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AN EMPIRICAL ANALYSIS OF FINANCIAL PERFORMANCE OF PUBLIC SECTOR INTEGRATED REFINING AND MARKETING OIL COMPANIES IN INDIA

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The current study attempts to evaluate the financial condition and position of the integrated refining and marketing oil companies in the Indian public sector by appropriately defining the linkages between the income statement and balance sheet items. Three BSE-listed public sector oil businesses are the subject of the study. During the ten-year study period, which ran from 2010–11 to 2019–20, the relevant data was gathered from the focus oil firms' annual reports. BPCL stood out as the most financially sound among the three oil majors. It maintained the strongest cash position, fastest receivables collection, and most efficient asset utilization, translating into higher profitability and market valuation. HPCL was more aggressive in paying creditors but struggled with cash volatility and lower returns, and carried higher debt levels. IOCL, while more conservative in its financing and slightly better in employee productivity, lagged in asset efficiency and receivables management. Overall, BPCL demonstrated the best balance of liquidity, profitability, and investor confidence, making it the top performer in the group. The study does not compare with private sector oil companies and solely relies on publicly available financial data. This is a significant research restriction. Measuring the firm's liquidity, solvency, profitability, efficiency, and other indicators that the business is run normally and rationally—ensuring sufficient returns to shareholders to sustain at least its market value—is a critical component of the study. The study will assist investors in determining the characteristics of Indian public sector oil businesses and in making investment decisions.

KEY WORDS: ***Financial Performance, Public Sector, Indian Oil Companies, Liquidity, Efficiency, Profitability, Solvency, Value added, Multiple Regressions***

1. INTRODUCTION

The public sector has been pivotal in India's planned economic and industrial development, especially in strategic sectors like oil and gas. Despite liberalisation and privatisation, public sector enterprises (PSEs) continue to play a vital role in national progress. In the energy sector, petroleum remains a cornerstone of industrial growth and modern living. India, the world's third-largest energy consumer, has a refining capacity of 249 MMTPA, with Indian public sector petroleum companies like BPCL, HPCL and IOCL contributing significantly. Together with private players, the top three refiners account for nearly 67% of output. With expanding pipeline infrastructure and LNG capacity, India is positioning itself as a global refining hub. This study aims to critically assess the financial condition and position of the public sector refining and marketing companies in India, given their strategic importance to the Indian economy.

India's public sector oil companies—IOCL, BPCL, and HPCL—are central to the country's energy security and economic development. However, they operate in an increasingly volatile environment marked by fluctuating global crude prices, deregulation, rising private sector competition, and the ongoing shift toward cleaner energy sources. While these enterprises remain strategically important, there is a noticeable gap in contemporary, comprehensive financial assessments that evaluate their performance across critical dimensions such as profitability, solvency, liquidity, and market valuation. Existing analyses often fail to reflect recent structural reforms, disinvestment efforts, and

external shocks impacting the sector. This article discusses the pressing need for a multifaceted, data-driven financial assessment of these businesses to offer investors, legislators, and industry stakeholders' useful information in the quickly changing oil and gas sector.

2. REVIEW OF EXISTING LITERATURE

The existing literature on the evaluation of financial health of oil and gas companies, particularly in India, encompasses a wide range of themes including investment behavior, working capital management, profitability, capital structure, and the impact of regulatory changes.

Investment and Economic Factors:

Reiss (1989) provided foundational insights into the investment activities of independent oil and gas firms, highlighting the role of credit constraints during energy price deflation. Similarly, Sauter and Awerbuch (2003) emphasized the macroeconomic impact of oil price volatility on economic indicators in IEA countries.

Working Capital and Liquidity: Several studies such as Durga Devi (2013), Sarkar and Sarkar (2013), and Yadav et al. (2001), concentrated on working capital management and liquidity. The findings of these studies were conflicting; although some companies, like HPCL, demonstrated superior receivables management, others, like BPCL, demonstrated somewhat lower liquidity positions.

Profitability and Financial Performance: Balakrishnan (2005), Sharma (2011), and Durga Devi (2013) analyzed profitability metrics of Indian oil companies, noting that IOCL often led in connection with gross profit and liquidity. However, some studies highlighted weak profitability across all three major public sector units (IOCL, BPCL, and HPCL) at various times, often recommending operational improvements and better cost management.

Regulatory and Policy Impact: Chatterjee (2010) and Bandyopadhyay (2016) explored the effect of policy changes such as the Administered Pricing Mechanism (APM) and deregulation. They found that post-liberalization and post-APM periods witnessed improved competitiveness and financial efficiency among Indian oil companies.

Capital Structure and Leverage: Singh and Kumar (2014) and Sarkar et al. (2020) studied capital structure decisions and their implications on profitability and risk. These studies emphasized the benefits of leveraging debt financing in capital-intensive sectors like oil and gas, given the companies' strong earnings and reserves.

Comparative Sectoral Analysis: Sharma and Agarwal (2019) evaluated petroleum companies in the public and private sectors, they discovered that private enterprises, such as Cairn India, outperformed the public sector in terms of financial parameters. But the public sector also showed steady expansion in a few areas, indicating a well-rounded performance all around.

Sector-Wide Evaluations: Jhala (2007) and Bhunia (2010) assessed operational effectiveness and financial health using comprehensive analytical methods such as regression, Z-scores, and ratio analysis, and they suggested better utilisation of assets and liquidity management. The research indicates that although Indian public sector oil businesses have experienced notable expansion and enhancement after liberalisation and policy changes, several aspects including capital structure optimisation, profitability, and liquidity management still need careful consideration. The significance of efficiency and adaptation in a deregulated, competitive global energy market is highlighted by comparative analysis.

The Indian petroleum sector is vital to the nation's economy, with public sector undertakings (PSUs) like IOCL, BPCL, and HPCL playing a central role in ensuring energy security, price stability, and equitable distribution. Performance analysis of the empirical financial data has become essential to evaluate their profitability, efficiency, and resilience amid regulatory changes, geopolitical shocks, and the energy transition. This study aims to address gaps in existing literature by offering a comprehensive, multi-variable financial assessment of these PSUs, providing insightful information to stakeholders, legislators, and investors.

3. OBJECTIVES OF THE STUDY

I. To assess the short-term financial health of BPCL, HPCL, and IOCL by examining their liquidity positions from 2010–11 to 2019–20, focusing on their ability to cover immediate liabilities.

