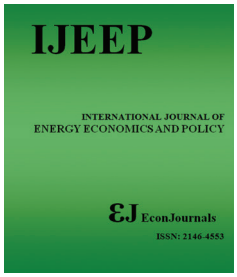

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Growth and Financial Performance Governance by the Total Resources: A Case of Indian Downstream Oil and Gas Firms

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ABSTRACT

The total resources of the business organizations define the size of the operational activities and provide the base for the revenue and availability of the working capital for the business activities. The oil and gas industry provides a base for the manufacturing and processing sector in India. Downstream oil and gas firms play a vital role in processing crude oil and gas and procuring it for final consumers. The study is intended to get the degree and direction of governance of the financial performance of the downstream Indian oil and gas firms. The study is based on secondary data while financial ratios, index numbers, post hoc homogeneity, and correlation are calculated to get the financial performance, movement trend, sensitivity of movement, and governance of the financial performance measures by the total resources in downstream Indian oil and gas firms. The study found that the growth of the total resources affects the profit-earning capacity and return on total resources in downstream Indian oil and gas firms positively but negligibly. There is moderate sensitivity between the growth of total resources and short-term paying ability while no relationship between the total resources and solvency of firms in downstream Indian oil and gas firms. The finding of the study concludes that investment in the total resources can be increased to get the benefits of profitability and profits, ultimately. But, the investment in the smaller downstream Indian oil and gas firms is more profitable than the investment in the larger downstream Indian oil and gas firms.

Keywords: Downstream, Oil and Gas Firms, Total Resources, Profitability, Financial Governance, Solvency, Post Hoc Homogeneity
JEL Classifications: Q40, Q43, M40, M41, L25

1. INTRODUCTION

In the Indian economy oil and gas, firms play a vital role, as the number of the theses firms is more than five thousand. The Indian manufacturing sector depends on fuel as it provides the input to run the manufacturing or processing in the industry sector. Oil and gas are to be used as fuel in the various Indian industries for production and manufacturing. The oil and gas Industries can be classified into three categories according to the nature of their activities. The firms that are involved in the exploration and extraction of oil and gas are termed upstream oil and gas firms. In contrast, midstream oil and gas firms execute the activities after the exploration and production but before the processing of the crude oil and gas. Midstream firms are involved in the transportation and storage of crude oil and gas for supply to downstream oil and gas firms.

The downstream oil and gas firms are the end processors of the crude oil and gas to make it consumable. The downstream oil and gas firms buy raw materials from national or International upstream oil and gas firms considering the cost and other constraints. After buying the raw material downstream oil and gas firms process and convert it into finished products. In India, there are smaller and larger companies involved in the downstream activities in the oil and gas sector. Likewise, other manufacturing segment profitability may vary the due level of production of activities. Generally, the giant players in every sector enjoy profitability and absolute profits due to advanced processing, manufacturing, quantity discount at the larger scale of buying raw materials, and cost efficiency at the larger scale of production.

The size of the firms can be assessed by total resources, revenue, and available working capital for the operational activities. The

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total resources of the firms define the level of working capital and ultimately level of revenue if there are no internal and external constraints affecting the demand, supply, and prices of the raw material and finished products to the firms. There is a need to study the governance of financial performances of the downstream oil and gas firms in the context of the movement and growth of the total resources. The co-movement and governance of the relational financial performance by the total resources explore the insights and indicate the degree and direction of the co-movement and governance. The mathematical measures between the relational financial performance measures and total resources determine the optimum level of total resources to get the maximum financial performance in the downstream Indian oil and gas industry.

2. LITERATURE REVIEW

Olujobi et al. (2020) studied the legal framework of downstream petroleum companies in Nigeria. They suggested encouraging the private investor and government bill to protect the eradicate corruption from the private sector. Sar (2017) analyzed the downstream oil and gas firms of India and found that the level of risk, measured by leverage has no significant contribution to firm performance. Abosede (2021) analyzed that there is negative governance of financial performance by the long-term debts in Nigerian downstream oil and gas companies and suggested to optimum utilization of the long-term debts to enhance return on resources to get retained earnings after making payment to the cost of the borrowed capital.

