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An Empirical Analysis of Corporate Return Valuation Using CAPM

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Abstract: In recent years, people have become more and more enthusiastic about investing in the stock market. However, as we all know, the stock market is very unstable, and investors want to get higher excess returns. Therefore, this paper is about how to help investors better choose company stocks to obtain higher excess returns. This paper decides to make use of some theories about β in the capital asset pricing model to do an empirical analysis with three ETF representing the entire industry (semiconductor ETF, pharmaceutical ETF, banking ETF), and then put forward suggestions for investors. This paper collects and uses the weekly closing prices of these three ETF from November 24, 2022 to November 24, 2024, to calculate their beta values. They are then classified by comparing their beta values and making recommendations to investors. These figures can be found on the website of IFR. Ultimately, this study shows that the beta values of semiconductor ETF and pharmaceutical ETF are both greater than 1, while the beta value of the bank ETF is less than 1. Therefore, investors can buy stocks of companies in the semiconductor and pharmaceutical industries during a bull market to obtain higher excess returns.

Keywords: Capital asset pricing model, β coefficient, Rate of return

1. Introduction

In recent years, with the economic development and income growth, the popularization of financial knowledge and the development of the Internet, the transformation of investment concepts, policy support and market standardization, the promotion of social media, and personal pursuit and realization of dreams, more and more people are involved in the stock market and participate in this field full of challenges and opportunities. This research aims to use the β value of capital asset pricing model to help investors choose the company stock they want to invest in, so as to obtain a considerable return rate. In China, people are used to investing in a certain industry, so this research selects the closing prices of ETF in three industries in recent five years for research. An ETF is an Exchange Traded Fund, also known as an index stock. It has moved in line with most stocks in the sector.In this paper, ETF of pharmaceutical industry, commercial bank and semiconductor industry will be selected for research. Studying these three industries is crucial both practically for guiding investors and theoretically for enhancing the capital asset pricing model's predictive power.

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2. Brief Introduction to Three Industries

2.1. Pharmaceutical Industry

China is the world's second largest pharmaceutical market and an important strategic market for most of the world's top pharmaceutical companies. This is also the reason why this industry is selected in this paper. The pharmaceutical industry is a pharmaceutical research and development and production as the core industry, is an important part of the pharmaceutical industry, is related to the national economy and people's livelihood, economic development and national security of the strategic industry, but also an important foundation for the construction of healthy China. In the face of the challenge of the global public health crisis of the novel coronavirus epidemic, the important role of the pharmaceutical industry in controlling the epidemic and maintaining social stability has become more prominent, and the innovation and development of the pharmaceutical industry is an important embodiment of the comprehensive strength of the country and an indispensable element of strengthening the country. The complexity of the Chinese market will further increase under the impact of the epidemic. As expectations for economic growth and healthcare spending have been revised downward, companies have faced significant challenges in customer communication during the pandemic, and it has been difficult to regain the level of support and impact they had before the pandemic on medical staff and the treatment and medication information needed by patients. New drug approvals continue, but bringing new drugs to market is challenging, reflecting shrinking patient volumes due to limited hospital capacity and a shrinking patient population. At the same time, with the expected investment growth caused by economic recovery and the accompanying supportive policies, the "14th Five-Year Plan" pharmaceutical industry Development Plan pointed out that China's pharmaceutical market has entered a stage of high-quality development. A new round of technological change and cross-border integration is accelerating, big data and artificial intelligence are deeply integrated into all aspects of the development of the pharmaceutical industry, and transformative new drug creation technologies, innovative therapies, and new drugs continue to emerge. The new development stage puts forward higher requirements for the pharmaceutical industry, and the pharmaceutical industry needs to accelerate the quality change, efficiency change, and power change to provide strong support for the construction of a new development pattern. China's pharmaceutical sector is currently experiencing significant restructuring aimed at achieving high-quality developmental transformation, demonstrating notable advancements in research and development innovation as well as enhancements in manufacturing processes [1]. It opened our eyes to some new areas of concern and opportunities.

