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Impact of CPI on Financial Performance: A Study of the U.S QSR Industry

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Abstract: This paper focus on the influence of Consumer Price Index on company's Return on Equity within the U.S. Quick Service Restaurant (QSR) industry. Utilizing quarterly data from 2008 to 2024, the study employs a linear regression model to analyze the impact of inflation on profitability, controlling for company size through total assets. Four models with varying time lags—ranging from one quarter to two years—are tested to capture possible delayed effects of CPI on QSR companies' performances. The findings reveal that while most models show an insignificant correlation between CPI and ROE, the model incorporating a 1.5-year lag identifies a negative impact of CPI on ROE. This result highlights the importance of considering inflation's time-lagged effects on profitability in competitive sectors like QSR. The study's conclusions offer valuable insights for financial forecasting and investment strategies in the QSR industry, although limitations regarding sample size and geographic focus are noted.

Keywords: Consumer Price Index, Return on Equity, Quick Service Restaurants, Inflation, Financial Performance.

1. Introduction

Over the past year, 2023, the agricultural and food industries have contributed approximately $1.53 trillion to the U.S. GDP [1]. Within this, consumer spending on the Quick Service Restaurant (QSR) sector alone accounted for over $340 billion, representing a significant share of the overall contribution [2]. This substantial economic impact highlights the critical role that the QSR industry plays in the U.S. economy.

As a driver of economic activity and an integral component of the broader economy, the Quick Service Restaurant (QSR) sector is inevitably influenced by macroeconomic determinants. These factors, both directly and indirectly, shape the sector's performance by affecting consumer behavior, input costs, and overall profitability. Consequently, understanding the macroeconomic environment is essential for assessing the financial health and resilience of the QSR industry.

Inflation, as measured by the Consumer Price Index (CPI), is a significant macroeconomic factor that influences various industries, including the QSR sector. Changes in CPI directly impact the costs of inputs such as raw materials, labor, and operational expenses, ultimately affecting a company's profitability. Return on Equity (ROE), a key measurement for assessing a company's financial performance, is sensitive to these inflationary pressures. While previous studies have extensively explored the relationship between CPI and profitability metrics like ROE and ROA (Return on

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Assets), limited research has focused on how inflation affects profitability ratios within the U.S. QSR industry [3, 4].

This paper aims to address this gap by examining the relationship between CPI and ROE of QSR companies. Utilizing quarterly data from 2008 to 2024, this study applies a linear regression model to analyze the impact of CPI on ROE, controlling for company size by using the natural logarithm of total assets. Additionally, the analysis considers several time lags to capture the possible delayed impacts of inflation on corporate profitability. The results of this study will provide valuable insights into the effect of inflation on profitability within the U.S. QSR sector, with broader implications for investment strategies and financial forecasting.

2. Literature Review

The relationship between macroeconomic factors, such as the CPI, and the quantified financial performance such as profitability ratios, has garnered significant attention in recent research. As ROE shows how much profit is generated by the company for each rupee invested by shareholders, it primarily reflects the company's profitability and is highly significant for investors [5]. Whether for financial or non-financial companies, the ROE metric is crucial. Previous research has examined the relationship between the banking sector's ROE and GDP growth in the European Union, concluding that inflation has a positive impact on banks' ROE [6]. This positive correlation can be attributed to the nature of banks' revenue sources and their sensitivity to macroeconomic factors like interest rates, which often move in tandem with inflation. As inflation increases, banks typically benefit from higher interest margins, which in turn boosts their profitability and ROE. However, this relationship is not directly transferable to non-financial sectors due to fundamental differences in revenue sources, leverage and capital structure, and the direct impact of interest rates [7].

A study examining the correlations between stock returns and profit margins in relation to inflation found a negative relationship between profit margins and CPI, during both high and low inflation periods [8]. The study explicitly highlighted that profit margins are a key driver of ROE, particularly in inflationary environments, suggesting a negative relationship between ROE and CPI. However, it's important to realize that the research did not have a focus on any specific economic sector but rather analyzed all companies across the board that issue common stocks.

Another research by Mohd, Siddiqui and Ahmed has investigated the relationship between CPI and Return on Assets (ROA) across seven industries in Pakistan including the food industry [9]. The study has revealed a statistically significant negative relationship between CPI and Return on Assets (ROA) for companies within the food industry in Pakistan. As inflation rises, companies in the food industry, including Quick Service Restaurant (QSR) companies, experience pressure on their profit margins due to increased costs for raw materials, labor, and other inputs, etc. Since both ROA and ROE indicate a company’s profitability and represent similar concepts, higher values for either generally signal greater profitability. Therefore, it is reasonable to expect that the negative impact of CPI on ROA would extend to ROE as well.

