variables. For each month, the thesis estimates the ordinary least squares cross-sectional regression, and the regression coefficients are summarized at the end. The results of the regressions for the monthly data between 2006 and 2020 are presented in **Table 6**. All control variables have been winsorized to replace the observations that are above the 99th percentile or below the 1st percentile.

	(1) fundret	(2) fundret	(3) fundret	(4) fundret	(5) fundret
alpha_L1	0.572*		0.513**		0.988***
	(1.667)		(2.040)		(2.908)
FRR_L1		0.0210		0.0474	0.779
		(0.0517)		(0.122)	(1.591)
past_std			0.0327	0.0292	0.0281
			(1.307)	(1.142)	(1.116)
fee_pershare			0.136***	0.138***	0.120**
			(2.741)	(2.604)	(2.215)
fundage			-0.000496*	-0.000491*	-0.000495*
			(-1.705)	(-1.675)	(-1.736)
ln_fundsize	-2.56e-05	3.88e-05	0.000543	0.000551	0.000339
	(-0.0488)	(0.0701)	(1.010)	(1.008)	(0.622)
ret_L1	-0.0402	-0.0444	-0.0842	-0.0770	-0.0919
	(-0.473)	(-0.548)	(-1.043)	(-0.974)	(-1.126)
Constant	0.00814	0.00716	-0.00684	-0.00663	-0.00284
	(0.712)	(0.594)	(-0.684)	(-0.636)	(-0.279)

t statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 *Fama–MacBeth (1973): Predictability of Fund Returns*

Columns (1) and (2) of **Table 6** contain the results when only the benchmark control variables are added to run separate regressions for α and FRR; columns (3) and (4) are the results of separate regressions when the three supplemental control variables are added; and column (5) presents the results when a regression is run for α and FRR at the same time. The results indicate that the excess return α has a strong predictive capability for fund returns in the future and that the conclusion is still robust when multiple control variables are added; by contrast, FRR does not generate a significant result throughout the test.

5.3. Group Tests for Fund Portfolios

The research also performs group tests for α and FRR, and the results are provided in **Table 7**. At the end of month t, based on the regression results for each fund's rates of return during the past 25 weeks using the five-factor model, the corresponding α and FRR are calculated; further, the indicators are divided into five groups based on indicator value, with group 1 having the lowest value and group 5 having the highest. Between the beginning and end of month t+1, the investment long all funds in group 5 with equal weight, and short all funds in group 1 with equal weight; then, the average monthly return between January 2006 and December 2020 is calculated. The results of the Alpha-based grouping indicate that the α-based combination of longing and shorting strategy earns significant positive returns, with an average monthly return of 0.399% and t statistic of 2.17; the result is significant at the 5% level. By contrast, the FRR-based grouping indicates that the FRR-based combinations of purchasing and shorting strategy has a not significant and negative average monthly return. **Figure 6** presents the cumulative returns of the α-based combinations of longing and shorting of funds in 180 months, with the highest cumulative return reaching 93.63%; by contrast, the FRR-based combinations of longing and shorting have a cumulative return of -40.39% during the 180-month period.

	Equal Weight	
	Alpha	FRR
1	1.388	1.704
2	1.405	1.456
3	1.323	1.363
4	1.520	1.411
5	1.786	1.487
5-1	0.399**	-0.217
t-stat	(2.17)	(-0.79)

Table 7 *Group Tests Based on Alpha and FRR*

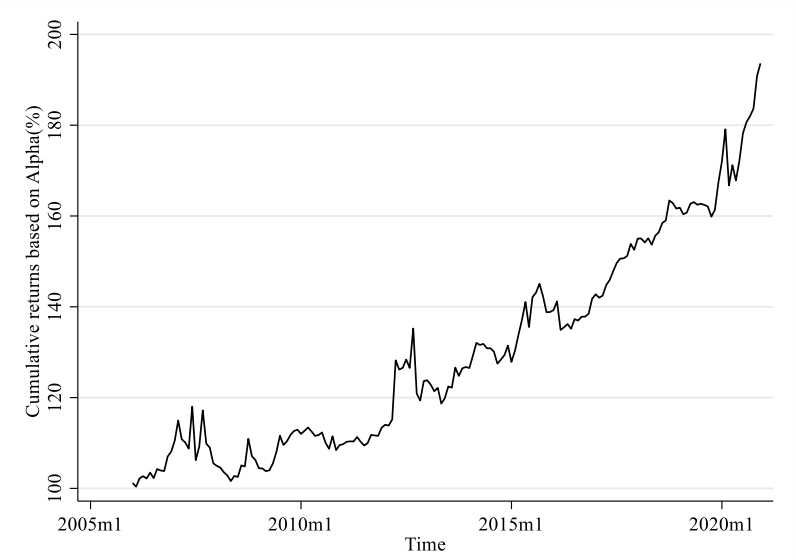

Figure 6 *Cumulative Returns of Alpha-based Combinations of Purchasing and Shorting (10-1)*

5.4. Explanatory Power of the Five-Factor Model for Star Funds

In this section, this work analyzes the extent to which the performance of mutual funds with the highest cumulative returns between January 2016 and December 2020 and the performance of mutual funds and fund managers that have an investment style highly similar to that of Buffett can be explained by the five-factor model proposed in the research.

5.4.1. Predictive Capability for Flagship Funds' Performance

In China's mutual fund market, both individual investors and institutional investors demonstrate a unique preference for certain star fund managers and the "flagship" funds that they manage. For those who invest in these funds, recognition of the star fund managers' performance in the past is the core reason why the funds are chosen. Therefore, this work attempts to further examine how much of the returns of the top funds during the past 5 years can be decomposed into the five-factor model proposed in this work. **Appendix Table 2** in the Appendix lists the top 50 funds in the research sample with the highest cumulative returns between January 2016 and December 2020 and the regression coefficients and t statistics derived by regressing their weekly return with the five-factor model.

As seen in **Appendix Table 2** in the Appendix, "flagship" funds all have a cumulative return greater than 180%, and the highest annualized return is 36.31%. The t-statistic of QMJ factor exposure is greater than 2 for 38 funds' return; furthermore, 29 funds among the 38 funds still have significant returns.

5.4.2. Explanatory Power for the Performance of Buffettlike Funds

Buffett's value investing concept has brought about prominent performance for Berkshire Hathaway, Inc., in the past decades, and his investment style has been studied and emulated by numerous investors. Buffett's excess return can be decomposed into BAB and QMJ, which renders the Alpha of the adjusted return no longer significant (Frazzini et al., 2013). Buffett's investment strategy is well applicable to China's stock market (Hu et al., 2018), and a large number of fund managers are trying to adopt this style to their fund management.

This work defines $Buffettlike = t(BAB) + t(QMJ) - |t(Alpha)|$ and uses this Buffettlike indicator, a t-statistics that test to what extend fund managers' return are exposed to QMJ and BAB factors, to describe the similarity between mutual funds' investment style and Buffett's style. A higher Buffettlike value means the fund's investment style is more similar to Buffett's style. Similarly, **Appendix Table 3** in the Appendix lists the top 50 funds in the research sample with the highest Buffettlike value between January 2016 and December 2020 and the regression coefficients and t statistics derived by regressing their weekly returns with the five-factor model. The results indicate that during the past five years, funds with an investment style that are closest to Buffett's style have an average cumulative return of 132.10%, and the annualized return is 18%, which has a outstandign performance. The culmulative return of CSI 300 is 39.67%, and annulized return is 6.89%. A common characteristic of these Buffettlike funds is that they have a high degree of exposure to QMJ; 38 funds have a t statistic for the QMJ factor that is greater than 2. By contrast, the α statistics for the 50 funds that have the closest investment style to Buffett's do not have a high degree of significance, and the t statistics are all below 2.

This work also attempts to formulate a portfolio of funds (FOF, Fund of Fund) using the Buffettlike indicator: at the beginning of each year, all funds in the market are ranked by Buffettlike value in the previous year, and the funds that have been issued are divided into 10 groups as 10 FOFs; at the end of each year, the groups are adjusted based on their performance in the current year. **Appendix Table 4** in the Appendix presents the performance of these FOFs. The results indicate that the performance of the funds that are more "Buffettlike" is significantly superior to that of the funds that are the least "Buffettlike" and that the combinations of longing and shorting strategy, as measured by 10-1, can also earn positive cumulative returns.