II. To analyze asset utilization efficiency to determine how effectively each company managed its resources to support operations and generate income.

III. Study profitability patterns to gauge how consistently and efficiently these companies turned investments and expenses into profits.

IV. To evaluate the capital structure and long-term solvency of the firms to understand financial stability and debt dependency over the study period.

V. To examine value creation by these enterprises, considering their economic contributions to key stakeholders such as the government, employees, and shareholders.

VI. To conduct a comparative analysis of the overall financial performance to identify the relative strengths and weaknesses of IOCL, BPCL, and HPCL during the decade under review.

4. METHODOLOGY OF THE STUDY

The current study is on three public sector enterprises (PSUs) in India that are listed on the Bombay Stock Exchange (BSE) and

are involved in the integrated refining and marketing of petroleum products. The businesses that have been chosen are Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), and Indian Oil Corporation Limited (IOCL). Convenience sampling was used in the selection of the sample.

The study's ten-year timeframe is from 2010–11 to 2019–20. The Department of Public Enterprises, Government of India, issued the Public Enterprises Survey, and the annual reports of the corresponding firms served as the main sources of data for the analysis. The study examines important factors including liquidity, efficiency, profitability, solvency, and value addition in order to evaluate these organisations' financial performance. A variety of accounting ratios have been used for this purpose, and the study analyses trends and correlations between financial variables using a number of statistical methods and methodologies. These comprise the following: Time Series Analysis (Linear Trend Analysis), Correlation and Regression Analysis (Pearson Correlation Coefficient, Coefficient of Determination (R2), Multiple Linear Regression), Descriptive Statistics (Arithmetic Mean, Standard Deviation, and Coefficient of Variation), and Statistical Inference Tests (t-Test, F-Test, and Durbin-Watson Statistic).

5. HYPOTHESES OF THE STUDY

H_{01}: Liquidity is not related to the profitability in public sector oil companies.
H_{11}: Liquidity is significantly related to the profitability in public sector oil companies.
H_{02}: Efficiency has no relationship with the financial performance of public sector oil companies in India.
H_{12}: Efficiency has a significant relationship with the financial performance of public sector oil companies in India.
H_{03}: The financial performance of public sector oil companies is unaffected by leverage.
H_{13}: The financial performance of public sector oil companies is significantly affected by leverage.
H_{04}: The profitability of India's public sector oil companies is the same (i.e., there is no significant difference among them).
H_{14}: The profitability of India's public sector oil companies varies significantly.
H_{05}: The financial performance of India's public sector oil companies is unaffected by value added.
H_{15}: The financial performance of India's public sector oil companies is significantly affected by value added.

6. OVERVIEW OF THE FOCAL OIL COMPANIES

Bharat Petroleum Corporation Limited (BPCL) is a prominent Indian public sector enterprise in the oil and gas sector, established in 1889 and nationalized in 1976. It operates three major refineries and has diversified into renewable energy. Despite facing legal challenges in privatization, BPCL has pursued significant investments and was awarded "Maharatna" status in 2017. Financially, it has shown consistent revenue growth from FY 2010–11 to FY 2019–20, although it has faced volatile profits and liquidity issues.

Hindustan Petroleum Corporation Limited (HPCL), also a major public sector undertaking, was established in 1974 through the nationalization of Esso entities. It operates refineries in Mumbai and Visakhapatnam and has a vast fuel distribution network. HPCL has diversified into upstream exploration and renewable energy, with net sales nearly doubling from FY 2010–11 to FY 2018–19. However, it has faced profitability volatility and liquidity challenges due to rising debt and negative net working capital.

Indian Oil Corporation Limited (IOCL), the largest public sector enterprise in India, was formed in 1959 and operates across the hydrocarbon value chain. With 11 refineries and a vast pipeline network, IOCL has also ventured into renewable energy. Its net sales increased significantly from FY 2010–11 to FY 2018–19, but profitability has fluctuated. Rising debt levels and negative net working capital have raised concerns about financial leverage, highlighting the need for improved working capital management and diversification into clean energy for long-term sustainability.

7. EMPIRICAL RESULTS AND ANALYSIS

SECTION - I

BPCL

	CPR	LR	STR	DTR	CTR	ROA	ROCE	DER	VA	TQ
N	10	10	10	10	10	10	10	10	10	10
Mean	.0206	.4440	13.5203	60.6414	7.7516	.0953	.1999	.4628	9.9746	.6580
Median	.0077	.4697	13.6170	57.7433	7.6616	.1004	.2135	.4841	10.0370	.6430
Std. Deviation	.02448	.07945	1.32773	10.79076	1.28259	.03303	.04897	.20027	.28710	.24543
C.V.(%)	118.83495	17.89414	9.820270	17.794378	16.54613	34.65897	24.49724	43.27355	2.878310	37.29939
Minimum	.00	.33	10.69	46.16	5.83	.04	.08	.14	9.47	.39
Maximum	.07	.53	15.22	80.11	10.53	.15	.25	.79	10.34	1.02

Table – 1: Descriptive Statistics

Table 1 showed that BPCL's average cash position was 2.06%, but it varied a lot over time (high standard deviation and high CV).Median (0.77%) was lower than mean (2.06%), suggesting a few higher cash ratios pushed the mean up (positive skewness). In some years, cash position was zero showing cash management instability in certain periods. Liquidity ratio was reasonable, indicating sensible short-term financial health. Some year-to-year variation existed, but not extreme. BPCL's stock turnover ratio was consistent. Low variability (CV = 9.8%) means the company's ability to meet short-term obligations was stable over time. High DTR means BPCL was efficient in collecting receivables quickly.However, sensible variability showed that receivable collection efficiency fluctuated between years. BPCL usually paid suppliers 7–8 times a year, indicating a reasonable credit cycle. Some fluctuation was present, but variability was reasonable. ROA was good, close to 10% most years. But there was significant variability, meaning profitability over assets was fluctuated depending on performance or oil prices. ROCE was strong, indicating BPCL was generating good returns on the capital invested. Variability was restrained. BPCL had sensible leverage and debt was around 46% of equity on average. But the DER was fluctuated significantly over years.Employee productivity in terms of value addition was very stable and consistently high at BPCL. A Tobin's Q below 1 indicated under-valuation in market terms. High variability showed the company's market perception has fluctuated over years.

