COMPETITIVE ADVANTAGE AND PERFORMANCE: AN ANALYSIS OF INDIAN DOWNSTREAM OIL AND GAS INDUSTRY

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ABSTRACT

The paper aims to gain insights into impact of competitive advantage on profitability. Financial data for ten years is taken for analysis of competitive advantage and return on equity. Panel data regression analysis is conducted to derive the determinants of profitability. Among cost advantage and differentiation advantage, the later has been found to be a greater driver of performance. The level of risk, measured by leverage has no significant contribution to firm performance. The paper provides insights on strategy formulation, more particularly differentiation as the key driver of firm performance in the Oil and Gas Industry.

Keywords: Profit Margin, Asset Turnover, Financial Leverage, Cost Advantage, Differentiation Advantage, Return on Equity.

JEL Classification: M41

INTRODUCTION

The profitability of the Indian downstream oil and gas industry has been fluctuating widely during the last decade with changes in the competitive landscape and changes in regulation. During the last decade, the mean, minimum, maximum and standard deviation of return on equity (ROE) has been 13.41%, 5.36%, 27.48% and 5.83, respectively. Till 1998 the prices of finished petroleum products were regulated by the government through a system of administered pricing mechanism (APM). Under the APM, prices of finished products were fixed by the government and oil marketing companies were assured of 12% return on net worth. The process was administered by the Oil Coordination Committee through pool accounts under the administrative control of the Ministry of Petroleum and Natural Gas, Government of India.

The key to success during the APM era was efficiency in managing logistics. However, efficiency was not rewarded beyond a particular level owing the ceiling of 12% of return on net worth. Since 1998, deregulation has been happening in phases. The last product to be deregulated was diesel in 2014. With announcement of deregulation of diesel prices in October, 2014, the downstream oil and gas industry was free to fix prices of all products based on global prices. This helped oil marketing companies (OMC) to avoid under recoveries, which they suffered during the days of regulation. The deregulation has opened up opportunities as well as challenges for the OMCs, particularly those in the public sector. Theses OMCs have gone through business process reengineering and have established customer focused strategic business units with a view to capture opportunities in a growing economy and overcome the challenges arising out of deregulation.

LITERATURE REVIEW

The structure-conduct-performance (SCP) framework articulated by the modern industrial organization economists, argues that industry structure determined the behaviour or

conduct of the firms, whose joint conduct then determine the collective performance of firms in the market place (Porter, 1986). The work of Porter in particular gave rise to the concept of industry analysis and emergence of the positioning school of strategy (Mintzberg & Lampel, 1999). Further work by Porter saw the emergence of competitive advantage through generic strategies as a means of creating superior profit (Porter, 2008).

As the turbulence in the external environment increased post the liberalisation era in the early 1990s, the significance of industry forces on profitability was on a decline (McGahan & Porter, 1997). It was established that nearly 80% of intra-industry variation in profit was not explained by the industry factors. This lead to the focus of scholars and managers to the internal firm specific factors as drivers of profitability. This in turn led to the resource based view (RBV) of firms (Barney, 1991). There has been a growing interest in the role of resource-based capabilities as sources of profitability (Collis & Montgomery, 2008). Resource-based theory of competitive advantage became a popular basis for strategy formulation (Grant, 1991). Unique resources-based capabilities which are valuable, rare, imperfectly tradable and imperfectly inimitable become the basis of superior profit (Kraatz & Zajac, 2001). Successful product market diversification have also largely based relatedness with reference to resource-based capabilities (Markides & Williamson, 1994).

The profitability of firms can therefore be said to be driven partly by the conditions in the industry, termed as the industry effect and partly by the firm's resources and capabilities, termed as the positioning effect. The positioning effect is aligned to a firm's competitive advantage. A firm is said to have a competitive advantage, when it is pursuing a strategy not currently being pursues by another firm that facilitates the reduction of cost or raise customer willingness to pay (Barney, 1991). Competitive advantage has therefore been a significant determinant of firm performance with declining significance of industry effect. Brandenburger and Stuart (2005) gave an objective meaning to the concept of competitive advantage through the measure of added value. Thus the generic strategies of cost leadership and differentiation articulated by Porter and the resultant competitive advantage can be determined using financial data.

The disaggregation of ROE into asset turnover, profit margin and leverage in the DuPont analysis can be aligned to the competitive advantage to performance linkage. A higher profit margin is a reflection of premium position of offerings of firm, which can be used as a measure of differentiation advantage. Similarly, asset turnover is a reflection of the efficiency of the firm, which can be used as a measure of cost advantage. Thus by analysing the impact of profit margin and asset turnover on ROE, one can assess the impact of competitive advantage on firm performance. Leverage or the equity multiplier is often referred to as a measure of risk, as a higher ratio means the firm is relying more on debt to finance its assets. Risk can become an important driver of performance considering the uncertainties associated with strategy formulation and execution.