5.4.3. Rank mutual fund according to an alternative measure of Buffettlike investment style

In the previous construct of the measure of Buffetlike investment style, this report do not consider funds' specific exposure to each factor. Therefore, although the overall top-50 fund according to Buffettlike investment style achieve significant cumulative returns, it does not distinguish fund returns within the top performance category and fails to rank them: all funds in the top Buffettlike segment have good performance, but a higher value does not indicate their relative performance. Specifically, the plot funds' cumulative returns and Buffettlike are shown in **Figure 7**, with Buffettlike1 on y-axis, and average performance in x-axis:

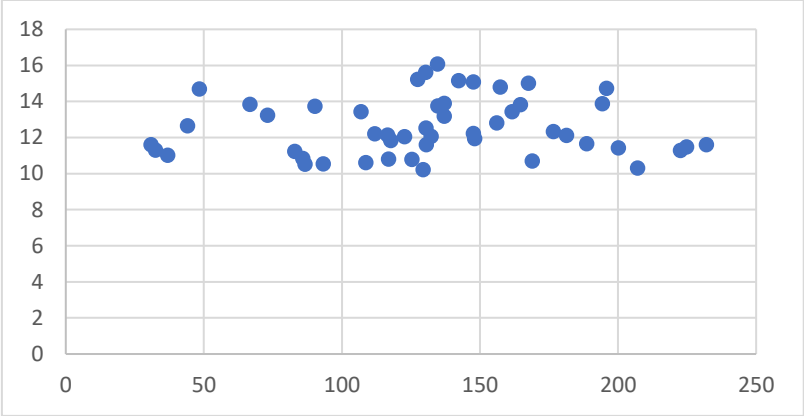

Figure 7 *Culmulative Return and Buffettlike*

This report also uses an alternative way to construct the measure of Buffettlike investment style to indicate relative performance by investigating the level of Beta (exposure). Specifically, Buffettlike2 is constructed as the following:

$$Buffettlike2 = (\beta_{BAB} + \beta_{QMJ} - |\alpha|) \times 1_{(t_{BAB}>1.5, t_{QMJ}>1.5, t_{\alpha}>0)}$$

Where $1_{(t_{BAB}>1.5, t_{QMJ}>1.5, t_{\alpha}>0)}$ is an indicator variable that equals to 1 if the T-stats of both beta related to BAB and QMJ are larger than 1.5, and the T-stat of alpha is larger than zero. The newly constructed measure of Buffettlike investment style considers the significance of the exposure to Buffettlike factors, and thus better indicates funds' relative performance. **Appendix Table 5** reports the newly constructed measure of Buffettlike investment style:

Figure 8 plots fund returns against Buffettlike2, with Buffettlike2 on y-axis, and average performance in x-axis:

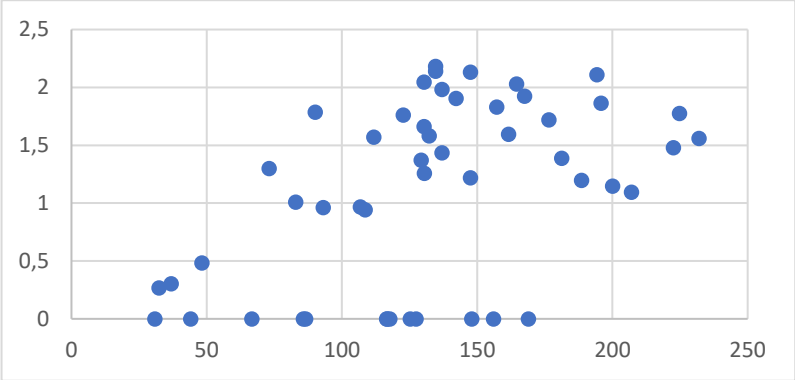

Figure 8 *Culmulative Return and Buffettlike2*

As shown in **Figure 8**, the revised measure of Buffettlike2 provides a better indicator of relative performance within the top performance mutual funds. A higher Buffettlike 2 represents mutual fund's higher return.

6. Robustness Check

While the previous sections provide that excess return α has a strong predictive capability for fund returns in the future, this might be due to the predictive power of excess return when FRR is subtracted; on the other hand, the predictive capacity of excess return might come from momentum effect. To mitigate this concern, this work used Fama-MacBeth (1973) regression to include momentum effect as a robustness check.

	(1)	(2)	(3)	(4)	(5)
	Ret_t	Ret_t	Ret_t	Ret_t	Ret_t
alpha_CH3UBQ	0.545***		0.360**		0.579***
	(2.85)		(2.52)		(2.92)
FRR_CH3UBQ		-0.361		0.062	0.469
		(-0.66)		(0.25)	(1.55)
ln(FundSize)			0.000	0.000	0.000
			(1.05)	(0.99)	(0.88)
pastStd			0.023	0.037	0.020
			(0.77)	(1.41)	(0.70)
LagRet			0.022	0.017	0.014
			(0.93)	(0.75)	(0.62)
FeePerShare			0.087***	0.089**	0.079**
			(2.67)	(2.56)	(2.41)
FundAge			-0.000**	-0.000**	-0.000**
			(-2.20)	(-2.26)	(-2.11)
Constant	0.011*	0.011*	0.002	0.002	0.003
	(1.97)	(1.86)	(0.85)	(0.91)	(0.97)

Table 8 *FMB of mutual fund returns on alpha and factor related returns: the inclusion of momentum*

This work further includes the momentum factor, shown as LagRet, to test the robustness of our findings. To construct the momentum factor, at each month t, stocks are sorted based on returns over month t-12 to t-1 into deciles. The momentum factor is the return spread between the top decile and the bottom decile. This analysis includes the momentum factor in Model 3, in addition to MKT, SMB, VMG, BAB and QMJ, and estimates the corresponding alpha and FRR based on the new model. Then mutual fund returns is regressed on the newly constructed alpha and FRR. **Table 8** report the FMB results. The thesis finds that after the coefficient of alpha remain significant and positive, while the coefficient of FRR remain insignificant. The results show that findings are robust to the inclusion of the momentum factor in the estimation of alpha and factor related returns.

7. Conclusion

Based on the results of the empirical analyses, this work concludes that similar to the QMJ and BAB factors proposed by Frazzini et al. (2018), the characteristics of industry preference in Buffett's investment style are also an important component of Buffett's Alpha. These characteristics help to stabilize the persistence of the QMJ factor proposed by Asness et al. (2018) in safety, growth, and profitability and help to maintain the low transaction costs and high concentration of stock holdings in Buffett's investment style, thereby generating long-term excess returns for Berkshire Hathaway.

Of the fund managers who continuously managed the same equity fund or balanced fund during the five years between January 2016 and December 2020, there are "Buffett-type" top investors who are capable of integrating theories and investment practices; compared to the CSI 300 Index, these investors have earned significant excess returns. In comparison with the Buffettlike indicator, which is constructed based on t-statistics exposure to QMJ and BAB factors, an alternative formulation Buffettlike2, which accounts for the level of Beta (exposure) of QMJ and BAB, provides a better indicator of relative performance within the top performance mutual funds.

The weekly returns and annual performance of the BAB and QMJ factors in China's A-share market during the sample period (2005 – 2020) indicate that these two factors, which represent Buffett's investment style, generate significant returns.

This work proposes that the CH-3 model has substantial room for improvement in describing China's mutual fund returns during the sample period, i.e. (2005 – 2020). When the market factor is integrated with BAB and QMJ, the model improves. When BAB and

QMJ are integrated into the CH-3 model, creating the five-factor model (CH-5) proposed by this work, overall, the model has more explanatory power for mutual fund returns in China. Hypothesis 1 is supported.

This work proposes that the Alpha under the five-factor model (CH-5) has significant predictive capability regarding the cross-sectional returns of China's mutual funds. In this model, the excess return α reflects mutual fund managers' ability to earn excess returns in addition to their stock selection following Buffett's style. The Alpha in addition to the FRR is to a large extent related to fund managers' ability to determine investment timing. Therefore, the selection of safety margins is also important in Buffett's investment approach. The results of the empirical analyses indicate that the excess return α in the past has significant predictive capability regarding funds' future returns; furthermore, the higher is the past excess return, the better the funds' performance will be in the future. Hypothesis 2 is supported.

The QMJ factor has more explanatory power for "flagship" funds than does the BAB factor. For the top 50 "flagship" mutual funds based on five-year cumulative returns between January 2016 and December 2020, QMJ has significant explanatory power for 80% of the funds; however, the explanatory effect of BAB is not significant. This work proposes that the reason why the BAB factor is different from the theoretical model is that shorting in China's A-share market is limited in fund management in practice.

The performance of the 50 funds with the highest Buffettlike values during the five-year period indicates that the funds with an investment style that is most similar to Buffett's style have outstanding performance. A common characteristic of these Buffettlike funds is that they have a higher degree of exposure to the QMJ factor. It can be inferred that because short-selling is restricted in China's A-share market, and this is also the cause of BAB factor having an insignificant effect on "Buffettlike" funds. Therefore, BAB factor does not perform as well as QMJ factor among "Buffettlike" funds.

Of the fund managers who continuously managed the same equity fund or balanced fund during the five years between January 2016 and December 2020, there are "Buffett-like" top investors who are capable of integrating theories and investment practices; compared to the CSI 300 Index, these investors have earned significant excess returns.

Limitations of This Work

This work does not perform a sufficient study on the factor performance of BAB in

operational practices in China's market. This work finds that academically, the BAB factor has validity in China's market but is less valid in the investment practices of the funds and fund managers. The degree to which the limit on shorting in China's market impacts the validity of BAB is worth further study.

With economic growth and changes in people's concepts about investing and money management, China's mutual fund sector has ushered in a period of rapid development. According to data from WIND, as of December 31, 2021, China's total mutual fund investment was 25.57 trillion yuan; this was an increase of 5.51 trillion yuan from 2019, with a year-over-year growth of 27.47%. Of all the funds, the total amount in balanced funds and equity funds was 6.70 trillion yuan. There were 9,175 mutual funds, an increase of 1,706 or 22.84% from the previous year. Of them, 4,971 were balanced funds, and 587 were equity funds. There were 2,758 mutual fund managers in the sector, of whom 190 manage equity funds and 1,164 manage balanced funds. The large number of actively managed funds has made selecting funds as difficult as selecting individual stocks.

Through the study of the industry preferences in Buffett's investment style, this work has improved the understanding of Buffett's Alpha. This work constructs a portfolio of funds (FOFs, fund of funds); the performance of the FOFs that are more "Buffettlike" is significantly superior to that of the FOFs with an investment style that is less like Buffett's style; further, the 10-1 combination of buying and shorting can also earn positive cumulative returns, substantiating that "Buffett-type" funds have higher excess returns. The purpose of this work is to enhance the understanding of value investing by institutional investors, such as insurance companies, asset management companies, and money management branches of banks, as well as by individual investors so that they can make more informed decisions in investing.

