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# Avoidance of Adverse Impact on Assets from Inflation: Basic Analysis of Multiple Models and Applications

**Waiyiu Wong**

Shenzhen International Foundation College, Shenzhen, 518000, China
timmmwongwaiyiu@gmail.com

**Abstract:**

This study analyses strategies to protect asset purchasing power under a low-interest, persistent-inflation environment. By using market data of China and establishing finance models, the Fisher equation, CAPM and EPV to calculate the real returns from bank deposits, policy-based bonds and equities (illustrated by Guizhou Moutai). Empirical inputs include a 1.28% forecast inflation rate (2025–2030), current deposit rate and bond yields, and historical equity returns (2017–2021). After inflation adjustment, results indicate that deposits offer near-zero real returns (~0.02%), policy-based bonds provide a modest positive real yield (~0.38%), while equities deliver the highest real return (~8.27%), but with substantial volatility and drawdown risk. The study also highlights limitations of standard models in an inflationary background, especially CAPM's fixed risk-free assumption and EPV's static discounting, and recommends methodological enhancements to better capture downside risk such as time-varying discount rates, dynamic risk premiums, and stochastic techniques (Monte Carlo simulations, Value-at-Risk). Practically, investors should minimise idle cash, use bonds for preservation and adopt diversified multi-asset strategies that accept calibrated equity exposure to preserve purchasing power.

**Keywords:** Inflation hedging; Real returns; CAPM; Expected present value; Asset allocation.

## 1. Introduction

"Global growth is slowing following a sharp rise in trade barriers and heightened policy uncertainty. Growth is expected to weaken to 2.3 percent in 2025—a significant downgrade from previous forecasts—with only a tepid recovery expected in 2026-27. Growth could be lower if trade restrictions escalate or if policy uncertainty persists" [1]. The central banks around the world have been cutting interest rates since October 2022, and the graph shows that the interest rates are still declining [2].

In addition, Economists expect global inflation to remain high at least until 2028, according to a new survey that may add to market concerns about sticky price pressures [3]. For instance, in China, the forecast of the inflation rate from 2025 to 2030 also shows an increasing trend [4]. However, the demand deposit interest rate of the central bank in China, the Bank of China, is only 0.05% [5]. In an environment where low interest rates and medium to high inflation coexist, the inversion between the nominal interest rate and the inflation rate appears. To combat the effects of inflation, several investment tools are available, including stocks, bonds, and mutual funds. That creates an interesting problem—at different inflation expectations, put money in the bank for saving, or invest in financial assets for investment, which method is better to maximize present value and purchasing power. The paper will define the financial models, including Compound Annual Growth Rate (CAGR), Fisher Equation, CAPM (Capital Asset Pricing Model), and EPV (Expected Present Value), and apply them successively to compare and provide suggestions.

# 2. Literature Review

Inflation is becoming a crucial factor in evaluating the real returns from savings and investments. This literature review investigates the impact of inflation on savings and investment cash flow, reviewing research on the effects of inflation on personal finance. It emphasizes that when the inflation rate is high, the real saving interest rate turns negative. Many studies suggest that investment usually returns more than deposit under this circumstance. Moreover, it examines the significant financial models that manage risk and returns in investments. Additionally, this study will examine the applications of various models, including CAGR, Fisher Equation, CAPM, and EPV, to facilitate a more comprehensive comparison with saving and investment.

## 2.1 Inflation and Personal Finance

Mankiw argues that inflation erodes the purchasing power of money, causing a real reduction in savings, which occurs in a low-interest environment where the real returns are inefficient to exceed inflation [6]. Research by Fama and French has shown that, although inflation can decline the real returns on savings, investments such as stocks and bonds can provide returns over inflation, which can maintain or increase the real value of money [7].