DATA AND RESEARCH METHODOLOGY

The analysis considers balanced panel data of three major Indian Oil Marketing Companies over ten years (2007-2016). The three companies are, Indian Oil Corporation limited, Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited. The other oil and gas companies in the downstream sector have entered the industry during the last five years with discontinuity in operations, hence not considered for analysis. The data is collected from CMIE – PROWESS (Database of the Centre for Monitoring Indian Economy). The analysis intends to estimate one regression equations as specified below through panel data analysis. Return on Equity (ROE_{it}) has been taken as dependent variable and Asset Turnover (AT_{it}), Profit Margin (PM_{it}) along with Leverage (LEV_{it}) have been taken

as independent variables. If any statistically significant association is found between the dependent and the independent variables as specified; then it might be concluded that competitive advantage has significant impact on firm performance.
The regression equations to be estimated is:

$$ROEit=a+b.\ AT_{it}+c.\ PM_{it}+d.\ LEV_{it}+u_{it}\ldots i=1, 2, 3 \text{ and } t=2007, 2008, \ldots 2016$$

In the above equation; 'a' is the constant terms, b, c, and d are the coefficients of AT_{it}, PM_{it}, and LEV_{it} and u_{it} is the stochastic error term.

Variables of Study and Hypothesis Development

DuPont analysis provides a means of disaggregating a firm's return on owners' equity into asset turnover, profit margin and leverage components (Stowe, Robinson, Pinto & Mcleavey, 2002). The three financial aspects, a) asset turnover, b) profit margin, and c) leverage have been derived from established theory as independent variables (Correia, Flynn, Uliana & Wormald, 2015). Return on owners' equity, measured by opening net worth is taken as the dependent variable in the study. The basis of choosing these variables in the study is explained in the following section. Since the study is aimed at understanding the impact of competitive advantage on firm performance, asset turnover and profit margin are considered for the analysis. Asset turnover is taken as the indictor for cost advantage and profit margin is taken as the indicator for differentiation advantage.

Asset Turnover

Asset turnover is calculated by dividing the sales with total asset. Asset turnover is often used as an indicator of efficiency with which a firm is deploying its assets in generating revenue. It can be seen as a reflection of relative position of firms with reference to unit cost and low cost positioning. Firms implementing low cost strategy tend to be associated with superior asset turnover. A study of US companies with one digit as well as two digit SIC codes established that the changes in return on fixed assets had a significant impact on profitability (Fairfield & Yohn, 2001). An empirical analyses carried out on a sample of 65,783 firm-year observations, with data sets for period 1991-2009, revealed significant positive impact of asset turnover on return on invested capital (Bauman, 2014). Jansen, Ramnath & Yohn (2012) analysed the impact of changes in asset turnover on firm earnings taking 46,522 firm year observations during the period 1971-2005 and concluded that there is a high explanatory power of asset turnover ratio on earning management. To validate the impact of asset turnover on profitability, the following hypothesis is proposed:

Hypothesis 1: Assets turnover positively affects ROE.

Profit Margin

Profit margin is calculated by dividing the net income by sales. It can be seen as a reflection of relative position of firms with reference to unit price and premium positioning. Firms implementing differentiation strategy tend to be associated with superior profit margin. Fairfield & Yohn (2001) analysed data from the Compustat Annual Tape for the years 1977-1996 (excluding SIC codes from 6000-6999, since separation of financial and operating activities were artificial) and concluded that changes in profit margin is a good predictor of future profitbility. Soliman (2007) studied 38,716 firm-year observations covering the time period, 1984-2002 and concluded that changes in profit margin has strong impact on the

change in ROE. In a study of the Indonesian automotive industry, Heikal et al. (2016) found profit margin having significant impact on income growth. Soliman (2008) analysed financial data from three sources: I/B/E/S, CRSP and Compustat and concluded that changes in profit margin has positive explanatory power for future changes in ROE. Bauman (2014) analysed profitability drivers in a sample of 65,783 farm-year over observations over the period 1999-2009, and concluded that the direction in the change in the profit margin can be used to significantly improve forecasts of ROE. To validate the impact of asset turnover on profitability, the following hypothesis is proposed:

Hypothesis 2: Profit margin positively affects ROE.

Since the mentioned regression refers to a multiple regression, hence, initially a multi-collinearity test has been performed. Then Considering the panel structure of the data under consideration and considerable heterogeneity among districts, the heteroskedasticity, autocorrelation and cross sectional dependence in the residuals have been checked. The choice among pooled regression, pooled regression with panel corrected standard errors, fixed and random effects models has been made following the necessary tests as explained in the next section.

Table 1
ECONOMETRIC TEST RESULTS

ROE_{it} (Dependent variable)	AT_{it}, PM_{it} and LEV_{it} (Independent variables)	
	Group (unit) Effect	
	Stat	Prob
Variance inflation factors (vif)	1.81<10	NA
Wooldridge test for autocorrelation	68.283	0.0143
Modified Wald test for Heteroskedasticity	0.97	0.8082
Pesaran test for Contemporaneous correlation	0.601 (FE) -0.063 (RE)	0.5477 (FE) 0.9501 (RE)
Average correlation across the units	0.246 (FE)	0.407 (RE)
F statistics for poolability	1.20	0.3183
Bera, Sosa-Escudero and Yoon modified Lagrange Multiplier Test for random effects (two tail)	1.88	0.1704
Bera, Sosa-Escudero and Yoon modified Lagrange Multiplier Test for random effects (one tail)	-1.37	0.9148
Bera, Sosa-Escudero and Yoon modified adjusted Lagrange Multiplier Test for serial correlation	2.20	0.1381
Baltagi-Li joint test for serial correlation and random effects	2.82	0.2435