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Appendix Tables

Sector	Company	Purchase Time (Year)	Holding Time (Year)	Cost ($million)	Current Value ($million)
Consumer Discretionary	Apple Inc.	2016	5	31,089	120,424
Financials	Bank of America	2011	10	14,631	31,306
Consumer Staples	Coca-Cola	1987	34	1,299	21,936
Financials	American Express	1994	27	1,287	18,331
Communication Services	Verizon Communications	2014	7	8,691	8,620
Financials	Moody's	2000	21	248	7,160
Financials	US Bancorp	2006	15	5,638	6,904
Consumer Discretionary	BYD Company	2008	13	232	5,897
Energy	Chevron Corporation	2020	1	4,024	4,096
Communication Services	Charter Communications	2018	3	904	3,449
Financials	BNY Mellon	2010	11	2,918	2,837
Health Care	AbbVie	2020	1	2,333	2,736
Health Care	Merck & Co	2020	1	2,390	2,347
Industrials	Itochu	2020	1	1,862	2,336
Consumer Discretionary	General Motors	2012	9	1,616	2,206
	Other			29,458	40,585

Appendix Table 1 *2020 Stock Holdings by Berkshire Hathaway*
(Source: Berkshire Hathaway 2020 Annual Report)

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}
1	Harvest Taihe Balanced Fund	Kai Gui	370.51	0.064	0.075	-0.255	-0.222	0.009	1.151
2	E Fund Consumer Sector	Yuanchun Wang	340.60	0.928	7.499	0.449	2.720	0.002	1.700
3	Zhongrong New Economy Flexible Allocation Mixed Fund	Chuangqi Gan	327.14	1.386	2.558	0.655	0.907	0.002	0.486
4	First Seafront National Comparative Advantage Balanced Fund	Yang Qu	297.22	0.495	3.365	0.531	2.709	0.003	2.284
5	China Universal Consumer Industries Balanced Fund	Xinwei Hu	283.92	1.139	11.547	0.033	0.247	0.001	1.650
6	First State Cinda New Energy Industry Equity Fund	Mingyuan Feng	275.95	0.090	0.787	-0.508	-3.338	0.005	5.119
7	Harvest Emerging Industry Equity Fund	Kai Gui	270.14	0.884	9.407	0.357	2.846	0.002	2.012
8	Fullgoal New Power Flexible Allocation Equity Fund	Bo Liu	255.80	0.984	9.602	-0.329	-2.410	0.002	2.475
9	ICBCCS Strategic Reform Theme Equity Fund	Yang Du	252.12	-0.009	-0.095	0.430	3.322	0.003	3.630
10	ICBCCS Culture & Sports Industries Equity Fund	Weisheng Zhang	251.91	0.350	3.763	0.057	0.456	0.003	4.191
11	E Fund New Income Flexible Allocation Balanced Fund	Qinghua Zhang	243.81	0.180	1.818	0.088	0.665	0.004	4.390
12	Fullgoal Low-carbon New Economy Mixed Fund	Dong Yang	243.06	0.120	1.132	-0.072	-0.506	0.004	4.298
13	Harvest Environmental Protection Low-Carbon Equity Fund	Zhipeng Yao	240.80	0.240	1.455	-0.487	-2.213	0.005	3.262
14	Guotai Event-driven Strategy Equity Fund	Xiaocong Lin	234.48	0.707	5.834	-0.154	-0.950	0.002	2.066

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}
15	China Post New Idea Flexible Allocation Balanced Fund	Xiaowen Guo	233.01	0.177	1.720	-0.603	-4.403	0.005	5.067
16	Penghua Seniors Care Sector Equity Fund	Zonghe Wang	231.98	1.206	9.532	0.355	2.105	0.000	0.024
17	China Southern Innovation Economy Balanced Fund	Hui Zhang	229.57	0.911	11.427	-0.166	-1.563	0.002	2.510
18	Great Wall Small & Medium-sized Firm Balanced Fund	Yiguang He	227.52	0.808	8.941	-0.011	-0.093	0.002	2.143
19	China Southern Privilege Balanced Fund	Hui Zhang	226.66	0.880	11.642	-0.183	-1.813	0.002	2.786
20	Huatai-pb Motivational Power Flexible Allocation Balanced Fund	Xuefeng Shen	224.80	0.841	6.643	0.936	5.541	0.001	0.704
21	HuaAn New Silk Road Theme Equity Fund	Zhendong Xie	224.79	0.174	1.970	0.475	4.045	0.003	3.274
22	Abc-ca Industry 4.0 Flexible Allocation Balanced Fund	Yi Zhao	224.14	0.582	3.981	-0.877	-4.495	0.004	2.938
23	Penghua Select Consumer Sector Balanced Fund	Zonghe Wang	222.60	1.183	9.564	0.297	1.803	0.000	0.080
24	Baoying Xin Rui Flexible Allocation Balanced Fund	Xiao Xiao	218.08	0.581	4.272	0.494	2.724	0.002	1.348
25	HSBC Jintrust China Manufacturing Sector Equity Fund	Bin Lu	216.47	-0.135	-0.926	-0.167	-0.857	0.004	3.433
26	HuaAn State-owned Enterprise Reform Theme Flexible Allocation Balanced Fund	Liang Zhang	215.54	0.440	4.353	-0.268	-1.991	0.003	3.234
27	HuaAn Iconology Priority Balanced Fund	Yuan Chen	214.43	0.979	8.588	-0.362	-2.380	0.002	1.705
28	SHDF Ruiyuan Three-year Flexible Allocation Balanced Fund	Dong Han	214.02	0.578	5.560	0.205	1.476	0.002	1.965

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}
29	Dacheng Hi-tech Sector Equity Fund	Xu Liu	212.93	0.780	9.442	-0.018	-0.160	0.001	1.907
30	GTS Yongfeng Youjia Life Equity Fund	Yan Fan	211.50	0.198	2.445	0.032	0.297	0.003	4.379
31	CMF Industry Select Equity Fund	Chengdong Jia	211.09	0.679	5.523	0.133	0.812	0.002	1.449
32	ICBCCS New Financials Equity Fund	Yao Yan	210.70	0.264	3.316	-0.122	-1.143	0.003	3.967
33	First Seafront China Rare Earth Balanced Fund	Yang Qu	209.52	0.016	0.099	0.671	3.081	0.003	2.194
34	CIFM Frontier Tech Flexible Allocation Balanced Fund	Dehui Li	207.78	0.902	9.605	-0.404	-3.227	0.002	2.380
35	CCB Principal Security Strategy Select Equity Fund	Dongjie Wang	207.18	0.784	9.689	-0.133	-1.234	0.002	2.259
36	Yinhua Prosperity Theme Hybrid Fund	Wei Jiao	207.08	0.746	8.848	0.351	3.121	0.001	1.650
37	ICBCCS New Trend Flexible Allocation Balanced Fund	Xiaojie He	204.42	0.045	0.435	-0.099	-0.712	0.004	4.261
38	Guotai Internet+ Equity Fund	Lingzhi Peng	203.19	0.570	4.709	-0.525	-3.247	0.003	2.594
39	Aegon-Industrial Select Balanced Fund	Yu Chen	200.42	0.218	1.931	0.146	0.968	0.003	3.031
40	Great Wall Healthcare Sector Balanced Fund	Weifeng Chen	200.08	0.963	11.252	0.185	1.623	0.001	1.434
41	IGW Rising Star Equity Fund	Jingdong Deng	200.00	0.532	5.110	-0.093	-0.668	0.002	2.386
42	GF Comparative Advantage Flexible Allocation Balanced Fund	Zhou Miao	199.02	1.076	9.419	-0.041	-0.269	0.001	0.769

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}
43	Penghua Extensive Growth Flexible Allocation Balanced Fund	Xuanmiao Chen	197.75	0.881	9.867	0.037	0.308	0.001	1.481
44	CIFM Health Care Sector Equity Fund	Yuhan Fang	195.82	1.341	11.833	0.523	3.456	-0.001	-0.546
45	CMF Healthcare Sector Equity Fund	Jiacun Li	194.33	1.667	12.358	0.443	2.464	-0.001	-0.931
46	Aegon-Industrial Herun Balanced Fund	Zhiyu Xie	193.32	0.735	9.009	-0.092	-0.841	0.001	2.060
47	GF New Economy Balanced Fund	Jingmin Qiu	191.68	0.896	6.948	0.192	1.130	0.001	0.975
48	Fullgoal Culture Sports &Health Equity Fund	Qing Lin	191.14	0.853	10.036	-0.200	-1.763	0.001	1.872
49	Harvest New Consumption Equity Fund	Li Tan	188.56	0.917	9.978	0.280	2.284	0.000	0.592
50	Penghua Environmental Protection Industry Equity Fund	Hao Meng	187.52	0.251	2.460	-0.170	-1.246	0.003	3.329