Chakrabarti (2016) found that total resources and EBIT (earnings before interest and tax) are in an increasing trend while ROACE (return on average capital employed) shows negativity in the oil and gas industry in India. Kang et al. (2017) found that oil demand has a positive impact on the returns of oil and gas firms while the returns vary in the upstream, downstream, and mid-streams oil and gas companies. Oh et al. (2019) found that the linkage-driven industry downstream energy firms coordinate more than the upstream firms in a larger geographic area. Abdulsalam and Babangida (2020) found a positive impact of size on the profitability of oil and gas firms in Nigeria and suggested a mixture of shareholders' capital and borrowed capital in the enhancement of the total resources of the firms. Gong (2020) observed that private downstream gas companies are more productive than state-owned upstream oil production companies.

Appiah et al. (2021b) studied 475 SMEs engaged in the downstream activities of oil and gas in Ghana and found that owners and managers of the downstream oil and gas SMEs expect high financial performance. Appiah et al. (2021a) found that resource competitive strategies, macro environment factors, and specific factors of oil and gas govern the intention to invest in the SMEs engaged in the downstream activities of oil and gas in Ghana. Akinola and Wissink (2018) found that the public sector of Nigeria is incapable to manage the downstream oil sector and responsible for the crisis of oil in Ghana. They showed the inefficiency and unprofessionalism of the downstream oil and gas institutions in Ghana and suggested focusing on the efficient distribution and marketing strategy of downstream oil and gas companies in Ghana. Udibe and Ugwuanyi (2018) found that the downstream oil sector contributes prominently to the socio-economic development of Nigeria. Also, they found that the deregulation practices of the oil and gas sector not contributed to the economic development in Nigeria.

Behera and Das (2019) analyzed found that the profitability of Indian oil and gas companies is in fluctuated trend during 2013 to 2017. Mbawuni et al. (2016) studied the impact of working capital management (WCM) on the profitability of the firms engaged in downstream activities. They found that the average payable days' affects return on assets (profitability) while the cash conversion cycle (CCC), inventory conversion days, and average days of receivable do not affect the profitability in downstream oil and gas firms in Ghana. Gardas et al. (2019) analyzed the sustainable supply chain management on the business performance of oil and gas firms and found that regulatory pressure plays a governing role in the financial performances of the oil and gas firms engaged in marketing and distribution. Also, they found that collaborative green logistics have a significant impact on operational and business performance. Norouzi (2021) found in this study that the COVID-19 pandemic affected demand, supply, price, investments, and many more factors in the energy sector including the oil and gas sector. They found a 25% decrease in the consumption of petroleum in the short run and 30-40% in long run. They suggested reducing the competitiveness of prices to maintain a substantial market share in the energy market. Sheel et al. (2020) found that the downstream firms need to solve the transportation problems of oil and gas. In the absence of proper transportation of the oil and gas, supply chain orientation and marketing orientation will not be able to handle the environmental uncertainty resulting from an overstock of oil and gas. The under and overstock of the oil and gas is negative for the oil firms.

Abosede et al. (2019) found that corporate governance governs the financial performance of the downstream oil and gas firms in Nigeria. They suggested the maximum number of members on the board of the companies. Eriki and Osagie (2017) found a negative and negligible relationship between the capital employed and long-term debt equity on the financial performance of downstream oil and gas companies in Nigeria. In Nigerian downstream oil and gas, companies' debt to assets and debt to common equity govern the return on assets (ROA) and return on equity (RoE). Appiah et al. (2021c) indicated that economic factors, environmental factors, technological factors, and political factors attract investors to make an investment in the SMEs of oil and gas and gas in Ghana. Further, they added that the SCR (supply chain resilience) lowered the intention to invest in oil and gas SMEs in Ghana. Adam et al. (2019) found that SCMP (supply chain management practicing) firms play a vital role in the downstream oil sector of Nigeria. They indicated the strategic interventions in the SCPM in the smooth operation of the downstream oil and gas firms in Nigeria. Ali and Shaik (2022) studied the Saudi Arabian oil and gas companies and found the negative impact of firm size on the financial performance of oil and gas firms. There is no specific study available to explore the governance of the financial performances by the total resources in the context of downstream Indian oil and gas firms.