Building on these insights, the hypothesis for this study is that there exists a negative relationship between CPI and ROE within the food industry. As a key component of the food industry, QSR companies are expected to experience similar pressures from inflation as other food companies, where rising CPI could erode profit margins, thereby reducing ROE.

3. Data and Methodology

3.1. Objective

This study employs a linear regression model to find an answer to the research question, the impact of the National Price Index (CPI) on fast food large-cap companies’ Return on Equity (ROE), while

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take natural logarithm of each company's total assets as the control variable. The rationale for selecting this approach is based on linear regression model's ability to quantify the relationship between macro-economic independent variable and company performance index.

3.2. Data Selection

Data used in this research was secondary data from the US Federal Reserve , annual and quarterly reports of QSR restaurant companies from their offical websites. The companies selected for this study meet the following rigorous criteria: they must have comprehensive quarterly financial data, including Return on Equity (ROE) and Total Assets, consistently available from Q1 2008 to Q2 2024; they must have been publicly traded throughout the entire study period; they must be classified within the Quick Service Restaurant (QSR) sector; and their primary operations must be based within the United States.

There are two selected companies that satisfy the above requirements: Yum, Inc. and Mcdonald's. Although Domino's Pizza, Inc. and Chipotle Mexican Grill, Inc. meet most of the sampling requirements, their financial data from 2008 is incomplete.

3.3. Variable and Regressors Description

3.3.1. Dependent Variable

3.3.1.1. ROE (Return on Equity)

ROE represents companies' financial performances. This metric is chosen due to its widespread use in evaluating a company's profitability in relation to its equity base.

3.3.1.2. CPI

Two key regressors are selected in the linear regression model to analyze their impact on the dependent variable, QSR restaurant chain company's ROE.

National Consumer Price Index (CPI): The primary regressor in the model is the CPI, which is the independent variable of interest. CPI is chosen due to its role as a broad measure of inflation, which can influence various aspects of a company's financial performance, including costs, pricing strategies, and overall profitability. The influences of macroeconomic inflationary pressures on the ROE of companies over time is quantified by including CPI as the regressor of interest.

3.3.1.3. Business Size

Natural Logarithm of Total Assets (ln(Total Assets)): the natural logarithm of total assets is included as a control variable in the model, also functioning as a regressor. The natural logarithm transformation is applied to total assets to reduce the impact of outliers. Including ln(Total Assets) as a regressor allows the model to account for differences in company size, ensuring that the effect of CPI on ROE is not confounded by variations in the scale of operations across different firms.

3.4. Model Specification

In the context of macroeconomic analysis, it is recognized that CPI often responds more quickly to economic changes—typically within 1 to 3 months—compared to the Producer Price Index (PPI) [10]. This quicker response of CPI suggests that its effects on corporate profitability could manifest relatively soon after changes occur. However, the exact timing of these impacts can vary depending on several factors, such as how quickly companies can adjust prices or manage costs.

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Given this variability, the precise length of the time lag—how long it takes for changes in CPI to affect profitability—remains uncertain. To capture these potential delayed effects, a lag structure has been introduced in the analysis, testing four different time periods through separate linear regression models. These models examine the impact of CPI at varying lags, ranging from one quarter to one and a half years prior, to determine the most significant lag period affecting profitability. Model 1 is to test the impact of CPI from the last quarter on this quarter's ROE (Equation (1)), model 2 examines the impact of CPI one year ago (Equation (2)), model 3 examines the impact of CPI from one and a half year earlier with Equation (3), while model 4 tests with the CPI from 2 years earlier (Equation (4)).

Model 1: Impact of CPI from last quarter (t-1)

$$\mathrm{ROE}_{\mathrm{i,t}} = \beta_1 \times \mathrm{CPI}_{\mathrm{t-1}} + \beta_2 \times \ln\left(\mathrm{Total\ \ Asset\ }_{\mathrm{i,t}}\right) + \epsilon_{i,t} \quad (1)$$

$\mathrm{CPI}_{\mathrm{t-1}}$ Represents the CPI for the country where the company operates, which in the context refers to the US, in the previous quarter (t−1).

Model 2: Impact of CPI from one year earlier (t-4)

$$\mathrm{ROE}_{\mathrm{i,t}} = \beta_1 \times \mathrm{CPI}_{\mathrm{t-4}} + \beta_2 \times \ln\left(\mathrm{Total\ \ Asset\ }_{\mathrm{i,t}}\right) + \epsilon_{i,t} \quad (2)$$

$\mathrm{CPI}_{\mathrm{t-4}}$ Represents the CPI for the country where the company operates one year (four quarters) earlier (t-4).