Appendix Table 2 *Performance of the Top 50 "Flagship" Funds*

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike
1	Harvest Health Care Sector Equity Fund	Miao Hao	134.64	1.567	14.33	0.573	3.93	-0.002	-2.17	16.09
2	Hwabao WP Healthcare & Biology Industry Equity Fund	Jintao Zhang	130.34	1.269	13.92	0.393	3.23	-0.001	-1.53	15.62
3	Dacheng Select Balanced Fund (LOF)	Jun Dai	127.42	0.919	14.65	0.061	0.73	0.000	-0.14	15.23
4	China Universal Health Care Flexible Allocation Balanced Fund	Jiang Liu	142.23	1.428	13.31	0.476	3.32	-0.001	-1.48	15.16
5	ICBCCS Health Care Industry Equity Fund	Donghan Tan	147.55	1.508	12.99	0.622	4.02	-0.002	-1.92	15.09
6	E Fund Health Care Sector Flexible Allocation Balanced Fund	Zhenxiao Yang	167.50	1.519	13.53	0.404	2.70	-0.001	-1.22	15.01
7	Bosera Health Care Sector Equity Fund	Chen Ge	157.25	1.347	12.55	0.483	3.38	-0.001	-1.13	14.80
8	CIFM Health Care Sector Equity Fund	Yuhang Fang	195.82	1.341	11.83	0.523	3.46	-0.001	-0.55	14.74
9	Fullgoal TianHui Growth Hybrid Fund	Shaoxing Zhu	48.28	0.400	14.00	0.085	2.23	0.000	-1.54	14.69
10	CMF Healthcare Sector Equity Fund	Jiacun Li	194.33	1.667	12.36	0.443	2.46	-0.001	-0.93	13.89

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike
11	Penghua Medical Science Equity Fund	Xiaofei Jin	137.00	1.534	12.80	0.446	2.79	-0.002	-1.69	13.90
12	Harvest High-quality Firm Balanced Fund	Tao Hu	66.67	0.776	14.47	0.071	1.00	-0.001	-1.62	13.85
13	Abc-ca Healthcare Theme Equity Fund	Yuan Meng	164.61	1.651	12.78	0.378	2.19	-0.001	-1.14	13.83
14	Rongtong Healthcare Sector Balanced Fund	Xiulei Jiang	90.17	1.315	12.65	0.470	3.39	-0.002	-2.30	13.74
15	Fullgoal Health Care Balanced Fund	Xiaoyue Sun	134.69	1.269	9.96	0.912	5.37	-0.002	-1.58	13.75
16	ICBCCS Seniors Care Sector Equity Fund	Bei Zhao	161.62	1.337	12.42	0.257	1.79	-0.001	-0.77	13.44
17	Penghua Emerging Industries Balanced Fund	Hao Liang	106.88	0.803	11.80	0.166	1.83	0.000	-0.18	13.44
18	Changxin Healthcare Sector Flexible Allocation Balanced Fund (LOF)	Haian Song	73.06	1.078	13.17	0.220	2.02	-0.001	-1.95	13.24
19	China Southern Healthcare Flexible Allocation Balanced Fund	Zhengjiao Wang	137.04	1.000	10.19	0.435	3.32	0.000	-0.31	13.19
20	E Fund New Silk Road Flexible Allocation Balanced Fund	Zongchang Yang	156.05	1.085	13.78	-0.081	-0.77	0.000	0.19	12.82
21	Fullgoal TianCheng Dividend Hybrid Fund	Wu Hou	44.08	0.480	15.08	-0.043	-1.01	0.000	-1.41	12.66

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike
22	Baoying Healthcare Sector Equity Fund	Yi Yao	130.43	1.542	11.15	0.503	2.73	-0.002	-1.34	12.54
23	Zhonghai Medicine & Health Selector Flexible Allocation Balanced Fund	Jingjing Liang	176.58	1.216	9.82	0.503	3.05	-0.001	-0.52	12.34
24	Great Wall Select Brand Balanced Fund	Jianhua Yang	147.55	0.920	9.98	0.300	2.44	0.000	-0.17	12.24
25	ChinaAMC Healthcare Balanced Fund	Zeshi Wang	111.83	1.287	11.68	0.282	1.92	-0.001	-1.38	12.22
26	MSHF Select Flexible Allocation Balanced Fund	Donghang Liao	116.52	0.752	11.50	0.070	0.80	0.000	0.17	12.14
27	GF Consumer Selected Balanced Fund	Chen Li	181.31	0.659	6.81	0.729	5.69	0.000	0.37	12.13
28	Penghua Health Care Equity Fund	Chao Lang	122.70	1.485	11.86	0.274	1.64	-0.002	-1.43	12.06
29	Rongtong Healthcare Sector Flexible Allocation Balanced Fund	Minyuan Wan	132.25	1.246	10.89	0.334	2.19	-0.001	-1.01	12.08
30	GF Rotation Balanced Fund	Xingwu Wu	148.00	1.244	12.54	-0.019	-0.15	0.000	-0.45	11.95
31	CC Principal Consumption Upgrade Balanced Fund	Yuhang Qiu	117.69	0.732	12.05	0.018	0.23	0.000	0.44	11.84
32	Harvest New Consumption Equity Fund	Li Tan	188.56	0.917	9.98	0.280	2.28	0.000	0.59	11.67

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike
33	Manulife Teda Renaissance Business Flexible Allocation Balanced Fund	Hua Wu	130.54	1.017	10.56	0.240	1.87	-0.001	-0.82	11.61
34	BOC China Select Open Flexible Allocation Balanced Fund	Shuai Wang	30.80	0.265	12.09	0.014	0.47	0.000	-0.95	11.61
35	Penghua Seniors Care Sector Equity Fund	Zonghe Wang	231.98	1.206	9.53	0.355	2.10	0.000	0.02	11.61
36	Huatai-pb Motivational Power Flexible Allocation Balanced Fund	Xuefeng Shen	224.80	0.841	6.64	0.936	5.54	0.001	0.70	11.48
37	Great Wall Healthcare Sector Balanced Fund	Weifeng Chen	200.08	0.963	11.25	0.185	1.62	0.001	1.43	11.44
38	ChinaAMC Return Fund-A	Xinxing Ji	32.44	0.216	9.60	0.052	1.73	0.000	0.03	11.30
39	Penghua Select Consumer Sector Balanced Fund	Zonghe Wang	222.60	1.183	9.56	0.297	1.80	0.000	0.08	11.29
40	UBS SDIC Healthcare Sector Flexible Allocation Balanced Fund	Hanshan Xiao	82.89	0.810	10.25	0.199	1.89	-0.001	-0.91	11.24
41	ChinaAMC Return II Fund	Kun Yang	36.88	0.248	9.53	0.055	1.60	0.000	0.09	11.03
42	CICC Consumption Update Equity Fund	Xin Yan	85.78	1.168	14.00	-0.195	-1.75	-0.001	-1.40	10.85
43	Harvest Return Flexible Allocation Balanced Fund	Zhen Chang	125.32	0.715	11.48	0.022	0.26	0.001	0.94	10.80

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike
44	Huatai-pb Consumption Growth Flexible Allocation Balanced Fund	Xiaoxi Li	116.79	1.049	10.39	0.062	0.46	0.000	-0.04	10.81
45	China Southern Select Growth Balanced Fund	Shuai Luo	168.92	0.796	12.10	0.027	0.31	0.001	1.71	10.70
46	Essence Medicine Theme Equity Fund	Yifeng Chen	108.59	0.528	6.76	0.414	3.97	0.000	-0.12	10.62
47	Manulife Teda Efficiency Discovery Balanced Fund (LOF)	Xiao Ning	93.15	0.769	9.56	0.193	1.80	-0.001	-0.81	10.55
48	Fullgoal Study Select Flexible Allocation Balanced Fund	Lili Liu	86.63	0.769	10.74	0.078	0.82	-0.001	-1.04	10.52
49	Yinhua Prosperity Theme Hybrid Fund	Wei Jiao	207.08	0.746	8.85	0.351	3.12	0.001	1.65	10.32
50	Fuanda Healthy Life Flexible Allocation Balanced Fund	Qing Ji	129.34	0.812	6.76	0.561	3.50	0.000	0.03	10.23

Appendix Table 3 *Performance of the Top 50 "Buffett-type" Funds*

Year	BFT1	BFT2	BFT3	BFT4	BFT5	BFT6	BFT7	BFT8	BFT9	BFT10	10-1
2006	69.90%	92.49%	85.25%	100.14%	89.11%	88.69%	105.14%	96.88%	103.93%	89.49%	19.59%
2007	87.97%	75.93%	78.00%	74.80%	65.86%	60.88%	74.94%	72.47%	64.77%	66.79%	-21.18%
2008	-29.88%	-28.20%	-30.12%	-32.83%	-32.37%	-32.69%	-34.31%	-33.78%	-33.50%	-34.58%	-4.70%
2009	37.19%	23.17%	33.44%	38.84%	29.26%	31.53%	40.66%	39.13%	48.26%	49.30%	12.11%
2010	0.68%	0.27%	2.33%	2.52%	2.71%	2.65%	3.92%	3.13%	2.51%	2.99%	2.32%
2011	-15.78%	-16.54%	-17.16%	-17.19%	-14.79%	-14.91%	-16.73%	-15.64%	-17.34%	-17.45%	-1.66%
2012	2.62%	3.19%	2.77%	3.37%	3.21%	3.74%	1.07%	4.18%	5.55%	4.38%	1.76%
2013	-0.69%	8.77%	12.53%	13.55%	9.91%	12.13%	13.24%	13.75%	13.54%	18.99%	19.68%
2014	28.48%	23.84%	22.81%	21.52%	18.94%	18.19%	16.65%	15.36%	14.83%	8.90%	-19.58%
2015	32.66%	32.94%	33.96%	43.10%	34.41%	36.13%	37.04%	38.11%	33.57%	37.48%	4.83%
2016	-2.72%	-3.33%	-3.40%	-8.14%	-12.30%	-12.48%	-11.95%	-10.16%	-10.73%	-10.97%	-8.25%
2017	8.62%	9.33%	7.33%	7.56%	7.77%	10.06%	9.68%	11.37%	11.82%	16.62%	8.00%
2018	-9.41%	-9.60%	-10.54%	-11.94%	-11.93%	-13.59%	-13.51%	-17.71%	-16.62%	-18.18%	-8.77%
2019	19.23%	24.12%	27.54%	30.52%	31.34%	27.90%	34.30%	36.38%	36.98%	40.79%	21.56%
2020	26.49%	31.67%	37.31%	40.43%	44.14%	44.27%	47.10%	46.89%	49.01%	58.27%	31.78%
Cumulative Rate of Return	553.11%	623.25%	705.53%	801.57%	585.83%	574.86%	766.34%	747.64%	776.56%	823.79%	50.65%