Table – 2: One-Sample t-Test Results

	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
CPR	2.663	.026	.02062	.0031	.0381
STR	32.201	.000	13.52026	12.5705	14.4701
DTR	17.771	.000	60.64140	52.9222	68.3606
CTR	19.112	.000	7.75158	6.8341	8.6691
ROA	9.125	.000	.09532	.0717	.1190
RONW	8.119	.000	.18432	.1330	.2357
ROCE	12.908	.000	.19987	.1648	.2349
DER	7.308	.000	.46281	.3196	.6061
VA	109.866	.000	9.97460	9.7692	10.1800
TQ	8.478	.000	.65800	.4824	.8336
LR	17.674	.000	.44403	.3872	.5009

Every variable was shown to be statistically significant at the 5% level in Table-2, indicating their mean values were meaningfully different from the assumed test value. BPCL's cash position was small but statistically significant. Liquidity (LR) was significant and stable. Stock turnover was sensible and statistically significant. Strong and significant debtor turnover (fast collection) was seen. BPCL significantly rotated creditors around 8 times per year. A statistically significant high asset profitability (ROA) was noted for BPCL. BPCL's strong capital efficiency (ROCE) was seen, which was highly significant. BPCL's value added was extremely consistent and significant employee productivity. Debt-equity ratio was reasonable and statistically significant. BPCL was statistically undervalued in market terms. Finally, highest t-values were seen in STR and VA, showing very strong and consistent performance in short-term solvency and employee productivity.CPR had the lowest t-valueand marginal significance**,** indicating cash position was positive but less strong and stable than other indicators.

HPCL

Table – 3: Descriptive Statistics

		CPR	STR	DTR	CTR	ROA	ROCE	DER	VA	TQ	LR
N	Valid	10	10	10	10	10	10	10	10	10	10
Mean		.0043	12.2043	49.9707	11.9859	.0708	.1488	.6039	9.7143	.3262	.4470
Median		.0018	12.5213	49.5345	11.9038	.0602	.1210	.5656	9.7335	.2900	.4045
Std. Deviation		.00749	1.85762	4.83758	1.71792	.03196	.07623	.24792	.29788	.19545	.11124
C.V.(%)		174.1860	15.22102	9.680833	14.33284	45.14124	51.22983	41.05315	3.066407	59.91722	24.88591
Minimum		.00	8.83	42.89	10.04	.03	.06	.31	9.21	.13	.31
Maximum		.03	14.64	59.79	14.94	.12	.29	1.04	10.10	.68	.62

Table-3 highlighted that liquidity management appeared weak overall, with a very low average Cash Position Ratio (0.0043) and a suboptimal Liquid Ratio (0.4470). It showed considerable inconsistency amongst firms and a lack of liquid funds to cover short-term contracts. Working-capital efficiency was relatively strong, as reflected in high average turnover ratios—Stock (12.20), Debtors (49.97), and Creditors (11.99)—showing efficient inventory movement, quick receivables collection, and timely payments to suppliers. However, firms with lower STR or DTR faced operational inefficiencies. Profitability and capital

structure metrics, such as ROA (7.08%) and ROCE (14.88%), showed moderate returns but with high variability, suggesting differing managerial or strategic effectiveness. The average Debt-Equity Ratio (0.6039) indicated moderate leverage, but high-leverage firms (DER > 0.8) were advised to be cautious of debt risks. Finally, market valuation appeared weak, with an average Tobin's Q of 0.3262 implying undervaluation relative to asset replacement cost. Despite stable value creation (VA of 9.7143), investor skepticism seemed to stem from inconsistent performance or uncertain growth prospects.

Table – 4: One-Sample t-Test Results

	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
CPR	1.817	.013	.00430	-.0011	.0097
STR	20.776	.000	12.20435	10.8755	13.5332
DTR	32.665	.000	49.97073	46.5101	53.4313
CTR	22.063	.000	11.98590	10.7570	13.2148
ROA	7.008	.000	.07081	.0480	.0937
ROCE	6.174	.000	.14883	.0943	.2034
DER	7.702	.000	.60386	.4265	.7812
VA	103.128	.000	9.71430	9.5012	9.9274
TQ	5.278	.001	.32620	.1864	.4660
LR	12.707	.000	.44701	.3674	.5266

According to Table 4, all variables had mean values that differed significantly from the presumptive test value, demonstrating that they were statistically significant at the 5% level. At the 5% significance level or higher, the one-sample t-test results show that all financial indicators, except for the Cash Position Ratio (CPR), show statistically significant mean differences from their hypothesised benchmark values. For CPR, the computed t-value of 1.817 corresponds to a two-tailed p-value of 0.103, suggesting that the null hypothesis cannot be rejected—implying that, on average, the cash position does not significantly differ from the test value. In contrast, the Stock Turnover Ratio (STR), Debtors Turnover Ratio (DTR), Creditors Turnover Ratio (CTR), Return on Assets (ROA), Return on Capital Employed (ROCE), Debt-Equity Ratio (DER), Value Added (VA), Tobin's Q (TQ), and Liquidity Ratio (LR) all exhibit highly significant deviations ($p < 0.01$ in nearly all cases). The observed mean differences range from moderate—for instance, Tobin's Q with a mean difference of 0.3262—to substantial, such as the Debtors Turnover Ratio with a mean difference of 49.9707. Additionally, the corresponding 95% confidence intervals are narrow and do not encompass zero, further reinforcing the statistical significance of these findings.

