

## AN EMPIRICAL STUDY ON PROFITABILITY PERFORMANCE OF DISINVESTED CENTRAL PUBLIC SECTOR ENTERPRISES OF INDIAN MANUFACTURING SECTOR

**\*MS.S.JAYACHITRA; \*\*DR.A.VIJAYAKUMAR;**

\*PH.D.,  
RESEARCH SCHOLAR IN COMMERCE,  
ERODE ARTS AND SCIENCE COLLEGE, ERODE, TAMIL NADU, INDIA.

\*\* ASSOCIATE PROFESSOR OF COMMERCE,  
ERODE ARTS AND SCIENCE COLLEGE, ERODE, TAMIL NADU, INDIA.

---

### ABSTRACT

The aim of this paper is to investigate the profitability performance of the disinvested CPSEs of Indian Manufacturing sector. A sample of 12 firms is drawn from various cognate group viz., Fertilizer, Heavy Engineering, Medium & Light Engineering, Petroleum ( refinery & marketing) and Transportation Equipment of Indian CPSEs (Central Public Sector Enterprises). The period of analysis covers 5 years before and 5 years after disinvestment. To test our predictions, the technique of Megginson et al. (1994) was followed in order to determine post disinvestment performance changes. The analysis is based on Ratio analysis, mean, median, CV, CAGR value of each variable for each firm over pre and post disinvestment periods are calculated. Paired t- test, Wilcoxon Signed-rank test and proportion test are used as principal methods for testing significant changes in variables. To test the significant differences among the group Kruskal Wallis test is applied for the subsample based on approaches to disinvestment (Minority, Majority and complete Privatization) and based on cognate group (Fertilizer, Heavy Engineering, Medium & Light Engineering, Petroleum ( refinery & marketing) and Transportation Equipment). To test the significant changes between the listed and unlisted disinvested CPSEs at Bombay Stock Exchange (BSE) Mann-Whitney Rank-Sum Test is adopted. Results obtained from this study are mixed. Whereas some of the sample CPSEs shows improvement in some indicator other sample CPSEs have shown decline in some indicator after disinvestment. However, in spite of mixed results the overall picture shows improvement in profitability for at least more than 58 per cent of the sample.

**KEYWORDS:** Disinvestment; Minority; Majority; Complete Privatization; Cognate group; Listed; Unlisted.

---

*" While the case for economic reforms may take good note of the diagnosis that India has too much government interference in some fields, it ignores that fact that India also has insufficient and ineffective government activity in many other fields, including basic education, health care, social security, land reforms and the promotion of social change. This inertia, too, contributes to the persistence of widespread deprivation, economic stagnation and social inequality."*

*Amartya Sen & Jean Dreze*

## **Introduction and Conceptual Framework**

Investment and disinvestment are two sides of the same coin. When we deal with the investment management, it automatically encompasses disinvestment also, as what is investment for one is disinvestment for another, particularly in the secondary market. If investment is an art and science; the more so is the disinvestment process. Disinvestment refers to the use of a concerted economic boycott to pressure a government, industry, or company towards a change in policy, or in the case of governments, even regime change. Investment refers to the conversion of money or cash into securities, debentures, bonds or any other claims on money. As follows, disinvestment involves the conversion of money claims or securities into money or cash.” Disinvestment can also be defined as the action of an organization (or government) selling or liquidating an asset or subsidiary. In most contexts, disinvestment typically refers to sale from the government, partly or fully, of a government-owned enterprise. A company or a government organization will typically disinvest an asset either as a strategic move for the company, or for raising resources to meet general/specific needs. Disinvestment is a wider term extending from dilution of the stake of the government to a level where there is no change in the control to dilution that results in the transfer of management. The transfer of ownership may occur when in an enterprise the dilution of government ownership is beyond 51 per cent. The disinvestment implies that the government will sell to public or private enterprises / public institutes’ part of its holding in public sector enterprises.