2.2. Semiconductor Industry

Semiconductors refer to materials with conductive properties between conductors and insulators at room temperature. Semiconductors are used in integrated circuits, consumer electronics, communication systems, photovoltaic power generation, lighting applications, high-power power conversion and other fields. Semiconductor is the core of the information technology industry and a strategic, basic and leading industry that supports economic and social development and guarantees national security. Its technical level and development scale have become one of important symbols to measure a country's industrial competitiveness and comprehensive national strength. The semiconductor industry is the core of new information technology and the cornerstone of the digital economy. On the one hand, the semiconductor industry connects the domestic cycle, and its products are widely used in electronics, communications, military and other fields, constituting the basis for the development of China's digital economy. Conversely, the semiconductor sector is intricately connected to the global economic cycle, with Chinese companies significantly engaging in the

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international supply chain and advancing towards the upper echelons of the value chain [2].The 14th Five-Year Plan provides important guidance for the semiconductor industry and emphasizes the development of third-generation semiconductors. Accordingly, listed companies in the industry have recognized the importance of high-end product research and development and the realization of domestic substitution, and actively laid out high-end chips and third-generation semiconductor materials. In recent years, semiconductor industry stocks have performed well, and China has strongly supported this industry, and investors have greater enthusiasm for investment in the semiconductor field. The semiconductor supply chain is undergoing significant consolidation, leading to an increase in the bargaining power of firms and a reduction in the prevalence of irrational competition. In the near future, the semiconductor sector is expected to exhibit promising market potential and enhanced investment attractiveness [3].

2.3. Banking

In the context of deepening global economic integration, the banking industry, as an important support for economic development, plays a pivotal role in promoting the growth of the real economy, maintaining financial stability and promoting social and economic transformation. The development goals, priorities and paths of China's financial power are increasingly clear, and the strategic blueprint of the "five major articles" of science and technology finance, digital finance, green finance, inclusive finance and pension finance has been initially formed, and the financial supervision system has gradually rationalized its mechanism and gradually improved its efficiency after undergoing major changes, creating a good institutional environment for the high-quality development of banking financial institutions. With the continuous stabilization of China's economic recovery, the effective improvement and release of consumer demand, the gradual clearing of real estate investment risks, and the continuous resolution of local government debt risks, China's banking industry is also expected to resolve risks at the source, comprehensively repair and improve the quality of balance sheets, and achieve a better balance between efficiency, liquidity and security. Numerous investors opt to purchase bank stocks due to their substantial market capitalization and liquidity. The significant capital required for price fluctuations renders them more challenging to manipulate, resulting in relatively stable trends with minimal volatility. Consequently, investing in bank stocks presents a lower risk compared to other equities.

3. Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) was developed by American scholars William Sharpe, John Lintner, Jack Treynor and Jan Mossin, developed in 1964 on the basis of portfolio theory and capital market theory, mainly studies the relationship between the expected return rate of assets and risk assets in the securities market, as well as how the equilibrium price is formed, which is the pillar of modern financial market price theory and is widely used in investment decision-making and corporate finance. It has emerged as a pivotal framework in financial economics for examining investor behavior in the context of risk [4]. The basic assumptions on which the model is based are (1)All investors have homogeneous expectations. This means that all investors have the same expectations about all assets' future returns,about the correlations between all asset’s returns, and about all the assets volatility. (2) Investors can invest and borrow at the risk-free rate RF. (3)There are no transaction costs. (4) Investors have risk aversion. (5)All investors have the same time horizon [5].The formula for the capital asset pricing model looks like this:

$$Eri - rf = \beta(Erm - rf) \tag{1}$$

This formula could also be expressed this way[6]:

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$$Eri = \beta(Erm - rf) + rf \quad (2)$$

The symbols in this formula are defined as follows: Eri is the expected rate of return of asset i,rf is the risk-free rate of return,β is the systemic risk of asset i, Erm is the expected market return of market m, Erm-rf is the market risk premium, that is, the difference between the expected market return and the risk-free rate of return. In this article,β is the focus of the study. Systemic risk is quantified by β, representing the slope of the regression line. This metric does not encapsulate risk in its entirety; rather, it serves as an indicator that illustrates the degree to which the return on an individual asset fluctuates in relation to the overall market return [7]. The Beta value of a share shows the changes in a particular

share to general market movement. When the market excess rate of return is positive, the higher the β coefficient corresponds to the higher the rate of return. When the market excess return is negative, a higher beta coefficient is associated with a lower rate of return [8]. There are usually three cases of beta value, when the beta is equal to 1, the stock is neutral, and its price is in line with the price volatility of the market. If beta is greater than 1, the stock is an aggressive stock, and as the market price goes up, its value goes up more; When the market price goes down, its value goes down even more. For example, if a stock has a Beta of 1.5, it means that when the market goes up by 10%, the stock price goes up by 15%. When the market falls by 10%, the stock price will also fall by 15%. On the other hand, if a stock has a Beta of less than 1, it is a defensive stock, resulting in smaller gains and losses for investors.