IOCL

Table – 5: Descriptive Statistics

	CPR	STR	DTR	CTR	ROA	DER	VA	TQ	LR
N	10	10	10	10	10	10	10	10	10
Mean	.0052	7.7086	44.8696	5.6387	.0757	.3451	10.3975	.3283	.5107
Median	.0032	7.7304	46.0685	5.6333	.0725	.3282	10.3701	.2957	.5091
Std. Deviation	.00629	.38506	7.06198	.46725	.02938	.11849	.33589	.11174	.13376
C.V.(%)	120.961	4.9952	15.7389	8.286484	38.8111	34.3349	3.230488	34.0359	26.1915
Minimum	.00	7.27	33.42	4.81	.04	.17	9.90	.17	.28
Maximum	.02	8.32	54.40	6.30	.13	.53	10.88	.56	.71

Table-5 exhibited that IOCL's average CPR was low at 0.52%, with high volatility (CV = 120.96%). This suggested tight cash management, possibly risking liquidity. A minimum buffer of 0.5% of assets was recommended to help absorb short-term shocks. Inventory management had been stable (STR = 7.71, CV = 4.99%), while receivables collection (DTR = 44.87, CV = 15.74%) showed more fluctuation. Payables turnover (CTR = 5.64, CV = 8.29%) was consistent. IOCL was advised to monitor receivables more closely in weaker years and maintain timely payments to suppliers. ROA averaged 7.57% (CV = 38.81%), indicating variability tied to operational efficiency and oil prices. IOCL was recommended to use scenario planning and cost controls to stabilize returns during downturns. A moderate average DER of 0.345 with fluctuations suggested episodic borrowing. The low average Liquidity Ratio (0.511) indicated a liquidity gap. IOCL was advised to consider a credit line and stabilize its debt strategy. With a TQ of 0.328 and stable VA (~10.40), IOCL was seen as a steady but low-growth firm. Strategic investments in growth areas like renewables were suggested to help enhance market valuation.

Table – 6: One-Sample t-Test Results

	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
CPR	2.606	.028	.00518	.0007	.0097
STR	63.307	.000	7.70858	7.4331	7.9840
DTR	20.092	.000	44.86964	39.8178	49.9215
CTR	38.162	.000	5.63867	5.3044	5.9729
ROA	8.142	.000	.07565	.0546	.0967
DER	9.211	.000	.34514	.2604	.4299
VA	97.887	.000	10.39746	10.1572	10.6377
TQ	9.290	.000	.32829	.2484	.4082
LR	12.073	.000	.51066	.4150	.6063

Table 6 exhibited demonstrated that each variable achieved statistical significance at the 5% level, suggesting that their average values significantly diverged from the hypothesized benchmark. This finding indicates that the companies consistently exhibited robust financial performance across several key areas. The Liquid Ratio (LR) significantly exceeded the test value by 0.51066 ($t = 12.073$, $p < .001$), with a 95% confidence interval [0.4150, 0.6063], indicating that firms upheld healthy short-term solvency buffers. The Cash Position Ratio (CPR) also surpassed the benchmark by a small yet statistically significant margin of 0.00518 ($t = 2.606$, $p = .028$), with a confidence interval [0.0007, 0.0097], suggesting a slightly conservative liquidity stance through marginally higher cash holdings. Stock Turnover Ratio (STR) showed remarkable efficiency in inventory management, outperforming the benchmark by 7.7086 turns ($t = 63.307$, $p < .001$), with a tight confidence interval [7.4331, 7.9840], pointing to reduced holding costs and lower risk of obsolescence. Debtors Turnover Ratio (DTR) exceeded the benchmark by 44.8696 turns ($t = 20.092$, $p < .001$), within a confidence range of [39.8178, 49.9215], highlighting robust receivables management supported by effective credit control and follow-up practices. Similarly, Creditors Turnover Ratio (CTR) was higher by 5.6387 turns ($t = 38.162$, $p < .001$), with the interval [5.3044, 5.9729], indicating rapid payment cycles that may reflect good supplier relations but could also imply under-utilization of trade credit. On the profitability front, Return on Assets (ROA) was higher by 0.07565 ($t = 8.142$, $p < .001$), with a confidence interval [0.0546, 0.0967], demonstrating efficient use of assets to generate earnings. The Debt-Equity Ratio (DER) showed that firms were more leveraged than the benchmark by 0.3451 ($t = 9.211$, $p < .001$), with a confidence interval [0.2604, 0.4299], indicating an aggressive financing approach that could boost returns but also elevate financial risk. In terms of value creation, Value Added (VA) exceeded the target by 10.39746 units ($t = 97.887$, $p < .001$), with a narrow confidence interval [10.1572, 10.6377], underscoring consistently strong operational performance. Lastly, Tobin's Q (TQ) surpassed the benchmark by 0.32829 ($t = 9.290$, $p < .001$), with a confidence interval [0.2484, 0.4082], reflecting positive market perceptions as firms' market values consistently exceeded the replacement costs of their assets.

Comparative Analysis

BPCL had the highest average cash position compared to HPCL and IOCL. HPCL's CPR was very low, and highly volatile (C.V. 174%), suggesting unstable cash holdings. BPCL showed the strongest short-term solvency, followed by HPCL. IOCL lags far behind, indicating weaker current asset management relative to liabilities. BPCL collected its receivables fastest among the three. Higher DTR indicated more efficient management of receivables. HPCL was paying its creditors more quickly than BPCL and IOCL. IOCL had the slowest payment cycle. BPCL used its assets most efficiently to generate profits. HPCL was the least efficient in asset utilization. BPCL generated a much higher return on the capital employed than HPCL. The company with the highest level of leverage (more debt than equity) was HPCL. IOCL kept its debt levels as conservative as possible. IOCL slightly outperformed in terms of employee productivity/value added. BPCL had a much higher Tobin's Q, indicating stronger market valuation relative to asset replacement cost. HPCL and IOCL were undervalued compared to BPCL. IOCL shows slightly better liquidity than BPCL and HPCL.BPCLappeared financially stronger in terms of liquidity (CPR, STR), profitability (ROA, ROCE), and market valuation (TQ). HPCL was more aggressive with creditors (higher CTR) but had unstable cash position (high CV in CPR). IOCL had a better value-added per employee and lower debt burden but struggled with asset turnover and receivables collection compared to BPCL.

SECTION – II

MULTIPLE REGRESSION MODELS

In this study, multiple regression models were developed to evaluate the influence of select financial indicators on key performance indicators, specifically Return on Assets (ROA), Return on Capital Employed (ROCE), and Value Added (VA). The regression framework was structured to analyse the degree to which a set of strategically selected independent variables.

Three regression models examined financial performance in Indian public sector oil companies to analyze how financial indicators influence company performance metrics in Indian public sector oil companies.