Disinvestment has been a major political and economic phenomenon over the past few decades, and researchers continue to target it for both theoretical and empirical work. Since first application in Britain in 1979 under Thatcher government, privatization has come to be accepted and employed throughout the world, often under conditions of considerable controversy. Given that most socialist and communist economies from every region in the world have recently started implementing economic reform programs, the reduction in size of the public sector through disinvestment has become an important part of such programs. Privatization has being a subject of intense global debate in recent years. The concept has received so much criticism from labour unions, academia and individuals. However in recent times, we are witnessing sweeping changes in the economics of both developed and developing countries. Several developing and transition economies have embarked on extensive privatization programs in the last two and a half decades as means of attaining macroeconomic stability, fostering economic growth and managing public sector borrowing arising from corruption, subsidies and subventions to State Owned Enterprises (SOEs).

## **Disinvestment Status in India**

The objective of Disinvestment policy is to promote people’s ownership of Central Public Sector Enterprises through increased participation of retail investors. For the first four decades after Independence, the country was pursuing a path of development in which the public sector was expected to be the engine of growth. However, the public sector overgrew itself and its shortcomings started manifesting in low capacity utilization and low efficiency due to over manning, low work ethics, over capitalization due to substantial time and cost over runs, inability to innovate, take quick and timely decisions, large interference in decision making process etc. Hence, a decision was taken in 1991 to follow the path of Disinvestment. There are primarily three different approaches to disinvestments in India (from the sellers’ i.e. Government’s perspective). A minority disinvestment is one such that, at the end of it, the government retains a majority stake in the company, typically greater than 51per cent, thus ensuring management control. Historically, minority stakes have been either auctioned off to institutions (financial) or offloaded to the public by way of an Offer for Sale.

A majority disinvestment is one in which the government, post disinvestment, retains a minority stake in the company i.e. it sells off a majority stake. Historically, majority disinvestments have been typically made to strategic partners. Complete privatization is a form of majority disinvestment wherein 100% control of the company is passed on to a buyer.

The change process in India began in the year 1991-92, with 31 selected PSUs disinvested for Rs.3,038 crore. In August 1996, the Disinvestment Commission, chaired by G V Ramakrishna was set up to advise, supervise, monitor and publicize gradual disinvestment of Indian PSUs. It submitted 13 reports covering recommendations on privatization of 57 PSUs. However, the Disinvestment Commission ceased to exist in May 2004. The Department of Disinvestment was set up as a separate department in December, 1999 and was later renamed as Ministry of Disinvestment from September, 2001. From May, 2004, the Department of Disinvestment became one of the Departments under the Ministry of Finance. Against an aggregate target of Rs. 54,300 crore to be raised from PSU disinvestment from 1991-92 to 2000-01, the Government managed to raise just Rs. 20,078.62 crore (less than half). The reasons for such low proceeds from disinvestment against the actual target set were: unfavorable market conditions, offers made by the government were not attractive for private sector investors, lot of opposition on the valuation process, no clear-cut policy on disinvestment, strong opposition from employee and trade unions, lack of transparency in the process and lack of political will. This was the period when disinvestment happened primarily by way of sale of minority stakes of the PSUs through domestic or international issue of shares in small tranches. The value realized through the sale of shares, even in blue chip companies like IOC, BPCL, HPCL, GAIL & VSNL, however, was low since the control still lay with the government. Most of these offers of minority stakes during this period were picked up by the domestic financial institutions. Unit Trust of India was one such major institution.