3. RESEARCH METHODOLOGY

The study analyzed the data of Downstream Indian oil and gas firms to know the financial status from 2015 to 2022. There are eight downstream Indian oil and gas firms selected of which three firms' operational activities are at a larger scale while five firms' operational activities are at a lower scale, relatively (Appendix 1). Profitability before tax (PBT ratio) and return on assets (ROA ratio) are calculated to get the profitability on sales revenue and return on total resources while current ratio (CR ratio) and debt-equity ratio (D/E ratio) are calculated to get the short-term and solvency of the downstream Indian oil and gas firms.

1. Profitability(PBT)ratio= $\frac{PBT}{TR}100$;
2. Return on Assets (ROA) ratio= $\frac{NI}{TA}$.
3. Liquidity (Current)Ratio= $\frac{CA}{CL}$;
4. Debt-Equity ratio= $\frac{LTD}{SHE}$;

Where, PBT: Profit before tax, TR: Total revenue, NI: Net income, TA: Total assets, CA: Current assets, CL: Current liabilities, LTD: Long-term debts, SHE: Shareholders' equity. Fixed base Index Numbers were computed to get the trend of the financial measures of Indian downstream oil and gas firms from 2015 to 2022.

5. FVFBI= $\frac{CYfv}{PVfv}100$;

Where, FV_{FBI}: Fixed base numbers of financial variables, $CYfv$: Financial variables in current year, $PVfv$: Financial variables in previous year.

Post Hoc multiple comparisons (Tukey) analysis is conducted to know the homogeneity of means of profitability, return on resources, short-term paying ability, and solvency of the downstream Indian and gas firms. The homogeneity analysis clarifies the similarity of the financial variables and establishes the group of means financial variables. The sensitivity of the impact of total resources on the relational financial variables will be determined by the number of means of groups. The sensitivity of governance of independent factors on dependent factors can be explained by the following parameters:

No. of subsets of means/ No. of groups (m/n)	Level of sensitivity of governance
0.0-0.25	Low
0.26-0.75	Moderate
0.76-1.00	High

While Karl Pearson's correlation coefficient explores the degree and direction of the relationship between two variables and Spearman's Rank correlations are calculated to get the relational co-movement of the total resources and financial measures i.e. profitability, return on resources, short-term paying ability, and solvency of the downstream Indian oil and gas firms.

6. Spearman's Rank Correlation (rs)=1- $\frac{6\sum(D*D)}{n(n*n-1)}$.;
7. Karl Pearson's Correlation (r)= $\frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{\sum(x-\bar{x})^2*\Sigma(y-\bar{y})^2}}$

4. DATA ANALYSIS AND RESULTS

To get the growth trend similarity and governance of the relational financial performance measures by the total resources study can be divided among the two categories. Growth trend and homogeneity of relational financial variables, and governance of total resources and relational financial variables.

4.1. Growth Trend and Homogeneity

Growth trend and homogeneity of relational financial measures consider the relational financial performance measures i.e. profitability, return on resources, short-term paying ability, and solvency. The co-movement of total assets and relational financial measures explores the average relationship between the growth of total resources and financial performance measures in downstream Indian oil and gas firms.

4.1.1. Growth trend and homogeneity of profitability

Growth trend and homogeneity of profitability consider the profit earning capacity and explore the basis of groups of means of profitability of the downstream Indian oil and gas firms.

