Analysis Of Performance Of Disinvested Public Sector Enterprises Using DEA Approach

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INTRODUCTION

Disinvestment of Public Sector Enterprises was considered as an urgent necessity for the Indian economy for the last two decades. The primary goals of disinvestment of Central Public Sector enterprises include raising revenue for the state, promoting economic efficiency, reducing government interference, promoting wider share ownership, providing the opportunity to introduce competition, and to subject the Public Sector Enterprises to market discipline (Megginson and Netter 2001). Due to the popularity of such activities, disinvestment studies are necessary to provide governmental institutions and investors with the background and knowledge to make appropriate decisions (Comstock, Kish, Vasconcellos 2003). Unlike the traditional methods of measuring financial performance, this paper examines the performance of disinvested public sector enterprises using the DEA approach. It indicates a firm's position relative to other firms in the industry or to industry averages. The relative efficiency of a firm, within the industry, is interpreted as performance.

REVIEW OF LITERATURE

Empirical evidence on performance evaluation and efficiency of the State-owned Enterprises is much researched globally. However, there is dearth of research in the Indian Public Sector Enterprises. As discussed earlier, the technique used to measure performance changes is ratio analysis, which examines the financial statements of individual firms and compares them with a benchmark. However, Ratio analysis was often suspected on the grounds of subjectivity, because an analyst must pick and choose ratios when two or more ratios provide conflicting signals.

Charnes, Cooper and Rhodes (1978) introduced Data Envelopment Analysis (DEA), a non-parametric method of measuring the efficiency of a decision-making unit (firm or a public sector enterprise). Banker, Charnes and Cooper (1984) extended the earlier model and later Seiford (1994), Tavares (2002) and several others have contributed to the literature. Akhtar's (2010) paper contributes to the literature by extending the analysis on efficiency assessment of commercial banks across Pakistan for the years from 2001 to 2006 by using Data Envelopment Analysis (DEA). The variables used as inputs and outputs help to develop some insights into the efficiency dynamics of the banking sector in Pakistan. The study leads to some useful managerial implications for developing countries like Pakistan. AlKhathlan and Malik (2010) used basic DEA models, i.e. CCR and BCR to evaluate the relative efficiency of Saudi Banks using annual data from 2003 through 2008. The results show that, on a relative scale. Saudi banks were efficient in the management of their financial resources.

Malhotra, Malhotra and Russel's (2010) paper explains how DEA can be used as a decision support system to screen corporate bonds. The study reveals that the DEA technique offers many benefits over traditional bond rating techniques. Agarwal and Mehrotra (2009) found out that by using DEA, some of the top organized retail companies in India have been performing relative to each other over the years and thereby, factors that help increase the efficiency of a retail company need to be identified. Min, Min, Joo and Kim (2009) proposed DEA for measuring the financial efficiency of Korean Luxury hotels. Malhotra and Malhotra (2008) opined that DEA can provide a consistent and reliable measure of managerial or operational efficiency, and also helps identify areas in which a firm has strengths or weaknesses relative to competition. When improvement is needed relative to peers, DEA shows by how much improvement is needed.

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Feroz, Kim and Raab (2003) have demonstrated that DEA can augment the traditional ratio analysis. They applied DEA to the oil and gas industry to demonstrate how financial analysts can employ DEA as a complement to ratio analysis. Thanassoulis, Boussofiane and Dyson (1996) compared data envelopment analysis (DEA) and ratio analysis as alternative tools for assessing the performance of organizational units such as bank branches and schools. The study shows that the two methods can support each other if used jointly. Ratios do provide useful information on the performance of a unit on specific aspects, and they can support the communication of DEA results to non-specialists, when the two methods agree on performance.

METHODOLOGY

Data Envelopment Analysis (DEA) (Farrel 1957; Charnes A et.al., 1978) is a non parametric technique used in evaluating the relative efficiency of decision-making units (DMU's). It identifies efficient production frontiers and evaluates the relative efficiency of decision making units (DMUs), which convert multiple inputs into multiple outputs (Wu et. al., 2005) (Min et. al., 2009). DEA is used to assess the productive efficiency of homogeneous operating units. It is a powerful technique for measuring comparative performance because of its objectivity and ability to handle multiple inputs and outputs that can be measured in different units. It does not require any specifications of any functional relationship between inputs and outputs (Feng et. al., 2007), or any prior specification of weights of inputs and outputs (Malhotra D. K. and Rashmi Malhotra, 2008). Weights are the relative importance of each input/output variable to the overall input and output of the firm. DEA was successfully explored in measuring the operational efficiency of banks (e.g., Oral & Yolalan, 1990; Thanassoulis, 1999; Yeh, 1996), hospitals (Valdmanis, 1992), nursing homes (Kleinsorge & Karney, 1992), purchasing departments (Murphy, Pearson, & Siferd, 1996), cellular manufacturing (Talluri, Huq, & Pinney, 1997), travel demand (Nozick, Borderas, & Meyburg, 1998), information technology investments (Shafer & Byrd, 2000), customer service performances of less-than-truckload motor carriers (Poli & Scheraga, 2000), international ports (Tongzon, 2001), trucking firms (Min & Joo, 2003), and container terminals (Min & Park, 2005).