4. Analytical Techniques

According to the formula of the Capital asset pricing Model, the value of beta can be calculated from the values of other variables. ri can be obtained by dividing the current price of the stock by the previous price and subtracting one. In the same way, this paper uses the Shanghai Composite index to calculate the value of rm. For the value of rf, given that there is little default risk on Chinese government bonds, this paper selects the yield rate of China's three-year Treasury bonds.

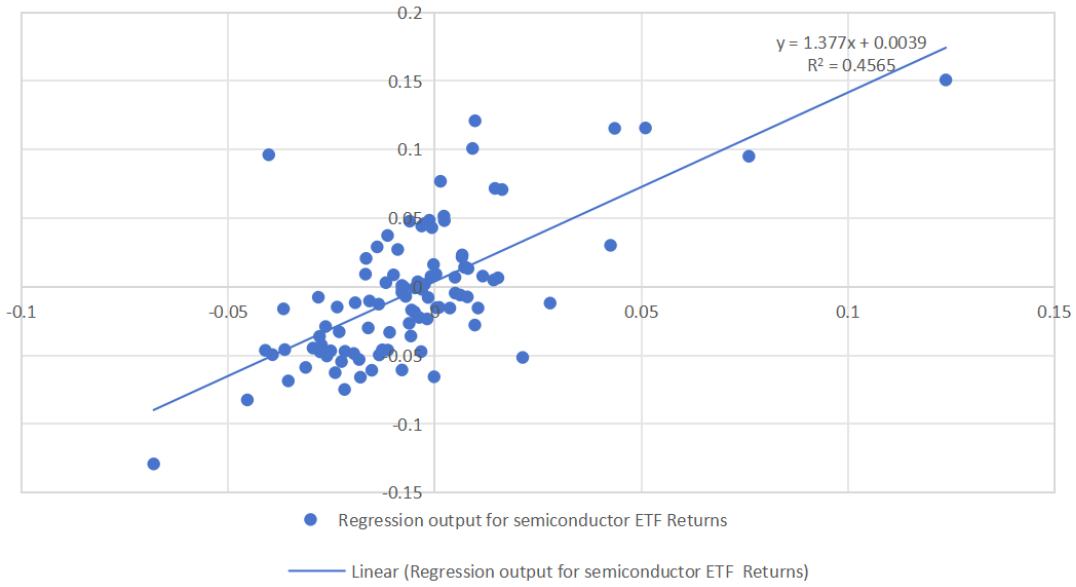

Figure 1: Regression output for semiconductor ETF returns. Source: Researcher computation

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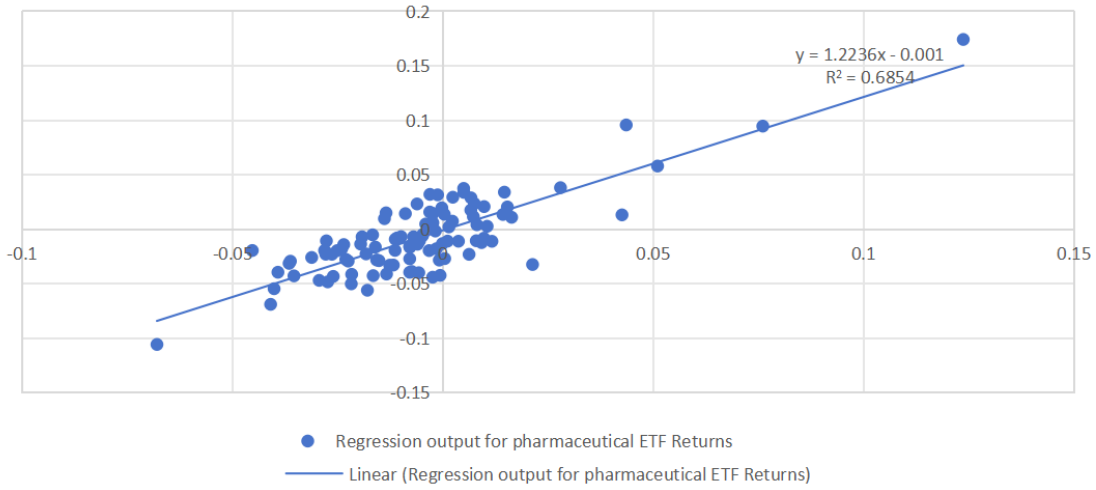

Figure 2: Regression output for pharmaceutical ETF returns. Source: Researcher computation