The total resources and profitability of the downstream Indian oil and gas firms are shown in Table 1 together with their growth pattern. The profitability of the smaller downstream Indian oil and

Table 1: Growth trend and co-movement of total resources and profitability ratio

Years	IOCL		BPCL		HPCL		CPCL		GGL		IGL		MGL		ATG	
	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$	TA_{FBI}	$P_{bt}R$
2015	100.00	1.43	100.00	3.09	100.00	2.00	100.00	−1.76	100.00	7.05	100.00	17.47	100.00	25.88		
2016	100.30	4.42	108.98	5.57	104.32	3.18	94.31	2.93	88.14	4.52	109.52	17.09	109.46	27.24		
2017	117.90	7.23	131.92	5.39	116.16	4.78	104.94	4.92	92.10	5.93	132.95	22.18	121.18	33.21		
2018	127.70	7.62	143.60	4.72	128.51	4.16	129.31	4.48	96.24	7.45	160.34	22.27	139.00	35.83	100.00	17.81
2019	143.60	4.73	165.82	3.48	153.59	3.37	139.23	−0.72	103.41	7.78	193.57	20.30	158.90	33.09	73.17	21.28
2020	141.50	1.56	181.37	1.31	168.78	0.95	115.65	−8.11	114.58	11.63	233.36	21.31	190.64	35.64	88.40	28.53
2021	151.95	7.77	201.64	6.83	194.28	6.04	128.15	5.66	122.59	17.17	279.40	26.15	212.47	39.71	114.59	37.11
2022	176.64	5.27	215.85	3.29	222.29	2.33	158.83	4.22	138.63	10.43	340.08	22.28	241.68	26.46	157.50	22.05
Mean	132.45	5.00	156.15	4.21	148.49	3.35	121.30	1.45	106.96	8.99	193.65	21.13	159.17	32.13	106.73	25.36
R1	5		3		4		6		8		1		2		7	
R2	5		6		7		8		4		3		1		2	

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

gas firms is higher than the larger downstream oil and gas firms except for CPCL (1.45%). The relational co-movement of total assets and profitability of the downstream Indian oil reveals low positivity (0.19) (Appendix 2). The profitability of the downstream oil and gas companies is only slightly impacted by the movement of the total resources.

From Table 2, the homogeneity of the means of profitability ratio explains the similarity of profitability among the downstream Indian oil and gas firms according to their size. Based on the subsets of means of profitability four subgroups were created as per the size of the firm. This indicates that the growth of total resources in downstream Indian oil and gas firms governs the profitability, moderately (m/n=0.50). There is moderate sensitivity observed between the growth of total resources and the profitability of the downstream Indian oil and gas firms.

4.1.2. Growth trend and homogeneity of return on resources

Growth trend and homogeneity of return on resources consider the profit earning capacity in the context of total assets and form the groups of means of return on assets (ROA) of the downstream Indian oil and gas firms.

Table 3 reveals the growth trend and co-movement of total resources and ROA of the downstream Indian oil and gas firms. The ROA of the smaller downstream Indian oil and gas firms is higher than the larger downstream oil and gas firms except for CPCL (1.73%). The relational co-movement of total assets and ROA of the downstream Indian oil reveals moderate positivity (0.40) (Appendix 2). The movement of the total resources affects the profitability of the downstream oil and gas firms, moderately.

Table 2: Tukey HSD homogeneity for means of groups of profitability ratio

f	n	Subset for alpha=0.05			
		1	2	3	4
CPCL	8	1.4525			
HPCL	8	3.3513	3.3513		
BPCL	8	4.2100	4.2100		
IOCL	8	5.0038	5.0038		
GGL	8		8.9950		
IGL	8			21.1313	
ATG	5			25.3560	
MGL	8				32.1325
Sig.		0.664	0.128	0.450	1.000

Means for groups in homogeneous subsets are displayed: a. Uses Harmonic Mean Sample Size=7.442. b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed. Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

From Table 4, the homogeneity of means of return on resources ratio explains the similarity of return on resources among the downstream Indian oil and gas firms according to their size. Based on the subsets of means of profitability four subgroups were created as per the size of the firm. This indicates that the growth of total resources in downstream Indian oil and gas firms governs the profitability, moderately (m/n=0.50). There is moderate sensitivity observed between the growth of total resources and the return on resources of the downstream Indian oil and gas firms.