The study was done on a few selected disinvested public sector enterprises. Only PSEs which had consistent information from 2000 to 2009 were selected. Companies were grouped into different industries based on their nature of operations, and their financial statements were studied. The input variable was the capital employed (Rashmi Malhotra et. al., 2008) and output variables were gross sales (Min et. al., 2009; Retti Agarwal & Ankit Mehrotra, 2009), PAT (Seiford, L. M. and J. Zhu, 1999; Ronald K. Klimberg et. al., 2009), market capitalization and EPS (Fama and French 1992; Kim and Kim 2000; Kim and Lee 2003).

There were in all 27 companies grouped into 7 industries. Medium and Light Industry had 4 companies - Andrew Yule & Company Limited, Bharat Electronics Limited, Hindustan Machine Tools Limited and ITI Limited. Transport Industry also had 4 companies - Bharat Earth Movers Limited, Container Corporation of India Limited, Dredging Corporation of India Limited and Shipping Corporation of India Limited. Petroleum Industry had 7 companies - Bharat Petroleum Corporation Limited, Bongaigaon Refinery & Petrochemicals Limited, Chennai Petroleum Corporation Limited, GAIL (India) Limited, Hindustan Petroleum Corporation Limited, Indian Oil Corporation Limited and Oil & Natural Gas Corporation Limited. Trading and Marketing Industry had 3 companies - CMC Limited, Mineral and Metals Trading Corporation of India Limited and State Trading Corporation of India Limited. Fertilizer Industry also had 3 companies - Fertilizers & Chemicals Travancore Limited, National Fertilizers Limited and Rashtriya Chemicals & Fertilizers Limited.

Minerals and Metals Industry had 4 companies - Hindustan Copper Limited, Hindustan Zinc Limited, National Aluminium Company Limited and National Mineral Development Corporation Limited. Chemical and Pharmaceutical Industry only had 2 companies - Hindustan Organic Chemicals Limited and Indian Petro Chemicals Corporation Limited. DEA was attempted to find out the relative efficiency of the companies in each industry. A 100% efficient firm in an industry is said to be performing well.

RESULTS AND DISCUSSION

From the Table 1, it can be seen that AYL, and BEL seems to be efficient in their operations, resulting in a good performance with 100% efficiency to input and output, while HMT and ITI seem to be less efficient in Medium and Light Industry categories. AYL's efficiency is due to having engaged in the manufacture, sales and servicing of various

industrial products. BEL is one of the pioneering enterprises in the manufacturing of electronics components / products for defence services & is always keen on expanding its operations by adding new products to its portfolio, which results in high efficiency. HMT Ltd.'s performance eroded in the recent decade due to lack of investment and technological up gradation. The performance of telecom equipment manufacturing unit has been adversely affected since deregulation. The factors affecting the performance and profitability of this company were, a decline in the prices of telecom equipment, surplus manpower, high cost of production, lack of modernization and high-interest liability. ITI Ltd. is always listed in the top ten loss-making Public sector units. In Transport Industry, CONCOR is 100% efficient, while SCIL is least efficient with 20%. CONCOR is a professionally managed Blue-chip Miniratna Public Sector Undertaking, and has been awarded as the Top Indian Company in the shipping and logistics sector for the Dun & Bradstreet-American Express Corporate Awards, 2007 & 2008 consecutively. SCI is expected to remain subdued due to higher interest and depreciation charges. Moving on to the Petroleum Industry, ONGC and Bongaigaon are 100% efficient and seems to have performed well after disinvestment, interestingly all the companies in this industry category are efficient and have performed well over the period.

Most of the PSEs in the Petroleum industry have either Navratna or Miniratna status, which had enhanced financial and operational efficiency. In Trading and Marketing Industry, MMTC and STC are 100% efficient, but CMC is only 40% efficient and seems to have not done well over the study period. MMTC is widely recognized as India's largest international trading company and the first Public Sector Undertaking to be awarded Premier Trading House status in the country. It is actively involved in exploring overseas markets for exports and sourcing material for domestic needs. STC has played an important role in the country's economy by arranging imports of essential items of mass consumption such as wheat, pulses, sugar, edible oils, etc. into India and developing exports of a large number of items from India. This has helped MMTC & STC achieve record breaking performances in the recent years. CMC's margins took a big hit, due to expenses growing at a higher rate than revenues and poor performance of the Systems Integration segment. In the Fertilizer Industry, all the companies seem to be efficient, with NFL being 100%. Fertilizer industry in India has succeeded in meeting the demand of all chemical fertilizers in the recent years. In Minerals and Metals Industry, HCL, HZL and NMDC are 100% efficient with NALCO, the only other company, to be comparatively less efficient with 72%.