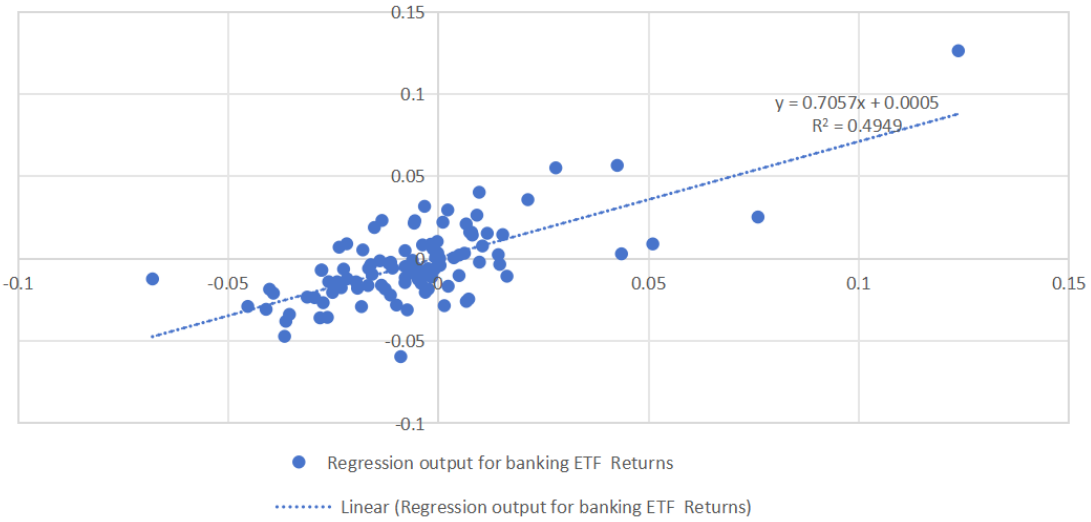

Figure 3: Regression output for banking ETF returns. Source: Researcher computation

From Figure 1-Figure 3, it can be seen that the beta value of the semiconductor ETF is 1.377, which can also be expressed as 137.7%. The beta value of the pharmaceutical ETF is 1.2236, or otherwise expressed as 122.36%. The beta value of the banking ETF is 0.7057, which can also be expressed as 70.57%.

In this case, a banking ETF with a Beta of 0.7057 is less than 1 and is considered a defensive stock, where the stock's value will change less than the overall market, and its price will be more stable than the market price. From the estimated beta coefficient value, the beta coefficient value of the bank ETF is less than 1, indicating that the bank ETF is relatively stable, the risk of individual stocks is less than the risk of the market, and the return may be relatively small [9]. Therefore, if the market rises, the bank ETF will not enjoy the same level of rise. However, if there is a downward trend in the market, according to CAPM theory, in general, for every 10% decline in stocks, the return of banking ETF will only decline by 7.06%, showing greater stability.

However, the beta values of semiconductor ETF and pharmaceutical ETF are 1.377 and 1.2236, respectively, both greater than one (beta >1), are considered aggressive stocks and tend to show higher return volatility compared to the corresponding index. According to capital asset pricing model theory,

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when the return of the market index rises by 10%, the return of the semiconductor ETF tends to rise by 13.77%, and the return of the pharmaceutical ETF tends to rise by 12.24%. Similarly, if the market falls by 10%, the semiconductor ETF tends to lose 13.77% of its return and the pharmaceutical ETF tends to gain 12.24%. Stock returns in both sectors are even more volatile than market returns.

5. Conclusion

The risk-return paradigm is a foundational principle in finance that holds significant relevance for investors and portfolio managers. A critical aspect of their responsibilities involves assessing the investment risk [10]. The beta coefficient is used to measure the level of systemic risk of an asset or portfolio relative to the market. The higher the β coefficient, the higher the correlation between the price fluctuations of the asset or portfolio and the fluctuations of the market, the greater the systemic risk. By analyzing the beta coefficients of various assets or portfolios, investors can evaluate their comparative risk profiles, thereby facilitating effective risk management and strategic asset allocation [11].

Since ETF represent the return rate of stocks in the entire industry, taking the three ETF in this paper as an example, when the market return rate is positive or investors predict that the current market is a bull market, they should choose more stocks in the semiconductor industry or the pharmaceutical industry, so as to obtain higher excess return rate. Also watch out for reducing exposure to banking stocks. On the other hand, if the market yield is negative, or investors believe that the current market is a bear market, it is necessary to reduce the investment in semiconductor industry stocks and pharmaceutical industry stocks, because they tend to decline more than the market decline. It could also increase its purchases of defensive stocks such as banks.

For aggressive stocks whose beta is greater than 1, investors can buy in the bull market to make profits and sell in the bear market to hedge. For defensive stocks with a beta of less than 1, investors should reduce their purchases in bull markets and buy in bear markets to diversify their risk.

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