4.1.3. Growth trend and homogeneity of short-term paying ability

Growth trend and homogeneity of short-term paying ability consider the ability to pay its current liabilities in the context of total assets and explore the basis of groups of means of the current ratio of the downstream Indian oil and gas firms.

Table 5 reveals the growth trend and co-movement of total resources and the current ratio of the downstream Indian oil and gas firms. The current ratio of the smaller downstream Indian oil and gas firms is higher than the larger downstream oil and gas firms except CPCL (0.67) and GGL (0.57). The relational co-movement of total assets and the current ratio of the downstream Indian oil reveals moderate positivity (0.74) (Appendix 2). The movement of the total resources affects the profitability of the downstream oil and gas firms.

From Table 6, the homogeneity of means of current ratio explains the similarity of short-term paying ability among the downstream Indian oil and gas firms according to their size. Based on the subsets of means of current ratio three subgroups were created and analyzed as per the size of the firms. This indicates that the growth of total resources in downstream Indian oil and gas firms governs the short-term paying ability, moderately (m/n=0.38). There is moderate sensitivity observed between the growth of total resources and the short-term paying ability of the downstream Indian oil and gas firms.

Table 3: Growth trend and co-movement of total resources and return on resources ratio

Years	IOCL		BPCL		HPCL		CPCL		GGL		IGL		MGL		ATG	
	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA	TA_{FBI}	R_OA
2015	100.00	2.39	100.00	7.29	100.00	4.04	100.00	−0.35	100.00	6.43	100.00	14.24	100.00	13.89		
2016	100.30	5.09	108.98	9.78	104.32	5.48	94.31	7.18	88.14	2.51	109.52	12.36	109.46	13.11		
2017	117.90	7.37	131.92	8.73	116.16	7.91	104.94	8.95	92.10	3.45	132.95	13.97	121.18	14.99		
2018	127.70	7.60	143.60	7.96	128.51	7.32	129.31	6.44	96.24	4.39	160.34	13.61	139.00	15.87	100.00	5.85
2019	143.60	5.35	165.82	6.16	153.59	5.81	139.23	−1.39	103.41	5.85	193.57	13.22	158.90	15.87	73.17	11.11
2020	141.50	0.42	181.37	2.12	168.78	2.31	115.65	−16.39	114.58	15.11	233.36	15.84	190.64	19.22	88.40	17.54
2021	151.95	6.53	201.64	13.54	194.28	8.12	128.15	1.69	122.59	15.09	279.40	11.71	212.47	13.46	114.59	14.64
2022	176.64	6.22	215.85	5.83	222.29	4.25	158.83	7.71	138.63	13.45	340.08	12.58	241.68	11.40	157.50	11.39
Mean	132.45	5.12	156.15	7.68	148.49	5.66	121.30	1.73	106.96	8.29	193.65	13.44	159.17	14.73	106.73	12.106
R1	5		3		4		6		8		1		2		7	
R2		7		5		6		8		4		2		1		3

Source: Based on financial statements of concerned companies available on the website of moneycontrol.com

Table 4: Tukey HSD homogeneity for means of groups of return on resources ratio

f	n	Subset for alpha=0.05			
		1	2	3	4
CPCL	8	1.7300			
IOCL	8	5.1213			
HPCL	8	5.6550	5.6550		
BPCL	8	7.6763	7.6763	7.6763	
GGL	8	8.2850	8.2850	8.2850	8.2850
ATG	5		12.1060	12.1060	12.1060
IGL	8			13.4413	13.4413
MGL	8				14.7263
Sig.		0.079	0.088	0.175	0.089