As illustrated in Table 1; according to the variance inflation factors (VIF) value there is no multi-collinearity. Again, Wooldridge test for first order autocorrelation that works robust even under heteroscedasticity (Wooldridge, 2003); idiosyncratic error terms are serially correlated for the panel data model. Modified Wald test for group-wise heteroskedasticity in fixed effects (within) regression model refutes the presence of heteroskedasticity in the fixed effects (within) regression model. Pesaran test (Pesaran, 2004) for contemporaneous correlation declares no presence of cross sectional dependence either in the fixed or random effects regression models. F statistics for poolability rejects the presence of fixed unit effects. For the choice between pooled OLS regression model and unit random

effects model; presence of autocorrelation rules out the use of Breusch and Pagan Lagrange Multiplier test and Honda's version of the same. However, Bera, Sosa-Escudero and Yoon modified Lagrange Multiplier test for random effects (two and one tail) that is robust under autocorrelation (Sosa-Escudero & Bera, 2008) cannot reject the null hypothesis of no random effects for the regression equation. On the other hand Bera, Sosa-Escudero and Yoon modified Lagrange Multiplier Test for autocorrelation that works unbiased even under random effects (Bera, Sosa-Escudero & Yoon, 2001) and Baltagi and Li joint test for serial correlation and random effects have not found autocorrelation in random effects models. At this juncture it is confirmed that a pooled OLS regression is a better option than FE or RE models but dilemma hovers around the autocorrelation part. Wooldridge test for autocorrelation has confirmed the presence of the same but Bera, Sosa-Escudero and Yoon modified Lagrange Multiplier Test for autocorrelation along with Baltagi and Li joint test for serial correlation and random effects have refuted the presence of autocorrelation. Wooldridge test for autocorrelation should only be considered for a reasonably sized sample (Drukker, 2003). Considering the limited size of the sample under consideration the test results of Wooldridge test for autocorrelation has been ignored and following the other two mentioned tests the presence of autocorrelation has been refuted.

Table 2
INTER-ITEM CORRELATIONS

		AT	PM	LEV	ROE
AT	Pearson Correlation	1	-0.282	0.211	0.258
	Sig. (2-tailed)		0.131	0.264	0.169
	N	30	30	30	30
PM	Pearson Correlation	-0.282	1	-0.728**	0.813**
	Sig. (2-tailed)	0.131		0.000	0.000
	N	30	30	30	30
LEV	Pearson Correlation	0.211	-0.728**	1	-0.532**
	Sig. (2-tailed)	0.264	0.000		0.002
	N	30	30	30	30
ROE	Pearson Correlation	0.258	0.813**	-0.532**	1
	Sig. (2-tailed)	0.169	0.000	0.002	
	N	30	30	30	30

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

Table 3
POOLED REGRESSION RESULTS (DEPENDENT VARIABLE ROE_{it})

List of independent variable	Coefficient	t statistics	Probability	R2	Adjusted R2	F Statistics (3, 26)	Probability
LEV_{it}	0.9615374	1.58	0.126				
PM_{it}	7.135723	13.32	0.000	0.9267	0.9182	109.55	0.000
AT_{it}	5.494371	9.55	0.000				
Constant	-15.18405	-4.44	0.000				

The correlation coefficient for asset turnover is 0.258 and not significant at 0.01 levels. Hence I reject Hypothesis 1 – asset turnover positively affects ROE.

The correlation coefficient for profit margin is 0.813, significant at 0.01 levels. Hence I accept Hypothesis 2 – profit margin positively affects ROE.

The regression coefficient is highest for profit margin signalling towards its higher impact on the ROE. Profit margin being an indicator of differentiation advantage, it can be estimated than a superior differentiation position can lead to higher ROE. In a deregulated market, companies' strategies need to be oriented towards raising customer willingness to pay while maintain cost proximity to earn superior ROE. Although the cost position reflected in the asset turnover is not significantly correlated to ROE, the regression coefficient is in in proximity with that for the profit margin. Thus, it is important to maintain cost proximity by controlling the drivers of cost that are critical to differentiation.

CONCLUSION

With the onset of competition in the downstream oil and gas industry in India, consequent to full deregulation in 2014-2015, OMCs need to reorient their strategies to achieve differentiation advantage by maintaining cost proximity. The reflections from the data presented in Tables 2 and 3 are indictors of the expected strategy orientations. Since profit margin has the greatest impact on ROE, differentiation strategy becomes the desired strategic orientation. Any effort on raise customers' willingness to pay is expected raise the cost of differentiation. Thus differentiation advantage may fail to result in superior ROE if the raise in customers' willingness to pay is not proportionately greater than the raise in cost to differentiate. Thus maintaining cost proximity concurrent to achieving differentiation becomes essential, as the regression coefficient for asset turnover is in proximity to that for profit margin.

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