During the period from 2001-02 - 2003-04 the maximum number of disinvestments took place. These took the shape of either strategic sales (involving an effective transfer of control and management to a private entity) or an offer for sale to the public, with the government still retaining control of the management. The valuations realized by this route were found to be substantially higher than those from minority stake sales. During this period, against an aggregate target of Rs. 38,500 crore to be raised from PSU disinvestment, the Government managed to raise Rs. 21,163.68 crore. The issue of PSU disinvestment remained a contentious issue during the period from 2004-05 – 2008-09. As a result, the disinvestment agenda stagnated during this period. In the 5 years from 2003-04 to 2008-09, the total receipts from disinvestments were only Rs. 8515.93 crore. A stable government and improved stock market conditions initially led to a renewed thrust on disinvestments. The Government started the process by selling minority stakes in listed and unlisted (profit-making) PSUs. From 2009-10 onwards period saw disinvestments in companies such as NHPC Ltd., Oil India Ltd., NTPC Ltd., REC, NMDC, SJVN, EIL, CIL, MOIL, etc. are made through public offers. However, from 2011 onwards, disinvestment activity has slowed down considerably. As against a target of Rs.40, 000 crore for 2011-12, the Government was able to raise only Rs.14, 000 crore.

## Review of Literature

**Megginson, Nash and Van Randenborgh (1994)<sup>1</sup>** developed a proxy variable methodology to test whether a significant operational and financial performance changes exist

between pre and post privatization period of divested firms. They compare both pre and post privatization 3-year average performance ratios for 61 firms in 18 countries over the period 1961-1989. The finding indicates significant increases in output, operating efficiency, profitability, capital investment spending and dividend payments are found along with significant decreases in leverage. The changes in employment after privatization are found to be insignificant. **Boubakri, Narjess, and Jean-Claude Cosset(1998)**<sup>2</sup> examine post-privatization financial and operating performance of 79 companies in 21 developing countries and 32 industries between 1980-1992. The study concludes that there are economically and statistically significant post-privatization increases in output (real sales), operating efficiency, profitability, capital investment spending, dividend payments, and employment as well as significant decreases in leverage. **D' Souza and Megginson (1999)**<sup>3</sup> compared the pre- and post-privatization financial and operating performance of 85 companies in 28 countries and 21 industries that were privatized through public share offerings for the period between 1990 and 1996. Reported that privatization has led to significant increases in profitability, output, operating efficiency and dividend payments as well as a significant decrease in leverage ratios. **La Porta and Lopez-de-Silanes (1999)**<sup>4</sup> address significant improvements in output and sales efficiency of 218 Mexican privatized firms through June 1992, and find that the gap in performance between privatized firms and privately controlled firms narrows. They also find a significant decrease in the level of employment.

**Harper (2000)**<sup>5</sup> examined privatization in the Czech Republic and concluded that this process resulted in improved profitability, higher efficiency and lower employment levels in divested firms in the second wave of privatization but caused the opposite results in the first divestment round. **Harper (2001)**<sup>6</sup> documents different findings for 178 Czech firms that were included in the first wave of voucher privatization. He concludes that profitability and efficiency decreased immediately following privatization. **Ray and Maharana (2002)**<sup>7</sup> have attempted to examine the progress of the process of PSEs disinvestment in India during the decade of 1991 to 2001. In terms of action to the PSEs disinvestment, very little has actually materialized. They suggest that the controversies and criticisms against disinvestment can be largely avoided through a transparent process. **Sudhir Naib (2003)**<sup>8</sup> examined the impact of the partial divestiture of disinvested enterprises in India. The results indicate that in case of partial divestiture, where divested equity is thinly spread with the majority shareholding still the government, there has been no improvement in terms of profitability and operational efficiency. **Torero (2003)**<sup>9</sup> analyses the impact of privatization through a detailed statistical and econometric analysis of first difference (the difference between pre- and post-privatization performance), and second difference (change in performance of privatized firms relative to the change in performance of SOEs) of several indicators on profitability, operating efficiency, employment, leverage and convergence. The results indicate that privately owned firms are more efficient and profitable than state-owned firms. **Omran (2004)**<sup>10</sup> examines the performance of 54 newly privatized Egyptian firms against a matching number of SOEs. By matching sample firms (privatized) with control firms (SOEs) 94 over 1994–98. The analyses show that privatized firms do not exhibit significant improvement in their performance changes relative to SOEs.

**Alovsat Muslumov (2005)**<sup>11</sup> analyzed the impact of financial and operating performance of privatized companies in the Turkish cement industry. Document that privatization in cement industry results in significant performance deterioration. **Isnurhadi Banaluddin (2007)**<sup>12</sup> evaluated the impact of privatization on operating and financial performance of the privatized firms in Malaysia.