Means for groups in homogeneous subsets are displayed: a. Uses Harmonic Mean Sample Size=7.442. b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed. Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

Table 5: Growth trend and co-movement of total resources and short term paying ability

Years	IOCL		BPCL		HPCL		CPCL		GGL		IGL		MGL		ATG	
	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR	TA_{FBI}	C_rR
2015	100.00	0.99	100.00	0.93	100.00	1.16	100.00	0.72	100.00	0.74	100.00	0.87	100.00	1.09		
2016	100.30	0.88	108.98	0.89	104.32	1.03	94.31	0.74	88.14	0.36	109.52	1.02	109.46	1.46		
2017	117.90	0.72	131.92	0.79	116.16	0.72	104.94	0.82	92.10	0.37	132.95	1.39	121.18	1.26		
2018	127.70	0.67	143.60	0.83	128.51	0.78	129.31	0.74	96.24	0.47	160.34	1.52	139.00	1.35	100.00	1.79
2019	143.60	0.81	165.82	0.99	153.59	0.76	139.23	0.68	103.41	0.62	193.57	1.46	158.90	1.43	73.17	1.37
2020	141.50	0.69	181.37	0.70	168.78	0.65	115.65	0.34	114.58	0.79	233.36	1.39	190.64	1.59	88.40	0.94
2021	151.95	0.73	201.64	0.93	194.28	0.70	128.15	0.54	122.59	0.64	279.40	1.32	212.47	1.58	114.59	0.28
2022	176.64	0.76	215.85	0.76	222.29	0.70	158.83	0.77	138.63	0.55	340.08	1.21	241.68	1.39	157.50	0.25
Mean	132.45	0.78	156.15	0.85	148.49	0.81	121.30	0.67	106.96	0.57	193.65	1.27	159.17	1.39	106.73	0.92
R1	5		3		4		6		8		1		2		7	
R2		6.00		4.00		5.00		7.00		8.00		2.00		1.00		3.00

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

Table 6: Tukey HSD homogeneity for means of groups of current ratio

f	n	Subset for alpha=0.05		
		1	2	3
GGL	8	0.5675		
CPCL	8	0.6688		
IOCL	8	0.7823		
HPCL	8	0.8125		
BPCL	8	0.8525		
ATG	5	0.9260	0.9260	
IGL	8		1.2725	1.2725
MGL	8			1.3938
Sig.		0.102	0.126	0.977

Means for groups in homogeneous subsets are displayed: a. Uses Harmonic Mean Sample Size=7.442. b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed. Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

4.1.3. Growth trend and homogeneity of solvency

Growth trend and homogeneity of solvency consider the ability to pay its long-term debts in the context of shareholders' funds and explore the basis of groups of means of the debt-equity ratio of the downstream Indian oil and gas firms.

Table 7 reveals the growth trend and co-movement of total resources and a debt-equity ratio of the downstream Indian oil and gas firms. There is a hybrid strategy of the debt-equity ratio between the smaller and larger scale production downstream oil and gas firms. The relational co-movement of total assets and solvency ratio of the downstream Indian oil reveals moderate positivity (0.71) (Appendix 2). The movement of the total resources affects the profitability of the downstream oil and gas firms, moderately.

From Table 8, the homogeneity of means of solvency ratio explains the similarity of long-term paying ability among the downstream Indian oil and gas firms according to their size. Based on the subsets of means of solvency ratio two subgroups were created and analyzed as per the size of the firms. This indicates that the growth of total resources in downstream Indian oil and gas firms governs the solvency, negligibly (m/n=0.25). There is low sensitivity observed between the growth of total resources and the solvency of the downstream Indian oil and gas firms.

4.2. Governance of Financial Measures by the Total Resources

Governance refers to the impacts of changes of one variable on other variables or movement in a variable due to variations in other variables, sympathetically.