## 2.2 The Fisher Equation

The Fisher Equation formula describes the relationship between nominal and real interest rates under the effect of inflation, which can be expressed as the following formula [8]:

$$(1+i)=(1+r)(1+\pi) \tag{1}$$

where $i$ =the nominal interest rate, r=the real interest rate, $\pi$=the inflation rate. However, it neglects the risk premiums. That will directly affect the asset protection, risk premiums, a significant component of expected asset returns; if the models ignore this point, they will probably underestimate the return rate required to protect the assets and cause failure in strategy. Neglecting risk premiums will also lead to an inaccurate estimate of the risk-free rate, affecting the CAPM model's results, which rely on the nominal risk-free rate [9].

## 2.3 CAPM

CAPM describes the relationship between systematic risks and expected returns for assets. It is a financial model that establishes a linear relationship between expected returns of assets and systematic risk ( $\beta$). The formula is that [10]:

$$ER_i = R_f + \beta_i\left(ER_m - R_f\right) \tag{2}$$

where $ER_i$=expected returns of investment, $R_f$=risk-free rate, $\beta_i$=beta of the investment, $\left(ER_m - R_f\right)$=market risk premium. There are some limitations to the CAPM; firstly, there is a fixed risk-free rate in CAPM, in an inflationary environment, the actual return of the bonds will no longer be risk-free due to a decline in purchasing power, which brings challenges to asset pricing and protection from inflation as CAPM unable to efficiently consider the dynamic impact of inflation on risk-free rate [11]; secondly, beta in CAPM cannot adequately explained the differences in assets return, especially when non-market risks are significant [12].

## 2.4 EPV

EPV is used to calculate the present value of uncertain future cash flows. It is based on the expected distribution of future cash flows, converts them into present value, and makes decisions. The formula can be expressed as

$$EPV = \sum_{t=1}^{n} \frac{E\left[C_t\right]}{\left(1+r_{disc}\right)^t} \tag{3}$$

where $EPV$=expected present value, $E\left[C_t\right]$=the expected cash flows in the $t^{th}$ year, $r_{disc}$=discount rate, $t$=time period, $n$=total period. EPV is widely applied in capital budgeting and corporate mergers, and assists investors in making the best decisions. However, it did not consider the impact of inflation on the value of cash flows and overestimated the present value of assets; therefore, it often integrated with the Fisher equation to adjust the pur-

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chasing power of future cash flows [13].

## 3. Methodology

When comparing the present value of saving money and investment, it is essential to make assumptions about the key factors. These assumptions include that the expected risk premium is known and constant, there are no transaction costs, the market is efficient, and asset prices reflect all available information [14].

Inflation rate ( $\pi$ ):1.28% (The average inflation rate from 2025-2030 forecast) [4].

### 3.1 Saving

Savings interest rate: 1.30% (60 months lump-sum deposit for lump-sum withdrawal on 20th May 2025 in the Bank of China) [5].

Adjust the influence of inflation by the Fisher equation, calculate the real expected return rate ( $r$ ) [8].

$$(1+i)=(1+r)(1+\pi) \tag{4}$$

$$r=\frac{1+i}{1+\pi}-1=\frac{1+1.3\%}{1+1.28\%}-1=0.01975\% \tag{5}$$

### 3.2 Bond

Time period:5 years

Face value of the bond: 100,000CNY (Standard face value unit of policy-based financial bonds in the Chinese bond market) [15].

Coupon rate:1.90% (The range for policy-based financial bonds is 1.8%–2.0%, based on market data from July 2025, and 1.90% is the midpoint, which reflects the typical level for low-risk bonds) [15].

Discount rate: 1.73% (based on the 5-year Chinese government bonds of 29th July, 2025) [16].

$$EPV=\sum_{t=1}^{n}\frac{E[C_t]}{(1+r_{disc})^t} \tag{6}$$

$$PV_1+PV_2+PV_3+PV_4+PV_5=\frac{100000\times1.90\%}{(1+1.73\%)^1}+\frac{100000\times1.90\%}{(1+1.73\%)^2}+\frac{100000\times1.90\%}{(1+1.73\%)^3}+\frac{100000\times1.90\%}{(1+1.73\%)^4}+\frac{100000\times(1+1.90\%)}{(1+1.73\%)^5}\approx100{,}807.61CNY \tag{7}$$