The results showed that the performance proxies ROS, ROA and ROE deteriorated and real sales and net profit of the firms improved upon privatization. **Ravinder and Rupinder's (2007)**<sup>13</sup> study compares the pre- and post-disinvestment financial and operational performance of 15 PSEs of India that experienced partial disinvestment during the period of 1991-92 to 2002. The empirical evidence supports the positive effects of privatization on PSEs' performance. These privatized units have significantly improved the level of profitability, sales, operational efficiency, earnings per share and dividend payments after disinvestment. **Gagan Singh and Deepak Paliwal (2010)**<sup>14</sup> assessed the impact of disinvestment on the financial and operating performance of competitive and monopoly units in Indian public sector enterprises. Documents that performance of monopoly firms show an improvement during the after-disinvestment period when compared to competitive firms. **Gupta Seema et al. (2011)**<sup>15</sup> assessed the financial performance of disinvested Central Public Sector Enterprises in India. Disinvestment has not yielded desired results in majority of dimensions, Concludes that government's intervention in operational functioning and managerial decision-making should be a matter of last resort. **Kishor C.Meher and Samiran Jana (2013)**<sup>16</sup> studied the impact of ownership due to strategic sale on financial performance of the privatized Public sector enterprises between pre and post privatization of Paradeep Phosphates Ltd, India. The various statistical tests have confirmed the significance of financial performance through improvement of short term financial position bringing liquidity in case of Paradeep Phosphates Ltd.

### Statement of the Problem

The most important criticism levied against public sector undertakings has been that in relation to the capital employed, the level of profits has been too low. Even the government has criticized the public sector undertakings on this count. Of the various factors responsible for low profits in the public sector undertakings, most important among them are; price policy of public sector undertakings, under – utilization of capacity, problem related to planning and construction of projects, problems of labour, personnel and management and lack of autonomy. The government in order to put an end to these problems, decided to disinvest its stake in the PSUs (Public Sector Undertakings). The companies traditionally established as pillars of growth have now become a burden on the economy. Except few mighty oil and petroleum companies, almost all other PSUs are incurring losses. The national gross domestic product and gross national savings are also adversely affected by low returns from PSUs. About 10 to 15 per cent of the total gross domestic savings are reduced on account of low savings from PSUs. With the equity markets having come off their historic lows in March 2009, there are certain signs of recovery. However, this should not be of any concern to the Government as PSUs, being high quality paper, would always find ready investors if the pricing is reasonable. PSU disinvestment of 10 per cent as per the Government's announced intentions, at attractive prices to retail investors, could ensure a strong message to the investment community about the Government's resolve to continue with reforms. Hence, it very important to analyze the profitability performance of disinvested Central Public Sector Enterprises in India which are very far from satisfactory. Therefore, the present study is undertaken to analyze the profitability performance of disinvested Central Public Sector Enterprises of Indian Manufacturing Sector.

### **Objectives of the Study**

The specific objectives of this study are

1. To analyze the profitability performance of the selected disinvested CPSE's of manufacturing sector in India.
2. To compare the effects of profitability performance based on different approaches to disinvestment of the selected disinvested CPSE's of manufacturing sector in India and
3. To analyze the profitability performance among different cognate group of the selected disinvested CPSE's of manufacturing sector in India.
4. To measure the profitability performance between listed and unlisted of selected disinvested CPSEs at Bombay Stock Exchange (BSE) of manufacturing sector in India.

### **Hypothesis**

. On the basis of the objectives of the study the following three main alternative hypotheses were developed for the purpose of the present study.

**Ha<sub>1</sub>** - There is a significant difference between profitability performances of disinvested CPSEs before and after disinvestment.

**Ha<sub>2</sub>** - According to the approaches of disinvestment of CPSEs, there is significant difference across changes in profitability performance of subsample groups following disinvestment.