1. Model 1 (ROA):
   ROA=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7VA+β8TQ+ε*ROA=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7VA+β8TQ+ε*
2. Model 2 (ROCE):
   ROCE=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7VA+β8TQ+ε*ROCE=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7VA+β8TQ+ε*
3. Model 3 (VA):
   VA=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7TQ+ε*VA=β0+β1CPR+β2LR+β3STR+β4DTR+β5CTR+β6DER+β7TQ+ε*

Where:

ROA: Return on Assets
ROCE: Return on Capital Employed
VA: Value Added
CPR: Cash Position Ratio
LR: Liquidity Ratio
STR: Stock Turnover Ratio
DTR: Debtors' Turnover Ratio
CTR: Creditors' Turnover Ratio
DER: Debt-Equity Ratio
TQ: Tobin's Q
ε: Error term

BPCL

Table – 7: Correlation Analysis

CPR	1										
STR	-.168	1									
Prob.	.643										
DTR	.268	-.207	1								
Prob.	.455	.566									
CTR	-.158	.275	-.411	1							
Prob.	.663	.442	.238								
ROA	.334	-.092	.720*	-.354	1						
Prob.	.345	.800	.019	.315							
ROCE	.495	-.418	.371	-.041	.746*	.696*	1				
Prob.	.146	.230	.291	.910	.013	.025					
DER	-.224	.708*	.331	.006	.152	.236	-.464	1			
Prob.	.535	.022	.350	.986	.676	.511	.177				
VA	-.206	.583	.345	-.386	.521	.563	-.112	.763*	1		
Prob.	.568	.077	.329	.271	.122	.090	.758	.010			
TQ	-.029	.073	.647*	-.653*	.785**	.819**	.313	.344	.745*	1	
Prob.	.936	.841	.043	.040	.007	.004	.378	.331	.013		
LR	.420	.135	-.138	.597	.024	-.038	.299	-.179	-.316	-.449	1
Prob.	.226	.710	.704	.068	.948	.916	.401	.621	.373	.193	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

The correlation study between the different financial performance metrics for BPCL was shown in Table - 7, providing information on the direction, strength, and statistical significance of the associations between the variables. A correlation value close to +1 or -1 indicated a strong linear relationship, while a value near 0 indicated a weak relationship. Significance levels were denoted by asterisks: * at the 0.05 level and ** at the 0.01 level. The correlation analysis of BPCL's financial indicators revealed that cash holdings (CPR) were largely independent of other metrics, with the strongest—yet still insignificant—correlation seen with ROCE. Liquidity (LR) showed weak positive links with inventory and payables management but lacked any statistically significant impact. Inventory turnover (STR) had a significant positive correlation with the debt-equity ratio (DER), suggesting that higher debt may have been used to accelerate stock movement, likely due to aggressive working capital strategies. Effective receivables management is important, as evidenced by the debtor turnover ratio (DTR), which showed substantial, statistically significant positive connections with both profitability (ROA) and market valuation (Tobin's Q). TQ, on the other hand, showed a strong negative association with the creditor turnover ratio (CTR), suggesting that frequent supplier payments may have lowered investor confidence, maybe as a result of liquidity issues. The market clearly rewarded internal efficiency, as evidenced by the positive and significant relationships that ROA had with DTR, ROCE, and TQ. ROCE, in turn, had a strong relationship with TQ and a moderate one with value added (VA), reinforcing the importance of capital efficiency. DER had a dual role—positively associated with STR and VA, suggesting a productive use of debt, but negatively linked to ROCE and TQ, reflecting the potential downside of excessive leverage. TQ showed strong positive correlations with DTR, ROA, ROCE, and VA, and a significant negative one with CTR, underlining that market valuation favoured profitability, efficiency, and productivity, while being wary of strained supplier terms. Overall, BPCL's financial performance was most enhanced by effective credit management, capital optimization, and prudent use of debt.

After deleting DTR, STR, DER, and VA, the following regression analysis was finalised for removing multicollinearity.

Table – 8: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.099	.065	-1.526	.187		
	CPR	.432	.315	4.372	.008	.550	1.817
	TQ	.143	.031	4.561	.006	.555	1.803
	LR	.086	.118	.728	.499	.371	2.694
	CTR	.007	.008	.866	.426	.318	3.143
	R = 0.92	R2= 0.82	Adjusted R2= 0.73		Std. Error of the Estimate = 0.02		
	Prob of F statistic = 0.02				Durbin-Watson= 2.53		

Dependent Variable: ROA

Table - 9: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.053	.179	-.296	.779		
	CPR	1.004	.870	4.155	.000	.550	1.817
	TQ	.014	.022	3.622	.001	.318	3.143
	LR	.126	.086	1.460	.204	.555	1.803
	CTR	.099	.326	.302	.774	.371	2.694
	R = 0.96	R2= 0.92	Adjusted R2= 0.90		Std. Error of the Estimate = 0.02		
	Prob of F statistic = 0.00				Durbin-Watson= 3.01		

Dependent Variable: ROCE

Table - 10: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	9.129	.914	9.985	.000		
	CPR	-2.674	4.449	-4.601	.000	.550	1.817
	TQ	.009	.112	7.081	.000	.318	3.143
	LR	.960	.442	2.173	.082	.555	1.803
	CTR	.449	1.669	.269	.799	.371	2.694
	R = 0.78	R2= 0.74	Adjusted R2= 0.70		Std. Error of the Estimate = 0.24		
	Prob of F statistic = 0.00				Durbin-Watson= 1.78		

Dependent Variable: VA

Table 8 presents the findings of a multiple regression analysis conducted to assess the combined effect of four financial indicators—Cash Position Ratio (CPR), Tobin's Q (TQ), Liquidity Ratio (LR), and Creditors Turnover Ratio (CTR)—on the Return on Assets (ROA) of Bharat Petroleum Corporation Limited (BPCL).

Table 9 displayed the results of multiple regression analysis examining the impact of four independent financial indicators, Cash Position Ratio (CPR), Tobin's Q (TQ), Liquidity Ratio (LR), and Creditors Turnover Ratio (CTR) on Return on Capital Employed (ROCE) for BPCL.

Table 10 presented the results of a multiple regression analysis aimed at identifying the effect of key financial indicators, Cash Position Ratio (CPR), Tobin's Q (TQ), Liquidity Ratio (LR), and Creditors Turnover Ratio (CTR) on Value Added (VA) for BPCL.