Appendix Table 4 *Buffett-type Fund Portfolios*

No.	Fund	Fund Manager	Cumulative Rate of Return %	β_{QMJ}	t_{QMJ}	β_{BAB}	t_{BAB}	α	t_{alpha}	Buffettlike	Buffettlike2
1	Fullgoal Health Care Balanced Fund	Xiaoyue Sun	134.69	1.269	9.96	0.912	5.37	-0.002	-1.58	13.75	2.183
2	Harvest Health Care Sector Equity Fund	Miao Hao	134.64	1.567	14.33	0.573	3.93	-0.002	-2.17	16.09	2.142
3	ICBCCS Health Care Industry Equity Fund	Donghan Tan	147.55	1.508	12.99	0.622	4.02	-0.002	-1.92	15.09	2.132
4	CMF Healthcare Sector Equity Fund	Jiacun Li	194.33	1.667	12.36	0.443	2.46	-0.001	-0.93	13.89	2.111
5	Baoying Healthcare Sector Equity Fund	Yi Yao	130.43	1.542	11.15	0.503	2.73	-0.002	-1.34	12.54	2.047
6	Abc-ca Healthcare Theme Equity Fund	Yuan Meng	164.61	1.651	12.78	0.378	2.19	-0.001	-1.14	13.83	2.03
7	Penghua Medical Science Equity Fund	Xiaofei Jin	137	1.534	12.8	0.446	2.79	-0.002	-1.69	13.9	1.982
8	E Fund Health Care Sector Flexible Allocation Balanced Fund	Zhenxiao Yang	167.5	1.519	13.53	0.404	2.7	-0.001	-1.22	15.01	1.924
9	China Universal Health Care Flexible Allocation Balanced Fund	Jiang Liu	142.23	1.428	13.31	0.476	3.32	-0.001	-1.48	15.16	1.905
10	CIFM Health Care Sector Equity Fund	Yuhang Fang	195.82	1.341	11.83	0.523	3.46	-0.001	-0.55	14.74	1.865
11	Bosera Health Care Sector Equity Fund	Chen Ge	157.25	1.347	12.55	0.483	3.38	-0.001	-1.13	14.8	1.831
12	Rongtong Healthcare Sector Balanced Fund	Xiulei Jiang	90.17	1.315	12.65	0.47	3.39	-0.002	-2.3	13.74	1.787
13	Huatai-pb Motivational Power Flexible Allocation Balanced Fund	Xuefeng Shen	224.8	0.841	6.64	0.936	5.54	0.001	0.7	11.48	1.776
14	Penghua Health Care Equity Fund	Chao Lang	122.7	1.485	11.86	0.274	1.64	-0.002	-1.43	12.06	1.761
15	Zhonghai Medicine & Health Selector Flexible Allocation Balanced Fund	Jingjing Liang	176.58	1.216	9.82	0.503	3.05	-0.001	-0.52	12.34	1.72
16	Hwabao WP Healthcare & Biology Industry Equity Fund	Jintao Zhang	130.34	1.269	13.92	0.393	3.23	-0.001	-1.53	15.62	1.663
17	ICBCCS Seniors Care Sector Equity Fund	Bei Zhao	161.62	1.337	12.42	0.257	1.79	-0.001	-0.77	13.44	1.595

18	Rongtong Healthcare Sector Flexible Allocation Balanced Fund	Minyuan Wan	132.25	1.246	10.89	0.334	2.19	-0.001	-1.01	12.08	1.581
19	ChinaAMC Healthcare Balanced Fund	Zeshi Wang	111.83	1.287	11.68	0.282	1.92	-0.001	-1.38	12.22	1.57
20	Penghua Seniors Care Sector Equity Fund	Zonghe Wang	231.98	1.206	9.53	0.355	2.1	0	0.02	11.61	1.561
21	Penghua Select Consumer Sector Balanced Fund	Zonghe Wang	222.6	1.183	9.56	0.297	1.8	0	0.08	11.29	1.48
22	China Southern Healthcare Flexible Allocation Balanced Fund	Zhengjiao Wang	137.04	1	10.19	0.435	3.32	0	-0.31	13.19	1.435
23	GF Consumer Selected Balanced Fund	Chen Li	181.31	0.659	6.81	0.729	5.69	0	0.37	12.13	1.388
24	Fuanda Healthy Life Flexible Allocation Balanced Fund	Qing Ji	129.34	0.812	6.76	0.561	3.5	0	0.03	10.23	1.373
25	Changxin Healthcare Sector Flexible Allocation Balanced Fund (LOF)	Haian Song	73.06	1.078	13.17	0.22	2.02	-0.001	-1.95	13.24	1.299
26	Manulife Teda Renaissance Business Flexible Allocation Balanced Fund	Hua Wu	130.54	1.017	10.56	0.24	1.87	-0.001	-0.82	11.61	1.258
27	Great Wall Select Brand Balanced Fund	Jianhua Yang	147.55	0.92	9.98	0.3	2.44	0	-0.17	12.24	1.22
28	Harvest New Consumption Equity Fund	Li Tan	188.56	0.917	9.98	0.28	2.28	0	0.59	11.67	1.197
29	Great Wall Healthcare Sector Balanced Fund	Weifeng Chen	200.08	0.963	11.25	0.185	1.62	0.001	1.43	11.44	1.147
30	Yinhua Prosperity Theme Hybrid Fund	Wei Jiao	207.08	0.746	8.85	0.351	3.12	0.001	1.65	10.32	1.096
31	UBS SDIC Healthcare Sector Flexible Allocation Balanced Fund	Hanshan Xiao	82.89	0.81	10.25	0.199	1.89	-0.001	-0.91	11.24	1.01
32	Penghua Emerging Industries Balanced Fund	Hao Liang	106.88	0.803	11.8	0.166	1.83	0	-0.18	13.44	0.969
33	Manulife Teda Efficiency Discovery Balanced Fund (LOF)	Xiao Ning	93.15	0.769	9.56	0.193	1.8	-0.001	-0.81	10.55	0.963
34	Essence Medicine Theme Equity Fund	Yifeng Chen	108.59	0.528	6.76	0.414	3.97	0	-0.12	10.62	0.942
35	Fullgoal TianHui Growth Hybrid Fund	Shaoxing Zhu	48.28	0.4	14	0.085	2.23	0	-1.54	14.69	0.485
36	ChinaAMC Return II Fund	Kun Yang	36.88	0.248	9.53	0.055	1.6	0	0.09	11.03	0.303

37	ChinaAMC Return Fund-A	Xinxing Ji	32.44	0.216	9.6	0.052	1.73	0	0.03	11.3	0.268
38	Dacheng Select Balanced Fund (LOF)	Jun Dai	127.42	0.919	14.65	0.061	0.73	0	-0.14	15.23	0
39	Harvest High-quality Firm Balanced Fund	Tao Hu	66.67	0.776	14.47	0.071	1	-0.001	-1.62	13.85	0
40	E Fund New Silk Road Flexible Allocation Balanced Fund	Zongchang Yang	156.05	1.085	13.78	-0.081	-0.77	0	0.19	12.82	0
41	Fullgoal TianCheng Dividend Hybrid Fund	Wu Hou	44.08	0.48	15.08	-0.043	-1.01	0	-1.41	12.66	0
42	MSHF Select Flexible Allocation Balanced Fund	Donghang Liao	116.52	0.752	11.5	0.07	0.8	0	0.17	12.14	0
43	GF Rotation Balanced Fund	Xingwu Wu	148	1.244	12.54	-0.019	-0.15	0	-0.45	11.95	0
44	CC Principal Consumption Upgrade Balanced Fund	Yuhang Qiu	117.69	0.732	12.05	0.018	0.23	0	0.44	11.84	0
45	BOC China Select Open Flexible Allocation Balanced Fund	Shuai Wang	30.8	0.265	12.09	0.014	0.47	0	-0.95	11.61	0
46	CICC Consumption Update Equity Fund	Xin Yan	85.78	1.168	14	-0.195	-1.75	-0.001	-1.4	10.85	0
47	Huatai-pb Consumption Growth Flexible Allocation Balanced Fund	Xiaoxi Li	116.79	1.049	10.39	0.062	0.46	0	-0.04	10.81	0
48	Harvest Return Flexible Allocation Balanced Fund	Zhen Chang	125.32	0.715	11.48	0.022	0.26	0.001	0.94	10.8	0
49	China Southern Select Growth Balanced Fund	Shuai Luo	168.92	0.796	12.1	0.027	0.31	0.001	1.71	10.7	0
50	Fullgoal Study Select Flexible Allocation Balanced Fund	Lili Liu	86.63	0.769	10.74	0.078	0.82	-0.001	-1.04	10.52	0

Appendix Table 5 *Ranking of Funds based on the Buffettlike2 Value*

Appendix: Buffett's Alpha: Industry Preference Characteristics of Investment Style

1. Decision-making Logic in Buffett's Investments

In Security Analysis, Graham pointed out that the market is a voting machine in the short term and a weighing scale in the long term.