**Ha<sub>3</sub>** - According to the cognate group in which disinvested CPSEs operate, there is significant difference across changes in profitability performance of subsample groups following disinvestment.

**Ha<sub>4</sub>** - According to the listing and non-listing status in which disinvested CPSEs operate, there is significant difference between changes in profitability performance of subsample groups following disinvestment.

### **Methodology**

As noted earlier the main purpose of this study is to examine the impact of disinvestment on the profitability performance of disinvested CPSEs of manufacturing sector in India. The study used secondary sources of data, which are collected from the capital market database called Centre for Monitoring Indian Economy Private Limited (Prowess CMIE). The research design used in the study is a "before- and-after" design (also known as the pre-test/post- test design). A "before and after" design can be described as two sets of cross section observations on the same population to ascertain the nature of the change in the phenomenon or variable (s), between two points of time. The change is measured by comparing the difference in the phenomenon or variables at the before and after periods. The most appropriate method in such a research is a post-event research methodology known as casual comparative method.

The research design adopted is similar to those employed by **Meggison et al. (1994)**, **Boubakri and Cosset (1998)** and **D'Souza and Meggison 1999**). Data on disinvested CPSEs for an eleven years, five years prior to the disinvestment and a five years period after the year of disinvestment for each disinvested firm in manufacturing sector were collected. According to purpose, the present research is classified as an applied research. Based on methodology and (nature, it is also presented as descriptive research. To measure the effects of disinvestment on firm performance, at first performance measures for every firm for the years before and after disinvestment was calculated. Then, the mean of each measure is computed for each firm over the before disinvestment (years -5 to -1) and after disinvestment (years +1 to +5) periods. The main objective of the study is to do a comparative analysis of disinvested firms before and after disinvestment mainly in manufacturing sector. Therefore, the research design tries to identify whether the CPSEs perform better after disinvestment.

### **Sampling Design**

Disinvested practices have started to implement in India since 1991. India has opted for the disinvestment for the period of 23 years (1991-92 to 2013-14). There are 260 CPSEs in India at present. Out of which only 80 CPSEs were disinvested during the period 1991-92 to 2013-14. Total disinvested enterprises till 6<sup>th</sup> July 2013 consist of 158 CPSEs. CPSE's consist of five sectors namely; Agriculture, Electricity, Manufacturing, Mining and Services. The analysis of the sectoral breakdown of the disinvestment in CPSEs in India within 1991-92 to 2013-14 shows that disinvested enterprises in manufacturing sector constitute 40.50 per cent of the total disinvestment of CPSEs which is higher than other sectors in India since 1991-92. (Table 1).

Keeping in view the scope of the study, it is decided to include all the 28 CPSEs in manufacturing sector which was disinvested during the period 1991-1992 to 2013-2014. But, owing to several constraints such as non-availability of financial statements, it was compelled to restrict the number of sample enterprises to 12 (Table 2). Thus, Multi-stage sampling technique is used. The final sample which constitutes 42.85 per cent of disinvested CPSEs of manufacturing sector in India during the time period 1991-1992 to 2013-2014 is selected using the following criteria: (i) Disinvested CPSEs should operate in manufacturing sector; (ii) Disinvested CPSEs are requested to have financial data for a period of eleven years encompassing five years before disinvestment and five years after disinvestment and (iii) The latest year of disinvestment is taken into account for the selection of sample and where there is no further dilution of stake by the government till 06 July 2013.