After that, eliminate the influence of inflation, calculate the real expected return rate ( $r$ ) [9],

$$RealC_t=\frac{NominalC_t}{(1+\pi)^t}\quad\frac{\frac{100000\times1.90\%}{(1+1.28\%)^1}}{(1+r)^1}+\frac{\frac{100000\times1.90\%}{(1+1.28\%)^2}}{(1+r)^2}+\frac{\frac{100000\times1.90\%}{(1+1.28\%)^3}}{(1+r)^3}+\frac{\frac{100000\times1.90\%}{(1+1.28\%)^4}}{(1+r)^4}+\frac{\frac{100000\times(1+1.90\%)}{(1+1.28\%)^5}}{(1+r)^5}=100807.61$$

$$r\approx0.379\% \tag{8}$$

### 3.3 Stock

The study collected historical data from 2017 to 2021, including stock prices from the Shanghai and Shenzhen stock exchanges (such as Kweichow Moutai 600519.SH) [17], the risk-free rate of the CSI 300 Index, and the inflation rate. These data were sourced from financial databases to ensure coverage of the five-year cycle.

Stock prices and market indices: Monthly closing price data used to calculate returns.

Risk-free rate ( $R_f$ ): 3.14% (Shanghai Interbank Offered Rate) [18].

Market return rate ( $ER_m$ ):8.35% (The geometric average annual return rates of the CSI 300 Index were 21.78% in 2017, -25.31% in 2018, 36.07% in 2019, 27.21% in 2020, and -5.20% in 2021) [17].

Beta value of the asset $i$ ( $\beta_i$ ):1.3178(from Python result)

In CAPM, taking Guizhou Maotai as an example, through regression analysis of its excess returns and market excess returns, putting the data of historical monthly closing price data for the CSI 300 Index, including Guizhou Maotai, daily 1-month Shibor interest rate data from 3rd January, 2017 to 31st December, 2021[17] as the risk-free rate into python script to generate excess return rate data, β value and excess return charts, security feature line charts, and overall securities market line charts for Guizhou Maotai, and obtain a beta value of 1.3178 and an $R^2$ of 0.471 according to Table 1, indicating that the market explains 47.1% of the volatility. Assuming a risk-free interest rate of 3.14% and a market return rate of 8.35%, the expected nominal return rate for Guizhou Maotai is calculated by CAPM [10]:

**Table 1. Regression analysis of Guizhou Maotai excess returns and market excess returns**

| OLS Regression Results | | | | | | |
|---|---|---|---|---|---|---|
| Dep. Variable | 600519.SH | | R-squared | | 0.471 | |
| Model: | OLS | | Adj. R-squared: | | 0.462 | |
| Method: | Least Squares | | F-statistic: | | 51.69 | |
| Date: | Mon, 28 Jul 2025 | | Prob(F-Statistic): | | 1.41e-09 | |
| Time: | 21:39:37 | | Log-likelihood: | | -196.17 | |
| No. observation | 60 | | AIC: | | 396.3 | |
| Df Residuals: | 58 | | BIC: | | 400.5 | |
| Df Model: | 1 | | | | | |
| Covariance Type: | nonrobust | | | | | |
| | coef | Std err | t | P>\|t\| | [0.025 | 0.975] |
| const | 2.2232 | 0.839 | 2.650 | 0.010 | 0.544 | 3.903 |
| 00030.SH | 1.3178 | 0.183 | 7.189 | 0.000 | 0.951 | 1.685 |
| Table 1 (Continued) | | | | | | |
| Omnibus: | 1.325 | | Durbin-Watson: | | 1.970 | |
| Prob(Omnibus): | 0.515 | | Jarque-Bera (JB) | | 0.640 | |
| Skew: | -0.113 | | Prob (JB) | | 0.726 | |
| Kurtosis: | 3.453 | | Cond. No | | 4.60 | |

$$ER_{Maotai} = R_f + \beta_i \left( ER_m - R_f \right)(2) = 3.14\% + 1.3178\left(8.35\% - 3.14\%\right) \approx 9.66\% \quad (9)$$