Table 7: Growth trend and co-movement of total resources and solvency

Years	IOCL		BPCL		HPCL		CPCL		GGL		IGL		MGL		ATG	
	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E	TA_{FBI}	D/E
2015	100.00	0.48	100.00	0.52	100.00	0.93	100.00	0.60	100.00	0.75	100.00	0.07	100.00	0.00		
2016	100.30	0.28	108.98	0.50	104.32	0.58	94.31	0.23	88.14	0.81	109.52	0.00	109.46	0.00		
2017	117.90	0.20	131.92	0.46	116.16	0.31	104.94	0.06	92.10	1.39	132.95	0.00	121.18	0.00		
2018	127.70	0.17	143.60	0.43	128.51	0.37	129.31	0.07	96.24	1.20	160.34	0.00	139.00	0.00	100.00	1.20
2019	143.60	0.32	165.82	0.64	153.59	0.40	139.23	0.23	103.41	0.96	193.57	0.00	158.90	0.00	73.17	0.31
2020	141.50	0.53	181.37	0.62	168.78	0.77	115.65	1.35	114.58	0.56	233.36	0.00	190.64	0.00	88.40	0.20
2021	151.95	0.50	201.64	0.31	194.28	0.75	128.15	2.12	122.59	0.17	279.40	0.00	212.47	0.00	114.59	0.16
2022	176.64	0.44	215.85	0.31	222.29	0.81	158.83	0.86	138.63	0.07	340.08	0.00	241.68	0.00	157.50	0.15
Mean	132.45	0.36	156.15	0.48	148.49	0.61	121.30	0.69	106.96	0.74	193.65	0.01	159.17	0.00	106.73	0.40
R1	5		3		4		6		8		1		2		7	
R2		3.00		5.00		6.00		7.00		8.00		2.00		1.00		4.00

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

Table 8: Tukey HSD homogeneity for means of groups of Solvency ratio

f	n	Subset for alpha=0.05	
		1	2
MGL	8	0.000075	
IGL	8	0.008663	
IOCL	8	0.364874	0.364874
ATG	5	0.403590	0.403590
BPCL	8	0.475863	0.475863
HPCL	8		0.613800
CPCL	8		0.690838
GGL	8		0.738513
Sig.		0.181	0.468

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com. Note: Means for groups in homogeneous subsets are displayed: a. Uses Harmonic Mean Sample Size=7.442. b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed

Table 9: Governance of profitability, return on resources, short-term and long-term paying ability by total resources movements

Financial measures	IOCL	BPCL	HPCL	CPCL	GGL	IGL	MGL	ATG
PBT ratio	0.260	−0.101	0.019	0.200	0.742	0.682	0.297	0.055
ROA ratio	0.175	−0.107	−0.122	0.069	0.880	−0.260	−0.123	−0.072
Current ratio	−0.56	−0.28	−0.12	0.07	0.88	−0.26	−0.12	−0.07
D/E ratio	0.34	−0.42	0.33	0.21	−0.87	−0.44	−0.16	−0.23

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

From Table 9, it is obvious that the total resources govern the profitability positively and moderately in downstream Indian oil and gas firms. There is negativity between the growth of the resources and the return on resources. In addition, the current ratio and growth of total resources indicate negativity. Nevertheless, the growth of total resources improves the solvency of larger downstream oil and gas firms than the smaller downstream oil and gas firms in India.