Buffett's investing is affected by the Kelly formula. He evaluates the probability and the odds first and then determines the proportion of investment to be applied to a stock.

Kelly formula:

$$f = \frac{p \times b - q}{b}$$

where *f* is the proportion of the asset to apply to the security; *p* (probability of winning) is the probability that the investment will win; *q* (probability of losing) is the probability that the investment will lose; and *b* (odds) refers to how many times the net income after deducting the principal is the principal.

Buffett calculates the proportion of the asset to apply to a stock based on the probability and the odds. The long-term predictability of the firm he intends to invest in is the first consideration in calculating the probability and the odds. When calculating the odds, it is necessary to evaluate the firm, and the valuation model he uses is as follows:

In The Theory of Investment Value, written over 50 years ago, John Burr Williams set forth the equation for value, which we condense here: The value of any stock, bond or business today is determined by the cash inflows and outflows - discounted at an appropriate interest rate - that can be expected to occur during the remaining life of the asset.

——Buffett's letter to stakeholders, 1992

Model 1: Williams Dividend Discount Model (DDM)

$$V = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

where V is the current stock price; D_t is the dividend of each period; and r is the discount rate.

Model 2: Gordon Growth Model (GGM)

Assume the dividend grows at a constant rate g; the formula is as follows:

$$V = \sum_{t=1}^{\infty} \frac{D_0(1+g)^t}{(1+r)^t} = \frac{D_0(1+g)}{r-g}$$

Where V is the current stock price; D_0 is the starting dividend; r is the discount rate; and g is the constant growth rate expected for dividends

Model 3: Free Cash Flow to the Firm (FCFF, Two-stage) Model

The first stage is variable growth, and the second stage is perpetual growth.

$$EV = \sum_{t=1}^{t=H} \frac{FCFF_t}{(1+WACC)^t} + \frac{PV_H}{(1+WACC)^H}$$

Where EV is the firm's overall value; the period from year 1 to year H is the first stage; the period after year H is the second stage; and PV_H is the present value of the firm's free cash flows in year H.

FCFF = (net profit after tax + interest expense after tax + depreciation and amortization + other non-cash expenses) - additional working capital - capital expenditure

Weighted average cost of capital (WACC) =

$$\frac{\text{Market value of firm's equity} * \text{Expected return to equity} + \text{Market value of firm's debt} * (1 - \text{Corporate tax rate}) * \text{Cost of debt}}{\text{Market value of firm's equity} + \text{Market value of firm's debt）}}$$

The valuation models that Buffett uses in his investing practices include the Williams DDM, the Gordon growth model (CGM), and the discounted FCFF model (DCF). The DDM and CGM are more applicable to firms in the financial sector, such as banks, which have a stable dividend distribution. The DCF model is a better fit for firms that distribute less dividends but have persistent operations and stable free cash flow growth.

FCFF is an important factor in Buffett's calculation of the odds for valuation. The first criterion is that the net profit has stable growth and the return on equity (ROE) is high; the second criterion is that the required additional working capital and capital expenditures are low; and the third criterion is that the debt ratio should be low.

Through the above analysis, we find that the high-quality firms preferred by Buffett highly align with the above conditions. With these firms, it is not only easy to calculate the free cash flow in the first stage of the DCF model but also feasible to forecast the free cash flow in the long term, thereby adding certainty to the calculation of the odds.

2. Buffett Prefers Consumption-oriented Industries in Investing

In particular, Buffett's decision to limit his activities to a few kinds and to maximize his attention to them, and to keep doing so for 50 years.

Charlie Munger's Summary of 50 Years of Operating Berkshire Hathaway

Renowned investor Li (2019) proposed that "over time, the characteristics of the industry itself are the most effective moat."

During the 24 years between 1977 and 2000, Berkshire Hathaway mainly invested in the financials, consumer staples, and consumer discretionary sectors; other sectors accounted for a small portion of the investment. The average proportion of common stock held by Berkshire Hathaway in each sector among the company's total holdings between 2001 and 2020 is as follows: financials, 40.37%; consumer staples, 33.18%; consumer discretionary, 11.02%; information technology, 5.36%; health care, 2.06%; industrials, 3.63%; energy, 2.88%; communication services, 1.02%; materials, 0.08%; real estate, 0.36%; and utilities, 0.05%. Therefore, Buffett prefers investing in four major sectors: financials, consumer staples, consumer discretionary, and information technology. In the information technology sector, his focus is heavily investing in Apple Inc., a consumer product company. During his interview with CNBC in 2020, he said that "I mean it is obviously it's a consumer product company to use this technology."

In Stocks for the Long Run, Jeremy Siegel pointed out that between 1957 and 2012, among the original S&P 500 component companies that still maintained their corporate structure, 12 of the top 20 companies based on performance were in the consumer staples and consumer discretionary sectors, accounting for 60%; four companies were in the health care sector, accounting for 20%; two were in the industrials sector; and one was in the energy sector. Therefore, companies in consumption-oriented industries accounted for an absolutely large proportion of all top performing companies. The ranking of sectors with a return above or close to that for the S&P 500 Index between 1957 and 2006 is as follows: health care, consumer staples, energy, consumer discretionary, and information technology. The financials sector experienced the greatest growth, and its return was also close to that for the

S&P 500 Index. It can be concluded that consumption-oriented industries had the most excess returns and high rankings, while the financials sector accounted for the largest proportion and had the most growth in terms of the weight it accounted for (**Figure 9**).

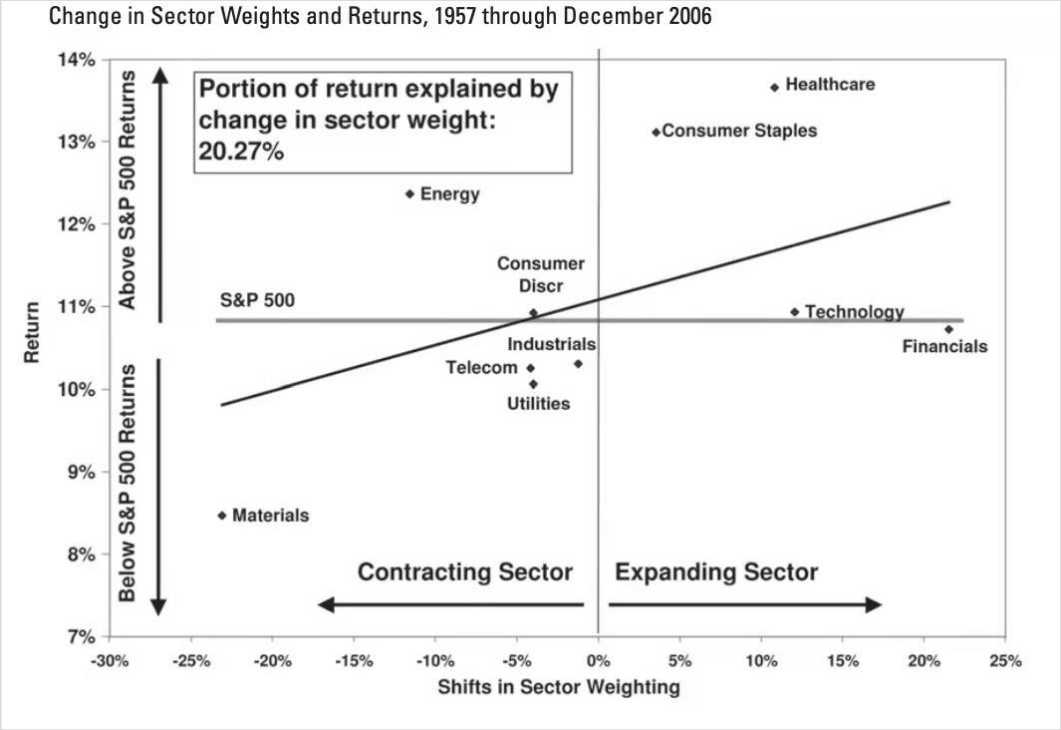

Figure 9 *Change in Sector Weights and Returns, 1957 through December 2006*
(Sources: Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies, p.81)

Capitalizing on the low price formulated by Mr. Market, Buffett always maintains high safety margins when investing in stocks in the financials sector; the investments have a high probability of winning and high odds. Based on an analysis of historical data, this work finds that the heavy-weight stocks in the financial sector held by Buffett were usually purchased at a very low price by taking advantage of a financial crisis or obtained through the conversion of preferred stocks. After a crisis, the valuation of a company is usually low, and the safety margins are broad. As such, Berkshire Hathaway has gained substantially from both the dividend distribution and price appreciation of stocks in the financials sector (**Table 9**).

During the economic crisis in 1990, Buffett purchased Wells Fargo stock. He said, Our purchases of Wells Fargo in 1990 were helped by a chaotic market in bank stocks…We purchased our 10% interest in Wells Fargo for $290 million, less than five times after-tax earnings, and less than three times pre-tax earnings.