The minerals and metals industry forms the foundation of the modern society. HCL is the major player dominating the Indian Copper Industry. It is a primary copper producer in the country, having its own captive mines, and the concentrates produced from these mines meets about 60% of the Company's requirement for concentrate, and the rest is imported. Hindustan Zinc is India's largest, and the world's second largest integrated producer of zinc & lead, with a global share of approximately 6.0% in zinc. NMDC has made a valuable and substantial contribution to the National efforts in the mineral sector during the last five decades and is India's single largest iron ore producer and exporter. NALCO is one of the lowest-cost producers of alumina and aluminium in the world. The decline in demand for aluminium and consistent fall in metal prices leads to less efficiency compared with other group of companies. Last industry studied was Chemical and Pharmaceuticals, here, both the companies HOCL and IPCL are 100% profitable, implying a good performance over the study period. HOCL and IPCL have accorded high priority for efficient utilization of the scarce and costly energy resources for reducing the cost of production and to remain competitive in the market. Thus, DEA complements the traditional ratio analysis by providing information about the operating and technical efficiency of the firm.

CONCLUSION

The public sector in India holds immense potential and prospects for growth and profitability in the future will continue to play an important role in the economy. The growth and performance of the Public Sector Enterprises have been in line with the growth in the Indian economy. DEA identifies that, most of the disinvested Public Sector Enterprises were efficient in the management of their financial resources in a given set.. Therefore, to conclude, this model has more implications for investors, decision-makers and others to measure the efficiency / inefficiency of the public sector enterprises based on their performance.

Table 1 : Efficiency Scores of Disinvested PSEs

Medium & Light Industry	Efficiency	Transport Industry	Efficiency	Petroleum Industry	Efficiency	Trading & Marketing Industry	Efficiency	Fertilizer Industry	Efficiency	Minerals & Metals Industry	Efficiency	Chemical & Pharmaceutical Industry	Efficiency
AYL	100%	**BEML**	50%	**BPCL**	99%	**CMC**	40%	**FACT**	94%	**HCL**	100%	**HOCL**	100%
BEL	100%	**CONCOR**	100%	**BRPL**	100%	**MMTC**	100%	**NFL**	100%	**HZL**	100%	**IPCL**	100%
HMT	62%	**DCI**	36%	**CPCL**	84%	**STC**	100%	**RCFL**	96%	**NALCO**	72%		
ITI	22%	**SCI**	20%	**GAIL**	92%					**NMDC**	100%		
				HPCL	92%								
				IOC	83%								
				ONGC	100%								
Variables	**Weights**		**Weights**		**Weights**		**Weights**		**Weights**		**Weights**		**Weights**
Input 1	0.00056		0.00054		1.76E-05		0.00053		0.00055		0.00025		0.000159
Output 1	0		0		2.34E-06		6.24E-05		0		0.00017		8.77E-05
Output 2	0		0		0		0		0		0.00036		0
Output 3	0.00019		0.00018		8.04E-06		2.9E-06		0.00072		1.38E-07		0.000146
Output 4	0.00108		0		0		0		0		0		0

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ANNEXURE

ABBREVIATIONS USED	
AYL	Andrew Yule & Company Limited
BEL	Bharat Electronics Limited
HMT	Hindustan Machine Tools Limited
ITI	Indian Telephone Industries Limited
BEML	Bharat Earth Movers Limited
CONCOR	Container Corporation of India Limited
DCIL	Dredging Corporation of India Limited
SCIL	Shipping Corporation of India Limited
BPCL	Bharat Petroleum Corporation Limited
BRPL	Bongaigaon Refinery & Petrochemicals Limited
CPCL	Chennai Petroleum Corporation Limited
GAIL	Gas Authority of India Limited
HPCL	Hindustan Petroleum Corporation Limited
IOCL	Indian Oil Corporation Limited
ONGC	Oil and Natural Gas Corporation Limited
CMC	Computer Maintenance Corporation Limited
MMTC	Mineral and Metals Trading Corporation of India Ltd.
STC	State Trading Corporation of India Limited
FACTL	Fertilizers & Chemicals, Travancore Limited
NFL	National Fertilizers Limited
RCFL	Rashtriya Chemicals & Fertilizers Limited
HCL	Hindustan Copper Limited
HZL	Hindustan Zinc Limited
NALCO	National Aluminium Company Limited
NMDC	National Mineral Development Corporation Limited
HOCL	Hindustan Organic Chemicals Limited
IPCL	Indian Petroleum Corporation Limited