After eliminating the highly multicollinear variables (DTR, STR, DER, and VA), the regression analysis carried out for BPCL offered important new information about the factors influencing the business's financial performance. The models focused on the impact of the Cash Position Ratio (CPR), Tobin's Q (TQ), Liquid Ratio (LR), and Creditors Turnover Ratio (CTR) on three key dependent variables: Return on Assets (ROA), Return on Capital Employed (ROCE), and Value Added (VA).

For ROA, A strong fit was shown by the model, with an R2 of 0.82 and an adjusted R2 of 0.73, meaning that the chosen independent variables accounted for almost 73% of the variance in ROA. TQ and CPR both had statistically significant positive coefficients ($p < 0.01$), indicating that enhanced asset returns were linked to higher market valuation in relation to asset replacement cost and better cash management. However, LR and CTR did not exhibit any noteworthy impacts, suggesting that they had no direct impact on ROA in this situation.

The ROCE regression model was even more robust, with an R^2 of 0.92 and an adjusted R^2 of 0.90. CPR and TQ again emerged as significant predictors ($p < 0.01$), reinforcing the importance of liquidity and market perception in driving returns on capital employed. LR and CTR remained statistically insignificant, indicating that, for BPCL, capital returns were less sensitive to these ratios.

For Value Added (VA), the model's explanatory power was slightly lower ($R^2 = 0.74$, adjusted $R^2 = 0.70$), but still substantial. Interestingly, CPR had a significant negative coefficient, suggesting that excessive liquidity may have detracted from value creation, possibly due to underutilization of resources. TQ was positively significant, highlighting the role of market confidence in value addition. LR was marginally significant, while CTR remained insignificant.

Across all models, the Variance Inflation Factor (VIF) values were below the critical threshold of 5, confirming that multicollinearity had been effectively addressed. The Durbin-Watson statistics were close to 2, indicating no serious autocorrelation issues.

HPCL

Table - 11: Correlation Analysis

	CPR	STR	DTR	CTR	ROA	ROCE	DER	VA	TQ	LR
CPR	1									
STR	-.066	1								
	.856									
DTR	.111	.227	1							
	.760	.528								
CTR	-.526	.542	-.261	1						
	.118	.106	.466							
ROA	.357	.371	-.091	.036	1					
	.311	.292	.802	.921						
ROCE	.394	.239	.083	-.194	.947**	1				
	.260	.506	.819	.591	.000					
DER	-.380	.163	-.422	.586	-.572	-.744*	1			
	.279	.652	.225	.075	.084	.014				
VA	.260	.871**	.229	.291	.730*	.654*	-.237	1		
	.469	.001	.524	.415	.016	.040	.509			
TQ	.394	.463	.147	.077	.935**	.906**	-.561	.779**	1	
	.260	.178	.686	.832	.000	.000	.092	.008		
LR	-.231	.009	-.821**	.426	-.206	-.440	.748*	-.208	-.383	1
	.521	.979	.004	.220	.568	.203	.013	.565	.275	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 11 outlined the correlation analysis among various financial performance indicators for HPCL, highlighting the direction, strength, and statistical significance of relationships between variables.

The correlation matrix for HPCL's key financial ratios and performance indicators revealed several noteworthy relationships. ROA and ROCE showed a very strong positive correlation (r = 0.947, significant at the 0.01 level), indicating that increases in return on assets were closely associated with increases in return on capital employed. Tobin's Q (TQ) also correlated strongly with both ROA (r = 0.935) and ROCE (r = 0.906), both significant at the 0.01 level, suggesting that market valuation was closely tied to operational profitability. Value Added (VA) was highly correlated with Stock Turnover Ratio (STR, r = 0.871) and TQ (r = 0.779), indicating that efficient inventory management and higher value addition were recognized by the market.

Higher leverage was linked to lower returns and market value, according to the Debt-Equity Ratio (DER), which had a moderate negative association with TQ (r = -0.561) and a substantial negative correlation with ROCE (r = -0.744, significant at 0.05). The Debtors Turnover Ratio (DTR, r = -0.821, significant at 0.01) and the Liquid Ratio (LR) had a substantial negative correlation, suggesting that higher liquidity was linked to slower receivables collection. Additionally, STR and VA showed a very strong positive correlation (r = 0.871, significant at 0.01), indicating that efficient stock management directly contributed to value addition. Some relationships, such as those involving CPR, were weak or insignificant, suggesting limited direct impact.

After deleting DTR, STR, DER, LR, and VA, the following regression analysis was finalised for removing multicollinearity.

Table - 12: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	.036	.040	.897	.404		
	CPR	-.250	.834	-.300	.774	.533	1.875
	CTR	-.001	.003	-.384	.714	.627	1.594
	TQ	.158	.027	5.786	.001	.733	1.364
	R = 0.93	R2= 0.88	Adjusted R2= 0.82		Std. Error of the Estimate = 0.02		
			Prob of F statistic = 0.00		Durbin-Watson= 2.15		

a. Dependent Variable: ROA

Table - 13: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	.232	.080	2.882	.028		
	CPR	-2.116	1.672	-1.265	.253	.533	1.875
	CTR	-.017	.007	-2.522	.045	.627	1.594
	TQ	.397	.055	7.263	.000	.733	1.364
	R = 0.82	R2= 0.67	Adjusted R2= 0.51		Std. Error of the Estimate = 0.20		
			Prob of F statistic = 0.00		Durbin-Watson= 2.61		

a. Dependent Variable: ROCE

Table - 14: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	8.682	.612	14.196	.000		
	CPR	6.111	12.728	.480	.648	.533	1.875
	CTR	.055	.051	1.078	.323	.627	1.594
	TQ	1.057	.416	2.543	.044	.733	1.364
	R = 0.95	R2= 0.91	Adjusted R2= 0.87		Std. Error of the Estimate = 0.02		
			Prob of F statistic = 0.00		Durbin-Watson= 1.23		

a. Dependent Variable: VA

The regression analyses presented in Tables 12, 13, and 14 offered a comprehensive view of the factors influencing HPCL's financial performance, specifically focusing on Return on Assets (ROA), Return on Capital Employed (ROCE), and Value Added (VA). After excluding variables with high multicollinearity (DTR, STR, DER, LR, and VA), the models concentrated on three key predictors: Cash Position Ratio (CPR), Creditors Turnover Ratio (CTR), and Tobin's Q (TQ).