Company	Purchase Time (Year)	Holding Time (Year)	Initial Cost ($million)	Current Value ($million)	Annualized Rate of Return	Cumulative Rate of Return
Moody's Corporation	2000	19	248	5,857	18.11%	2261.69%
American Express	1994	25	1,287	18,874	11.34%	1366.51%
Visa	2011	8	349	1,924	23.79%	451.29%
Goldman Sachs	2008	11	890	2,859	11.19%	*221.24%*
Wells Fargo	1989	30	7,040	18,598	3.29%	164.18%
Bank of America	2011	8	14,631	31,306	9.98%	113.97%
US Bancorp	2006	13	5,709	8,864	3.44%	55.26%
BNY Mellon	2010	9	3,696	4,101	0.55%	10.96%

Table 9 *Heavy-weight Stocks in the Financials Sector Held by Berkshire Hathaway*
(Source: Berkshire Hathaway2019 Annual Report)

Overall, the combined investments in the consumer staples and consumer discretionary sectors account for the largest portion of Buffett's total investments, followed by investments in the financials sector. Buffett prefers consumption-oriented industries and financial service industries; the companies in the financials sector that he invested in mainly include banks and payment companies that directly deal with consumers. Recently, Buffett has invested heavily in Apple Inc., a company in the information technology sector that specializes in manufacturing electronic consumer products. An obvious characteristic of Buffett's investment style is that he invests in companies that directly deal with consumers.

3. Buffett Avoids Technology Industries in Investing

This explains, by the way, why we don't own stocks of tech companies, even though we share the general view that our society will be transformed by their products and services. Our problem -- which we can't solve by studying up -- is that we have no insights into which participants in the tech field possess a truly durable competitive advantage.

Buffett's letter to shareholders, 1999

Technology is not within Buffett's circle of competence. Due to rapid technological progress, competition in the industry is overly intense, affecting the forecast of cash flows in the future. As such, Buffett tends to avoid technological firms.

The reason why Buffett views Apple Inc. as a consumer product company that uses technologies is that "Apple fans" not only pursue every new phone and tablet but also download various apps and games in the Apple store; the providers of these games and apps must share their revenue with Apple Inc. Therefore, the free cash flow of Apple Inc. is very

stable and predictable.

As seen in **Table 10**, for Amazon.com, the price-to-earnings ratio (PE) is 101.36, the price-to-sales ratio (PS) is 4.27, and the price-to-book ratio (PB) is 19.29; for Tesla, Inc., the PE is 212.89, the PS is 10.18, and the PB is 25.99. In comparison, the indicators for Apple Inc. are as follows: PE, 28.48; PS, 6.04; and PB 21.70. Apple Inc. does not have a high PE and is relatively easy to evaluate.

Company	PE (TTM)	PS (TTM)	PB (MRQ)
Amazon.com	101.36	4.27	19.29
Apple Inc.	28.48	6.04	21.70
Tesla, Inc.	212.89	10.18	25.99
Microsoft Corporation	32.24	10.38	12.64
Meta	30.39	6.70	6.23
Google	13.07	2.67	2.16

Table 10 *Data on PE, PS, and PB of Top US Technology Companies based on 2020 Annual Reports (Data: Wind)*

The data in **Table 11** are from Berkshire Hathaway's 2020 Annual Report. Apple Inc. had a gross profit margin of 38.78% and net profit margin of 21.73%; the Coca-Cola Company maintained a gross profit margin of 59.31% and net profit margin of 23.53%; the bond rating firm Moody had a gross profit margin of 100%; Johnson & Johnson had a gross profit margin of 51% and a net profit margin of 21.01%; and Procter & Gamble had a gross profit margin of 51.26% and net profit margin of 18.84%. By contrast, the companies that lack strong competitive advantages had much lower gross profit margins. For example, Chevron Corporation only had a gross profit margin of 19.71%, and General Motors had a gross profit margin of only 21%. Two companies that Buffett purchased during the early days but sold later, US Steel and Goodyear Tire and Rubber Company, only had gross profit margins of 17% and 20%, respectively. Without exception, these companies are facing fierce competition or are mired in predicaments.

No.	Security	PE (TTM)	PB (MRQ)	PS (TTM)	ROIC (%)	Debt Ratio (%)	Gross Profit Margin (TTM,%)	Net Profit Margin (TTM,%)	ROE (%)
1	Apple Inc.	38.88	34.16	8.13	19.95	79.83	38.78	21.73	73.69
2	Bank of America	14.65	1.07	3.07	0.70	90.32	——	20.92	6.66
3	Coca-Cola	30.45	12.68	7.15	9.91	75.62	59.31	23.53	40.48
4	American Express	31.05	4.45	2.70	1.76	87.99	——	8.69	13.61
5	The Kraft Heinz	-85.81	0.86	1.64	0.36	49.67	35.05	1.38	0.70
6	Verizon Communications	13.66	3.74	1.90	6.13	78.11	60.09	14.30	27.55
7	Moody's	30.54	36.27	10.11	19.95	85.79	100.00	33.09	163.04
8	US Bancorp	14.16	1.51	3.02	0.97	90.30	——	21.46	9.45
9	DaVita HealthCare	16.68	8.20	1.12	5.21	82.95	30.84	8.61	43.99
10	Chevron Corporation	-29.33	1.23	1.72	-2.39	44.65	19.71	-5.87	-4.02
11	Charter Communications	47.64	4.76	2.71	2.35	79.00	37.77	7.64	11.66
12	BNY Mellon	10.40	0.93	2.38	0.87	90.18	——	22.94	8.29
13	General Motors	17.60	1.38	0.51	3.09	78.88	20.37	5.16	14.81
14	Verisign	30.47	-17.71	19.56	60.11	178.68	85.76	64.42	-56.58
15	AbbVie	40.97	12.39	4.13	4.83	91.30	66.41	10.09	188.25
16	Liberty Media	-1.92	0.07	0.12	-3.84	55.46	51.37	-14.86	-9.05
17	Merck & Co.	29.29	7.09	4.31	8.94	72.26	67.74	14.76	27.59
18	Visa	39.29	13.72	19.54	16.80	55.25	100.00	49.91	30.65
19	Bristol Myers Squibb	-15.55	2.79	3.30	-8.14	68.03	72.31	-21.16	-20.16
20	Amazon.com	76.80	19.79	4.24	9.11	70.92	39.57	5.53	27.44
21	Mastercard	55.41	61.29	23.22	28.18	80.59	100.00	41.90	104.38
22	Wells Fargo	37.89	0.78	1.73	0.17	90.49	——	4.96	1.77
23	Johnson & Johnson	24.39	6.43	5.12	9.77	63.82	65.68	21.01	23.97
24	Procter & Gamble	24.74	7.24	4.63	13.44	60.90	51.26	18.84	30.80

Table 11 *Financial Data of Companies Held by Berkshire Hathaway in 2020*
(Source: US SEC, Wind)

4. Genes and Brands Are the Moat of Consumption-oriented Companies

In his book *The Selfish Gene*, British Neo-Darwinism writer Richard Dawkins wrote the following: "They are in you and me; they created us, body and mind; and their preservation is the ultimate rationale for our existence. They have come a long way, those replicators. Now they go by the name of genes, and we are their survival machines." In The Moral Animal, Robert Wright pointed out that "nowadays, we live in cities or villages, watching TV or drinking beer, and are driven by the emotions set to reproduce our genes in a small hunter-gatherer society."(Dawkins 21)

Genes have both physical and informational attributes. In people-centered consumption and financial services industries, the mental and behavioral preferences for brands, products, and services that are developed in the long process of human evolution are passed on through genes from one generation to another and do not easily change.

In Thinking, Fast and Slow, Daniel Kahneman proposed that people's modes of thinking can be divided into "System 1," i.e., an instinctive system, and "System 2," i.e., a rational system. Instincts are simple and effortless and play a critical role in everyday decision-making. The brands of products and services affect people's instinctive system and become preferences. What determines people's purchasing behavior? Magnetic resonance imaging indicates that 85% of people's purchasing behavior is controlled by subconsciousness, instead of explicit reasoning. Human beings develop mental dependence on brands, thereby creating psychological accounts.

Forecasting the future is extremely difficult. Buffett once said with humor that he was not competent enough to predict what changes will happen in the future; therefore, he had better buy products that are insusceptible to change, such as soft drinks, candies, razors, and chewing gum – "the art of chewing doesn't require much technology."

The common stock holdings disclosed by the 2020 Annual Report of Berkshire Hathaway (Table 12) indicate that the companies held by Berkshire Hathaway that are consumer centered all have a high ROE. Buffett once said, "We judge a company based on its ROE. The companies I select all have an ROE of over 20%." He believes that a stock's rate of return is very close to the company's ROE in the long run. In Poor Charlie's Almanack, Charlie Munger suggested, "The reputation of a brand will gain information advantage and social recognition so as to create advantage of scale." Preference brings about premium; the leading firms in the consumer good industry all have an ROE over 20%. During the past 50 years, the ROE of the consumption-oriented industry and the health care industry has been at the top of all industries.

Genes determine preference, so does brand. Consumers' preference for genes and brand ensures the persistence, profitability, and safety of the performance of leading companies in consumption-oriented industries

5. Reasons and Advantages of Buffett's Investment Preference

5.1.Why Buffett Prefers High-quality Companies in Consumption-oriented Industries

First, stability is a required characteristics of Berkshire Hathaway's insurance funds. Insurance float is essentially debt, and therefore, Buffett has extremely strict requirements on the safety of the principal. The stability of target investment firms is his top consideration, and he pursues excess returns on the condition that risks are controllable.

Second, Buffett's valuation model is based on discounted free cash flow. The leading companies in consumption-oriented industries have stable and predictable cash flows, which make firm valuation easier.

Third, leading companies in consumption-oriented industries help ease the adverse effects due to inflation. Buffett once remarked on the damaging power of inflation in the US. Leading companies in consumption-oriented industries may offset the adverse effect of inflation by raising prices.