Model 3: Impact of CPI from one and a half year earlier (t-6)

$$\mathrm{ROE}_{\mathrm{i,t}} = \beta_1 \times \mathrm{CPI}_{\mathrm{t-6}} + \beta_2 \times \ln\left(\mathrm{Total\ \ Asset\ }_{\mathrm{i,t}}\right) + \epsilon_{i,t} \quad (3)$$

Model 4: Impact of CPI from two years earlier (t-8)

$$\mathrm{ROE}_{\mathrm{i,t}} = \beta_1 \times \mathrm{CPI}_{\mathrm{t-8}} + \beta_2 \times \ln\left(\mathrm{Total\ \ Asset\ }_{\mathrm{i,t}}\right) + \epsilon_{i,t} \quad (4)$$

For all equations, $\epsilon_{i,t}$ is the error term, accounting for other hidden factors affecting ROE for company i, at time t.

These four models allow for a comprehensive analysis of the impact of inflation on corporate profitability, capturing both immediate and more delayed effects of changes in CPI on ROE.

4. Result and Discussion

4.1. Descriptive Statistic

The Descriptive statistics for data used in this research has been listed in Table 1 below. On average the total return on equity of two companies in chosen time period is -8.49% but the whole data set for ROE ranging from -215.08 to 346.52 with a large value of standard deviation. For the same time period, CPI varies less with a standard deviation of 0.29.

Table 1: Descriptive statistics for variables included in this research

	ROE%	CPI%	Total Assets	Ln(Total Assets)
N-Observations	127.00	128.00	127.00	127.00
Mean	-8.49	0.22	1616.29	7.04
Std. Dev.	62.33	0.29	1211.85	0.89
Min	-215.08	-0.47	293.74	5.68
Max	346.52	1.03	3993.39	8.29

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4.2. Regression Result

Table 2 presents the results of Pearson Correlation between each of all variables, which provides insights into the linear relationships between each variables. The Pearson correlation between ROE and CPI is -0.11, presenting a weak negative correlation. It indicates that there is a tendency for ROE to decrease as CPI increases, although the tendency is slight. This preliminary finding aligns with the hypothesis that higher CPI could have a detrimental impact on QSR companies' ROE.

Table 2: Pearson correlation coefficients for variables included in this research

	ROE%	CPI%	Total Assets	Ln(Total Assets)
ROE%	1.00			
CPI%	-0.11	1.00		
Total Assets	0.23	0.12	1.00	
Ln	-0.28	0.02	0.88	1.00

Results of Model 1 (1 quarter lagged) is in Table 3.

Table 3: Regression result of Model 1

					Number of observations = 124 (outliers removed)	
					F-value = 5.812	
					Prob > F = 0.0039	
					R-sqaured = 0.088	
	Coef.	Std. Err.	t	P > | t |	95% Conf. Interval	
CPI_{t-1}	-23.857	18.468	-1.292	0.199	-60.418	12.704
$\ln(\text{Total Asset}_{i,t})$	-18.9468	6.031	-3.142	0.002	-60.418	12.704
Cons $\epsilon_{i,t}$	129.5635	43.024	3.011	0.003	44.386	214.741

The analysis of Model 1, incorporating a one-quarter lag, reveals that the relationship between ROEt and CPIt-1 is statistically insignificant. The coefficient for CPIt-1 is -23.857, indicating a negative association with ROE. However, the corresponding P-value of 0.199 exceeds the conventional threshold of significance (0.05), implying that this relationship lacks statistical robustness and cannot be considered a reliable predictor of ROE within the model. The model's overall significance is supported by an F-value of 5.812 and a Prob > F of 0.0039, indicating that while the model itself is statistically significant, the specific impact of CPI remains inconclusive and does not significantly explain variations in ROE in this context.

Results of Model 2 (1 year lagged) in in Table 4.

Table 4: Regression result of Model 2

					Number of observations = 124 (outliers removed)	
					F-value = 5.377	
					Prob > F = 0.00582	
					R-sqaured = 0.084	
	Coef.	Std. Err.	t	P > | t |	95% Conf. Interval	
CPI_{t-4}	10.3096	18.655	0.553	0.582	-26.632	47.251
$\ln\left(\text{Total Asset}_{i,t}\right)$	-19.9327	6.172	-3.23	0.002	-32.155	-7.711
Cons $\epsilon_{i,t}$	128.0320	44.062	2.906	0.004	40.777	215.287

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Incorporating a 1 year time lag, model 2 shows that the relationship between ROE and CPI one year earlier is also statistically insignificnat, as the P-value of 0.582 is way exceeding the conventional threshold of significance.

Results of Model 3 (1.5 year lagged) is in Table 5.