The model for ROA demonstrated a very strong fit, with an R^2 of 0.88 and an adjusted R^2 of 0.82, indicating that 88% of the variance in ROA was explained by the predictors. Among the variables, Tobin's Q (TQ) stood out as a highly significant positive predictor (B = 0.158, p = 0.001), suggesting that market valuation relative to asset replacement cost was a key driver of asset returns. CPR and CTR, however, did not show significant effects, as indicated by their high p-values.

For ROCE, the model fit was moderate (R^2 = 0.67, adjusted R^2 = 0.51). Tobin's Q again emerged as a strong, significant positive predictor (B = 0.397, $p < 0.001$). Interestingly, CTR had a significant negative effect (B = −0.017, p = 0.045), implying that higher creditor turnover may have reduced returns on capital employed, possibly due to increased short-term liabilities or less favorable credit terms. CPR remained non-significant.

The VA model was highly robust (R^2 = 0.91, adjusted R^2 = 0.87). Tobin's Q was again significant (B = 1.057, p = 0.044), reinforcing its importance across all performance metrics. CPR and CTR did not show significant effects in this model.

Across all models, the Variance Inflation Factor (VIF) values were well below the critical threshold (all < 2), confirming that multicollinearity had been effectively addressed. The Durbin-Watson statistics were close to 2, indicating no serious autocorrelation in the residuals

IOCL

Table - 15: Correlation Analysis

	CPR	STR	DTR	CTR	ROA	DER	VA	TQ	LR
CPR	1								
STR	-.547	1							
	.101								
DTR	-.244	.146	1						
	.497	.687							
CTR	.639*	-.346	-.724*	1					
	.047	.328	.018						
ROA	-.418	.141	.635*	-.638*	1				
	.229	.698	.049	.047					
DER	.348	.055	-.422	.353	-.907**	1			
	.324	.879	.224	.318	.000				
VA	-.315	.145	.536	-.536	.947**	-.878**	1		
	.375	.689	.110	.110	.000	.001			
TQ	-.309	.128	.729*	-.462	.849**	-.840**	.795**	1	
	.385	.725	.017	.179	.002	.002	.006		
LR	-.075	-.405	.431	-.183	.588	-.680*	.472	.708*	1
	.836	.246	.214	.613	.074	.031	.168	.022	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

In order to demonstrate the direction, strength, and statistical significance of the correlations between variables, Table 15 presented the correlation analysis among the several financial performance indicators for IOCL. The IOCL correlation matrix showed a number of noteworthy connections between important financial measures and performance metrics. The Cash Position Ratio (CPR) and the Creditors Turnover Ratio (CTR) had a substantial positive association ($r = 0.639$, $p < 0.05$), suggesting that better cash position was linked to a greater capacity to pay creditors. CPR showed a negative correlation with both Return on Assets (ROA) and Stock Turnover Ratio (STR), but these correlations were not statistically significant, indicating that liquidity had no direct effect on inventory efficiency or asset returns. STR showed a positive link with Debtors Turnover Ratio (DTR) and a negative correlation with CTR ($r = -0.346$), although these were not statistically significant. Because STR and CPR had a negative connection, it was possible that active inventory management was the cause of the decreased cash reserves that accompanied it.

DTR and CTR showed a substantial negative association ($r = -0.724$, $p < 0.05$), suggesting that slower payment to creditors was associated with faster receivables collection, or vice versa. Additionally, DTR and Tobin's Q (TQ) had a strong positive association ($r = 0.729$, $p < 0.05$), suggesting that effective receivables management raised market valuation. Higher asset returns were associated with better receivables management, greater market value, less reliance on creditors, and less financial leverage, according to ROA, which was significantly negatively correlated with CTR ($r = -0.638$, $p < 0.05$) and Debt-Equity Ratio (DER) ($r = -0.907$, $p < 0.01$) and positively correlated with DTR ($r = 0.635$, $p < 0.05$) and TQ ($r = 0.849$, $p < 0.01$).

The results indicated that high leverage has a negative impact on profitability, value creation, and market perception. DER exhibited strong negative associations with ROA ($r = -0.907$, $p < 0.01$), Value Added (VA) ($r = -0.878$, $p < 0.01$), and TQ ($r = -0.840$, $p < 100$). VA was highly positively correlated with ROA ($r = 0.947$, $p < 0.01$) and TQ ($r = 0.795$, $p < 0.01$), and negatively with DER, emphasizing that value creation drove profitability and market value, while excessive leverage undermined these benefits. TQ, representing market valuation, was positively correlated with DTR, ROA, VA, and Liquid Ratio (LR), and negatively with DER, reflecting that market value was enhanced by operational efficiency, profitability, value addition, liquidity, and prudent leverage. Finally, LR was positively correlated with TQ ($r = 0.708$, $p < 0.05$) and moderately with ROA and DTR, indicating that liquidity supported market value and, to some extent, profitability.

After deleting CTR, DER, TQ and VA, the following regression analysis was finalised for removing multicollinearity.

Table - 16: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.150	.259	-.581	.587		
	CPR	-.905	1.669	-.542	.611	.595	1.681
	STR	.014	.031	.456	.667	.449	2.225
	DTR	.001	.001	1.040	.346	.691	1.447
	LR	.110	.084	1.315	.246	.522	1.915
	R = 0.79	R2= 0.62	Adjusted R2= 0.61		Std. Error of the Estimate = 0.02		
			Prob of F statistic = 0.00		Durbin-Watson= 1.62		

Dependent Variable: ROA

Table - 17: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.134	.578	-.232	.826		
	CPR	-1.111	3.722	-.298	.777	.595	1.681
	STR	.028	.070	.399	.707	.449	2.225
	DTR	-.001	.003	-.171	.871	.691	1.447
	LR	.185	.187	.988	.368	.522	1.915
	R = 0.72	R2= 0.61	Adjusted R2= 0.52		Std. Error of the Estimate = 0.02		
			Prob of F statistic = 0.00		Durbin-Watson= 1.70		

Dependent Variable: ROCE

Table - 18: Multiple Regression Analysis

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	7.684	3.652	2.104	.089		
	CPR	-4.513	23.541	-.192	.856	.595	1.681
	STR	.201	.442	.455	.668	.449	2.225
	DTR	.014	.019	.724	.502	.691	1.447
	LR	1.085	1.181	.919	.400	.522	1.915
	R = 0.65	R2= 0.62	Adjusted R2= 0.60		Std. Error of the Estimate = 0.34		
			Prob of F statistic = 0.00		Durbin-Watson= 1.75		

Dependent Variable: VA

The regression analyses presented in Tables 16, 17, and 18 offered a comprehensive view of the factors influencing HPCL's financial performance, specifically focusing on Return on Assets (ROA), Return on Capital Employed (ROCE), and Value Added (VA).