Governments determine the ultimate value of money, and systemic forces will sometimes cause them to gravitate to policies that produce inflation. From time to time such policies spin out of control. Even in the US, where the wish for a stable currency is strong, the dollar has fallen a staggering 86% in value since 1965, when I took over management of Berkshire. It takes no less than $7 today to buy what $1 did at that time.

——Buffett's letter to shareholders, 2011

Since peaking in 1982, the Federal Funds Rate has been declining **(Figure 10**).

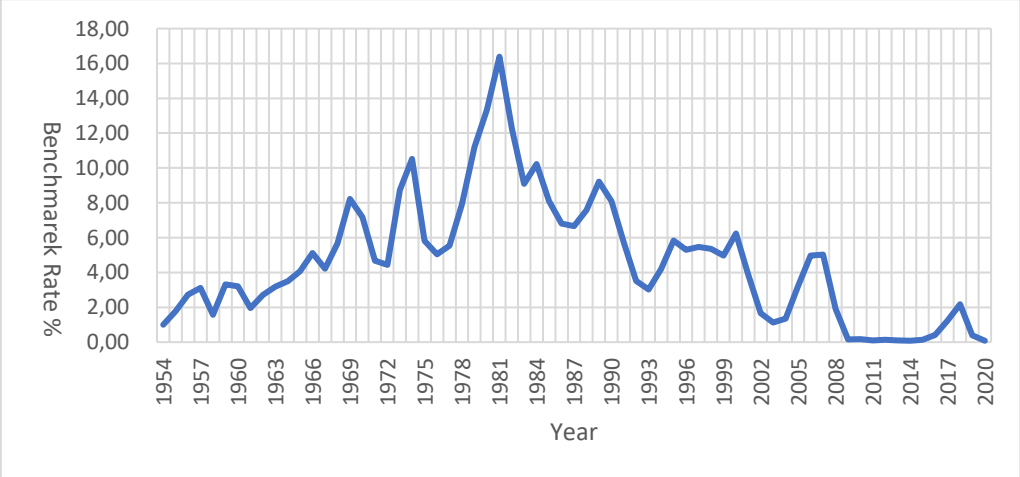

Figure 10 *Federal Funds Rate 1954-2020 (Source:Wind）*

As shown in **Figure 11**, since 1960, the supply of M2 in the US has been growing year-over-year.

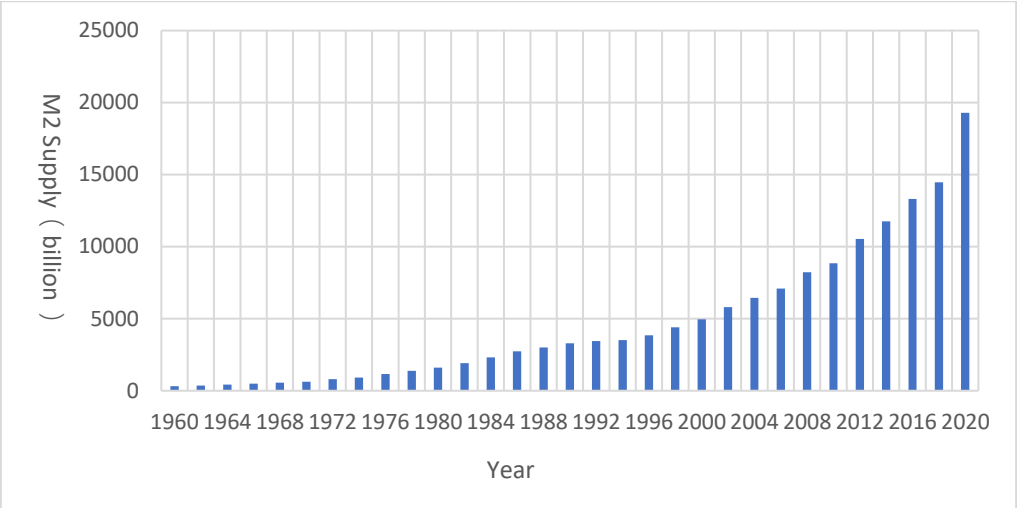

Figure 11 *Supply of M2 in US 1960-2020 (Source:Wind)*

Since abandoning the gold standard, the consumer price index (CPI) in the US has been demonstrating a growing trend (**Figure 12**).

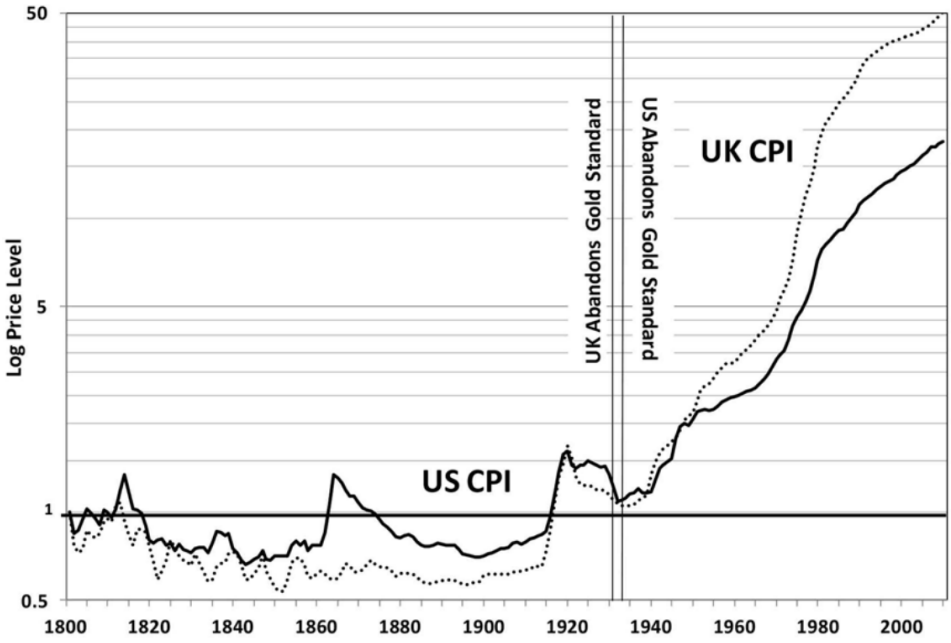

Figure 12 *US and UK Consumer Price Index 1800–2012*
(Sources: Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies, p.105)

5.2. Leading Companies in Consumption-oriented Industries Preferred by Buffett's Investments Have the Following Advantages

(1) The costs to transition into the industries are high; therefore, it is not easy to replace firms already in the industries;

(2) The industries have the pricing power to combat inflation;

(3) Brands are well-established with consumers, and they formulate consumers' psychological accounts;

(4) There are sufficient free cash flows, and there is high predictability for future cash flows;

(5) The requirement for the reinvestment of capital to maintain competitiveness is low;

(6) The industries are characterized by steady growth and safety. These industries provide essentials in people's everyday lives and will not decline and disappear over a short period of time;

(7) Inputs in building the brand, such as advertising and sales expenses, are recorded as costs in the balance sheet; however, the inputs actually increase a company's intrinsic value;

(8) Sales will increase with the growth in GDP in the US; and

(9) Thanks to globalization, their products can be sold in the global market. The majority of Berkshire Hathaway's look through earnings is from globalized firms such as Coca-Cola.

Buffett's investing is affected by the Kelly formula. He evaluates the probability and the odds first and then determines the proportion of investment to be applied to a stock. Buffett addresses the issue of probability by sticking to his "circle of competence" and by taking advantage of the "safe margin" of under-valuated stocks as a result of the panic caused by behavior finance and "Mr. Market." To address the issue of odds, Buffet applies the DCF valuation approach and prefers investing in high-quality firms in the consumer staples, consumer discretionary, financials, and information technology sectors. During the periods of 1977-2000 and 2001-2020, the largest proportion of Berkshire Hathaway's investment was accounted for by consumption-oriented firms in one of these sectors.

Analyzing the industry preferences in Buffett's investments is one of the effective approaches to studying the long-term stability in Berkshire Hathaway's performance. The stability in the growth, profitability, and safety of companies in which Buffett invests is the foundation that ensures Berkshire Hathaway's compound returns, i.e. a "snowball" effect. The characteristics of the industries in which Buffett invests explain the predictability of the quality factor QMJ, and the questions raised by Asness (2018) – "growth and safety are the

least persistent" and "conditional on survival" are answered. The castle is built (investing in high-quality companies) on solid ground (industries favored by Buffett such as the consumption-oriented industries). It is highly likely that the survival and safety, profitability, and growth of the companies preferred by Buffett will not be affected within 5-10 years. The performance of companies with a "moat" has a higher degree of predictability.

The following findings stem from the above discussions. First, Buffett prefers investing in top companies in the consumer staples, consumer discretionary, financials, and information technology sectors. The preferred industries are all directly related to consumption, and this characteristic guarantees the persistence of the high-quality companies' profitability, growth, and safety. Second, Buffett's industry preferences enable him to invest in companies that outperform the market average within his circle of competence, thereby gaining excess returns. Third, Buffett's industry preferences ensure that Berkshire Hathaway has low turnover rates, which not only reduces transaction costs but also provides a large amount of deferred income tax that can be used as leverage.

This work makes the following propositions: the QMJ and BAB factors in Buffett's investment style and the leverage ratio of 1.7:1 explain Buffett's Alpha returns, risks, and risk-adjusted returns; the characteristics of industry preferences in Buffett's investment style explain the time and costs that drive the long-term excess returns and therefore are an important component of Buffett's Alpha.

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