Table 5: Regression result of Model 3

					Number of observations = 124 (outliers removed)	
					F-value = 7.157	
					Prob > F = 0.00118	
					R-sqaured = 0.111	
	Coef.	Std. Err.	t	P > | t |	95% Conf. Interval	
CPI_{t-6}	-37.8352	18.705	-2.023	0.045	-74.886	-0.784
$\ln(\text{Total Asset}_{i,t})$	-19.4882	6.12	-3.184	0.002	-31.612	-7.365
Cons $\epsilon_{i,t}$	133.536	43.746	3.053	0.003	46.884	220.188

Incorporating a 1.5-year lag, model 3 reveal a statistically significant negative relationship between CPI and ROEt. Specifically, the coefficient for CPIt-6 is -37.8352, and the corresponding p-value is 0.045, which is below the 0.05 conventional threshold of significance. This suggests that CPI from 1.5 years prior has a significant negative impact on ROE.

Results of Model 4 (2 years lagged) is in Table 6.

Table 6: Regression result of Model 4

					Number of observations = 124 (outliers removed)	
					F-value = 5.696	
					Prob > F = 0.00441	
					R-sqaured = 0.092	
	Coef.	Std. Err.	t	P > | t |	95% Conf. Interval	
CPI_{t-8}	14.13	19.195	0.736	0.463	-23.902	52.162
$\ln\left(\text{Total Asset}_{i,t}\right)$	-20.7327	6.273	-3.305	0.001	-23.902	52.162
Cons $\epsilon_{i,t}$	129.2551	44.887	2.88	0.005	40.316	218.194

The results of model 4 show that the impact of CPIt-8 on ROEt is statiscally insignificant, as the P-value is bigger than the conventional threshold of significance.

Among the analyses of all four regression models presented, Model 3 stands out as the only one that identifies the negative impact of CPI on ROE as statistically significant. Specifically, this model reveals that CPI from 1.5 years prior has a negative effect on the current ROE of companies in the QSR industry in the United States. This finding aligns with the original hypothesis that posits a negative relationship between CPI and ROE within this sector, in addition, also underscores the importance of considering time lags in economic analyses, particularly in industries like QSR, where the ability to adjust quickly to economic conditions can be limited.

4.3. Discussion

The mechanism behind the time lag likely involves the time it takes for deflationary and inflationary pressures to fully permeate through the supply chain, cost structures, and pricing strategies of QSR companies. Given that the US QSR industry is highly fragmented, with an expected CAGR of 0.48%

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over the projection period, QSR companies face significant challenges in rapidly adjusting prices due to intense competitive pressures and cautious consumer behavior [11]. For instance, during deflationary period, this delay or inability in price adjustments, coupled with rising costs and a fiercely competitive environment, can compress profit margins, ultimately leading to reduced profitability and a decline in ROE.

The negative impact of CPI from 1.5 years ago on QSR companies' ROE also has several applications in financial forecasting and investment strategies. By considering the anticipated effects of current CPI on future profitability, current information can be used to adjust forecasts and investment plans. From the QSR companies' perspective, the findings suggest the delayed risk that current inflationary/deflationary pressure would pose on profitability in the future. Understanding the lagged impact of CPI, companies may also seek to lock in long-term contracts for key inputs at fixed prices to mitigate the future impact of inflation on their ROE. This finding also provides a basis for comparative studies across different sectors to explore whether similar lagged effects of CPI are present, potentially leading to broader insights into how various industries respond to inflation.

In model 3, the range of CPI is in the negative region, while other models all ranging from negative to positive region. This implies a possibility that the negative impact on ROE may rather due to the economic challenges associated with deflation which reflected on CPI.

5. Conclusion

In conclusion, this study provides empirical evidence on the impact of CPI on ROE within the U.S. QSR industry. Through the analysis over the period from Q1 2008 to Q2 2024, the results demonstrate that CPI has a complex and time-lagged impact on profitability. While most models reveal an insignificant correlation between CPI and ROE, the model that incorporates a 1.5-year lag, identifies a statistically significant negative relationship. This suggests that CPI from 1.5 years earlier negatively affects the current ROE of QSR companies.

The findings align with the hypothesis that rising inflation, even when CPI remains in a negative range, can erode profitability, especially in a highly competitive industry like QSR. The delay in adjusting to economic conditions highlights the importance of considering time lags in analyzing the financial impact of macroeconomic variables.

Despite the study's contributions, there are notable limitations. The sample size is restricted to two large-cap companies, and the findings are specific to the U.S. market. Additionally, the linear model may not fully capture the complexities of the relationship between macroeconomic factors and profitability. Also, the exclusive focus on the U.S. market may limits the applicability of the findings to other regions where QSR companies may encounter different inflationary pressures and competitive landscapes.

Future research could expand the scope to include more companies, different geographic regions, to provide a broader understanding of CPI's impact on financial performance across various sectors. Nonetheless, this study offers valuable insights into how inflationary pressures can affect the financial health of the QSR industry, with important implications for financial forecasting and investment strategies.

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