Across all three regression models (with ROA, ROCE, and VA as dependent variables), the models demonstrated strong explanatory power. The R^2 values were consistently above 0.60, indicating that over 60% of the variance in the dependent variables was explained by the independent variables (CPR, STR, DTR, LR). This suggested that the chosen financial ratios were significant predictors of IOCL's performance metrics. The Adjusted R^2 values were also close to the R^2 values, confirming the robustness of the models even after adjusting for the number of predictors.

Cash Position Ratio (CPR): In all three models, CPR had a negative coefficient, but its effect was not statistically significant (p-values well above 0.05). This implied that, for IOCL, liquidity as measured by CPR did not have a meaningful direct impact on profitability or value addition.

Stock Turnover Ratio (STR): STR showed a positive relationship with all dependent variables, but again, the coefficients were not statistically significant. This suggested that while efficient inventory management was generally beneficial, its direct impact on IOCL's profitability and value addition was limited during the observed period.

Debtors Turnover Ratio (DTR): DTR's coefficients were very small and not significant, indicating that receivables management did not play a major role in driving IOCL's key financial outcomes.

Liquid Ratio (LR): LR had positive coefficients across all models, with the highest impact on Value Added (VA), but none of the coefficients reached statistical significance. This suggested that while liquidity was important, it was not a primary driver of performance for IOCL in this context.

The Variance Inflation Factor (VIF) values for all predictors were below 2.5, indicating that multicollinearity was not a concern in these models. The Durbin-Watson statistics were close to 2, suggesting that there was no significant autocorrelation in the residuals, which supported the reliability of the regression results.

8. FINDINGS FROM TEST OF HYPOTHESES

In the multiple linear regression analysis, the first null hypothesis was rejected solely for BPCL based on the t-test results, indicating a significant relationship between liquidity and profitability in BPCL. However, this hypothesis could not be rejected for HPCL and IOCL, suggesting no such relationship in their cases.

The second null hypothesis was rejected only for HPCL, implying that efficiency plays a significant role in influencing HPCL's financial performance. In contrast, the hypothesis remained valid for both BPCL and IOCL, where no significant relationship was found.

The third null hypothesis was not rejected for any of the three companies under study. This implies that leverage does not have a statistically significant impact on the financial performance of public sector oil companies.

The fourth null hypothesis was tested using the F-test and was rejected, indicating that notable differences exist in the profitability levels among India's public sector oil companies.

Finally, the fifth null hypothesis was rejected in the cases of both BPCL and HPCL, as per the t-test results, revealing that the examined variable has a significant impact on the financial performance of these two companies.

9. SUGGESTIONS

For BPCL, strengthen cash-flow forecasting and optimize reserves. Tighten credit policies and speed up receivables. Renegotiate supplier terms to improve payables. Boost asset utilization through efficiency. Clearly communicate growth plans. Maintain inventory efficiency, use debt strategically, and focus on long-term shareholder value.

For HPCL, Maintain cash buffers for stability. Use just-in-time inventory to reduce costs. Improve profitability by reviewing costs. Reassess leverage—deleverage if high, borrow strategically if low. Improve terms with stakeholders. Reinvest surpluses or cut debt. Explore innovation and expansion. Keep cash for opportunities.

For IOCL, Maintain a minimum cash buffer. Tighten credit to reduce slow payments. Use scenario planning for profitability. Hedge costs and improve efficiency. Stabilize debt policy and secure working capital lines. Focus on liquidity and strategic growth.

10. CONCLUDING COMMENTS

The comparative analysis of BPCL, HPCL, and IOCL reveals distinct financial profiles shaped by each company's strategic priorities and operational efficiencies. BPCL emerges as the strongest overall performer, marked by superior liquidity management, efficient asset utilization, robust profitability, and strong market valuation. Its ability to maintain a healthy cash position, coupled with high returns on assets and capital employed, highlights effective financial stewardship and operational discipline. However, the company must balance its liquidity to avoid diminishing returns on excess idle funds.HPCL demonstrates strengths in aggressive creditor management and a strong focus on enhancing market-based performance indicators, particularly Tobin's Q. Despite its relatively lower efficiency in asset utilization and volatile liquidity, HPCL's strategic emphasis on market valuation provides a viable pathway for improving shareholder value. Enhancing credit policies and refining operational efficiencies will be crucial for long-term growth.IOCL, while lagging in some operational metrics like receivables collection and asset turnover, shows commendable performance in employee productivity and maintains a conservative financial structure. Its financial dynamics are influenced by a complex interplay of factors, underscoring the need for a more integrated and flexible financial management approach. A holistic strategy that aligns liquidity, profitability, and operational efficiency will be essential for sustaining performance in a competitive environment.

Overall, the regression findings reinforce the importance of tailoring financial strategies to the unique operational and market realities of each company. For all three firms, sustained value creation hinges on harmonizing traditional financial metrics with broader market-oriented goals. Strengthening the link between internal financial efficiency and external market perception will be key to ensuring long-term profitability, competitiveness, and stakeholder confidence.

11. FURTHER SCOPE AND LIMITTIONS OF THE STUDY

Future studies could incorporate advanced tools such as financial modeling, stress testing, and scenario planning to gain a more comprehensive understanding of risk exposure and financial stability. Including qualitative factors—like leadership effectiveness, governance practices, and competitive positioning—could further enrich the analysis. Moreover, assessing how global energy shifts, policy changes, and sustainability efforts influence financial outcomes would provide meaningful insights for long-term strategic planning in the oil industry.

This analysis is based on historical financial data and ratio evaluation, which may not fully reflect the influence of external economic forces, regulatory updates, or international market fluctuations on company performance. It also does not account for non-financial variables like executive decisions or industry-

specific challenges. Additionally, the reliance on publicly reported financial data may introduce inconsistencies due to differences in accounting practices and disclosures.

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