Next, adjust the influence of inflation by the Fisher equation, calculate the real expected return rate ($r$) [8]

$$(1+i) = (1+r)(1+\pi) \quad (10)$$

$$r = \frac{1+i}{1+\pi} - 1 = \frac{1+9.66\%}{1+1.28\%} - 1 = 8.27\% \quad (11)$$

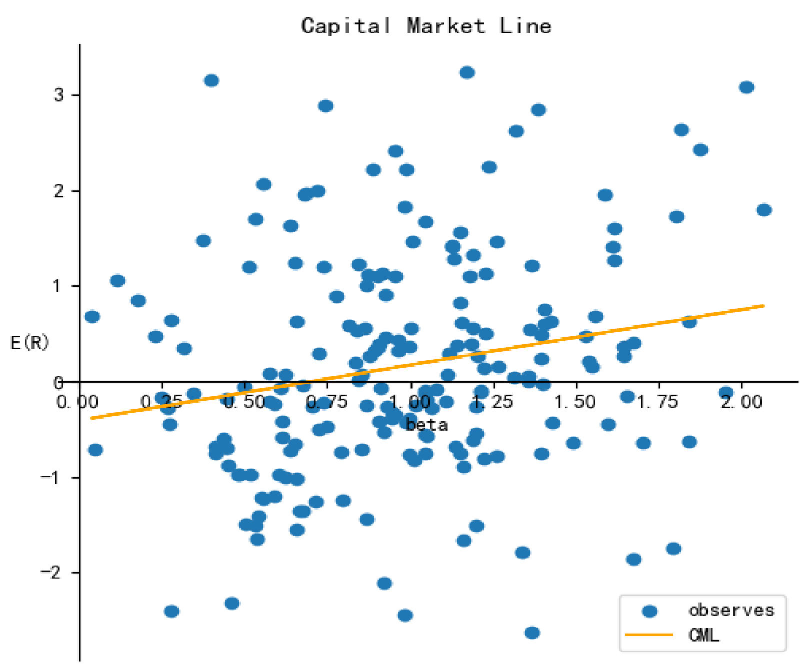


**Fig. 1 Capital Market Line**

The Capital Market Line (CML), as shown in Fig. 1 [8, 19], illustrates the theoretical relationship between risk

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and return. The blue dots are the distribution of actual investment portfolios, showing the importance of optimizing asset allocation.