5. DISCUSSIONS AND CONCLUSION

The profitability of the smaller downstream Indian oil and gas firms is higher than the larger downstream oil and gas firms. The growth of the total resources affects the profit-earning capacity downstream of Indian oil and gas firms positively but negligibly. There is moderate sensitivity observed between the growth of total resources and the profitability of the downstream Indian oil and gas firms. The ROA of the smaller downstream Indian oil and gas firms is higher than the larger downstream oil and gas firms. There is moderate sensitivity observed between the growth of total resources and the return on resources of the downstream Indian oil and gas firms. The current ratio of the smaller downstream Indian oil and gas firms is higher than the larger downstream oil and gas firms. There is moderate sensitivity observed between the growth of total resources and the short-term paying ability of the downstream Indian oil and gas firms. There is the hybrid strategy of the debt-equity ratio between the smaller and larger scale production downstream oil and gas firms. There is low sensitivity observed between the growth of total resources and the solvency of the downstream Indian oil and gas firms.

The total resources govern the profitability positively and moderately in downstream Indian oil and gas firms. There is negativity between the growth of the resources and the return on resources. In addition, the current ratio and growth of total resources indicate negativity. Nevertheless, the growth of total resources improves the solvency in larger downstream oil and gas firms than the smaller downstream oil and gas firms in India while weakening the solvency in the larger scale downstream oil and gas firms. The finding of the study concludes that investment in the total resources can be increased to get the benefits of

profitability and profits, ultimately. But, the investment in the smaller downstream Indian oil and gas firms is more profitable than the investment in the larger downstream Indian oil and gas firms. There is a negative co-movement of the total resources and the return on resources. The investment in the resources enhances the profitability positively but not proportionately resulting in the negativity between the growing movement of total resources and return on resources. Total resources growth or movement governs the short-term paying ability, moderately. While, the solvency of the downstream Indian oil and gas firms governs by the total resources, negligibly. So, smaller downstream oil and gas firms are suggested to enhance investment to enhance the level of activities for enhanced profitability and profits.

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APPENDIX

Appendix 1: Total resources (assets) of downstream oil and gas firms

Years	IOCL	BPCL	HPCL	CPCL	GGL	IGL	MGL	ATG
2015	219849.47	69728.88	67550.64	10954.62	6892.61	3073.49	2165.59	
2016	220504.17	75989.41	70470.93	10331.67	6074.98	3366.11	2370.48	
2017	259213.27	91989.63	78469.85	11495.57	6348.36	4086.13	2624.25	
2018	280739.91	100131.17	86807.22	14165.49	6633.31	4928.16	3010.24	2812.05
2019	315707.72	115627.25	103750.85	15251.7	7127.47	5949.34	3441.02	2057.64
2020	311090.56	126468.98	114010.83	12668.93	7897.27	7172.25	4128.5	2485.76
2021	334054.08	140604.49	131239.18	14038.4	8449.4	8587.4	4601.14	3222.25
2022	388339.1	150512.56	150160.38	17399.08	9555.28	10452.32	5233.81	4429.01
Mean	291187.285	108881.5463	100307.485	13288.1825	7372.335	5951.9	3446.87875	3001.342
Rank	1	2	3	4	5	6	7	8

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com

Appendix 2: Relational co-movement of size (total resources) and profitability, return on resources, short-term paying ability and solvency of the downstream oil and gas firms

Name of firm	T.A.(R1)	PBT (R2.1)	ROA (R2.2)	CR (R2.3)	D/E (R2.4)	(R1-R2.1) 2	(R1-R2.2) 2	(R1-R2.3) 2	(R1-R2.4) 2
IOCL	5	5	7	6	3	0	4	1	4
BPCL	3	6	5	4	5	9	4	1	4
HPCL	4	7	6	5	6	9	4	1	4
CPCL	6	8	8	7	7	4	4	1	1
GGL	8	4	4	8	8	16	16	0	0
IGL	1	3	2	2	2	4	1	1	1
MGL	2	1	1	1	1	1	1	1	1
ATG	7	2	3	3	4	25	16	16	9
						68	50	22	24
						$r_{R1\&R2.1=}0.19$	$r_{R1\&R2.2=}0.4$	$r_{R1\&R2.1=}0.74$	$r_{R1\&R2.1=}0.71$

Source: Based on financial statements of Concerned companies available on the website of moneycontrol.com