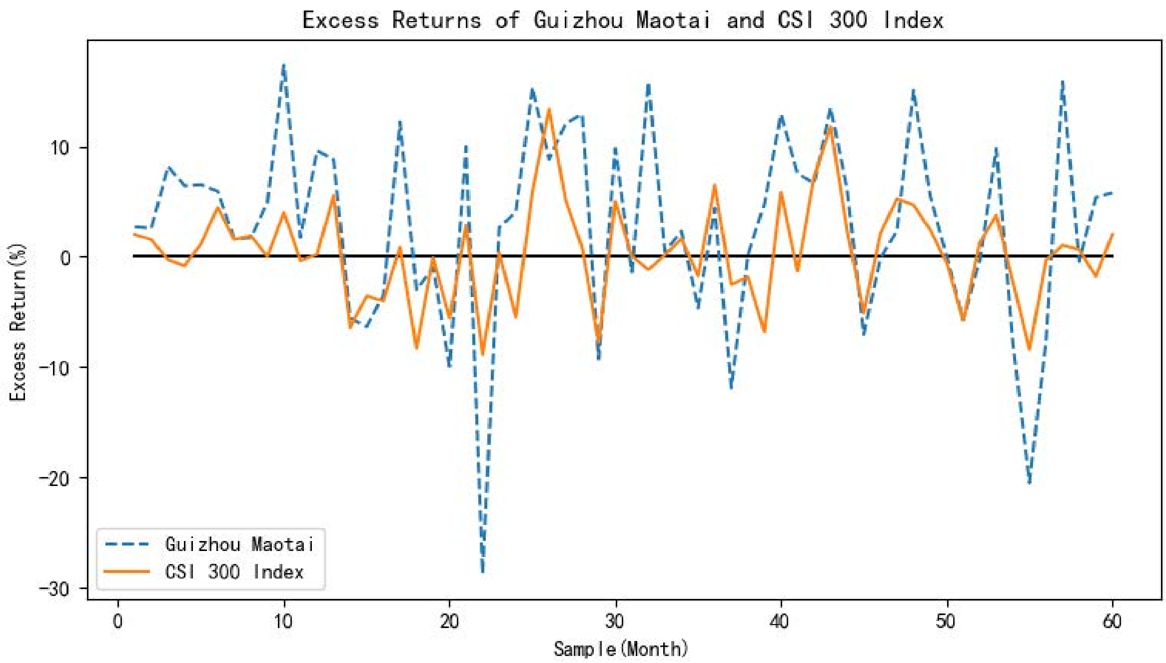


**Fig. 2 Excess Returns of Guizhou Maotai and CSI 300 Index**

According to Fig. 2 Guizhou Maotai's excess returns fluctuate significantly (-29 % to +18%), while the CSI 300 Index is more stable (-10% to +12%), reflecting that individual stock investments are high-risk, high return.


**Fig. 3 Guizhou Maotai Security Market Line**

The securities market line for Guizhou Maotai refers to Fig. 3, with the orange line representing CAPM predictions and the blue dots representing actual observations, supports the high expected returns brought about by its high beta value (1.3178) [19].

## 4. Discussion

The comparative analysis under inflation rate( $\pi = 1.28$ ) (Statista2025,2025) highlights the three distinct real return scenarios.

Firstly, Bank Deposits have virtually zero real returns ( $\approx 0.02\%$ ), although this is a real return, after adjusting for inflation, which becomes negligible. In this circumstance, holding higher return assets is a better choice than a deposit. Although it is unsuitable for preserving purchasing power, many people seeking no risk will opt for this method [20].

Secondly, Policy-Based Bonds are Steady but have a low real return rate ( $\approx 0.38\%$ ), offering asset preservation and a modest real return. The return rate is slightly higher than the deposit but insufficient when the inflation accelerates. In addition, government bonds reflect the policies on interest rates, so that the cash flow rate can be predicted.

Thirdly, Stocks have the highest actual return ( $\approx 8.27\%$ ) but are accompanied by significant volatility and asset drawdown risk. It fluctuates with the business cycle which long-term outpaces the inflation but downturns in the short-term and might cause the wealth loss.

The comparison highlights that in a low-interest-rate and high-inflationary environment, achieving real growth of assets requires investors to accept risks. In contrast, bonds serve as a defence, while deposits and cash should be minimized or hedged.

## 5. Conclusion

The deposit failed to keep pace with inflation. Bonds offer a modest real return above zero. Equities, represented by Guizhou Moutai, provide an effective inflation hedge, yielding an 8.27% real return after adjusting for inflation.

This study has several limitations. First, the data of the stock market only consists of the time period 2017-2021, which may not be sufficient for the whole economic cycle, especially for the time after COVID-19 and the prediction interval from 2025 to 2030. The coupon rate, the discount rate of the bond, and the inflation rate are based on the data in 2025 and predictions, which may differ from the real circumstances. Second, it is challenging to fully establish a market that is efficient, characterized by a constant risk premium, and free from transaction costs in reality. CAPM assumes that the risk-free rate is fixed; however, it will fluctuate in an inflationary environment. Third, the asset scope limits paper deposits, bonds, and individual stocks. The result overlooks other asset classes, such as gold, real estate, and REITs, which are essential for a diverse investment portfolio. Therefore, the applicability of the conclusion is limited.

Looking ahead, central banks may gradually hike rates after stabilizing inflation, which will shift the risk-return balance of stocks and equities. Additionally, more investors will incorporate equities, bonds, and inflation-protected assets into multi-asset strategies, making them increasingly important for preserving purchasing power.

On the methodological side, future research may enhance the applicability of CAPM and EPV in an inflationary environment by incorporating a dynamic risk premium and time-varying interest rate model, such as Monte Carlo simulations or Value-at-Risk (VaR) analysis. These methods could provide a more realistic evaluation of asset performance and downside risk under complex inflationary scenarios.

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