### **Selection of Variables**

The variables that refer to the different factors that may influence disinvested firms' performance. Specifically, the study seeks to determine whether, following disinvestment, the disinvested CPSEs of manufacturing sector in India: increase their profitability. In the present study, an attempt has been made to cover profitability performance of disinvested firms. As firms move from public to private ownership or both, their profitability should increase. First, given that shareholders wish the firm to maximize profit, newly disinvested firms' managers should place greater emphasis on profit goals. Second, disinvestment typically transfers partly or fully both control rights and cash flow rights to the managers who then show a greater interest for profits and efficiency relative to pleasing the government with higher output or employment. Profitability is measured by the operating profit margin ratio, net profit margin, return on capital employed, return on total assets and return on net worth. It may be recalled that the primary objective of disinvestment

has been to enhance operational efficiency leading to better/higher profitability. This would constitute the focus while interpreting the results of post-disinvestment *vis-à-vis* pre-disinvestment period. Table 3 presents variable description, performance measurement and expected results of the performance measure after disinvestment used in the present study. It focuses on the characteristics, which are examined for changes resulting from divestiture. The symbols A and B in the testable predictions stand for 'after' and 'before' divestiture.

### Tools of Analysis

The data available in the database are computed for requirements of the study. Analysis of the data is made using various accounting, mathematical and statistical tools. The tools used for the purpose of analysis of the present study are: Mean, Median, Standard deviation, Co-efficient of Variation, CAGR(Compounded Annual Growth Rate), Ratio analysis, Skewness, Kurtosis, Shapiro-Wilk, Paired t test, Wilcoxon signed- rank test, Proportion test, Kruskal-Wallis test and Mann-Whitney Rank-Sum Test. To compare the profitability performance change of subsample groups, according to the type of disinvestment, the sample is made split into three subsamples; minority, majority and complete privatization firms. Also according to type of activity or cognate group or industry, the sample is made split into five subsamples. Further to measure the significant change based on Listing status at Bombay Stock Exchange (BSE), the sample is split up into two subsamples; listed and unlisted CPSEs. To test for the significant difference in performance change of each subsample group, the data are adjusted to ensure that such comparison is valid. In this method, the absolute change in mean performance for each firm and subsample are calculated as follows:

$$APC = P_{i,t} - P_{i,t-1}$$

Where:

*APC* is absolute performance change,

*P<sub>i,t</sub>* is the mean performance after -disinvestment period, and

*P<sub>i,t-1</sub>* is the mean performance before -disinvestment period.

Overall, the data analysis is conducted using a general-purpose statistical package called SPSS. Basically, SPSS is a collection of statistical analysis routines. SPSS provides a broad range of data manipulation and transformation procedures, statistical procedures, and charting facilities. The version IBM SPSS Statistics 20 for Windows of SPSS has all the necessary statistical routines for conducting the tests required in this research. The entire set of data has been analyzed by using Statistical Package for Social Sciences (SPSS).

### Test of Normality

Before the test for significant changes in performance are employed, several tests are applied to determine whether the accounting performance measures of disinvested CPSEs can be adequately modeled by normal distribution. Thus, three different tests are employed (a) Standardized Skewness, (b) Standardized Kurtosis and (c) Shapiro-Wilks to determine whether the accounting performance measures could be adequately modeled by normal distribution. Table 4 shows the results of several tests run to determine whether the accounting performance measures of disinvested firms can be adequately modeled by a normal distribution. The standardized skewness test, which looks for lack of symmetry in the data, the standardized kurtosis test that looks for distributional shape, which is either flatter or more, peaked than the normal distribution. The results for Shapiro-Wilks test are based upon comparing quartiles of the fitted quartiles of the data. According to these three tests, if the lowest P- value amongst the tests performed is significant, the data comes from normal distribution is rejected.

Table 4, tests that accounting performance measure follow a normal distribution are strongly rejected, as the lowest P-values for these tests employed are generally less than one or five percent. Thus, the results indicate that these variables are significant departures from normality. Consequently nonparametric tests are adopted. Even though both parametric and non-parametric results are reported discussion will relied on latter.

### Empirical Results

The primary objective of disinvestment has been to enhance operational efficiency leading to better/higher profitability. Therefore, profitability ratios are relatively of higher significance than liquidity and solvency ratios. Public Sector Enterprises (PSEs) are often chronically unprofitable. They need to pursue objectives like maximizing employment or providing goods or services at heavily subsidized prices erode the goal of profit maximization. As a consequence, PSEs often are unprofitable. A change in ownership structure leads to a shift in firm's objective towards profit maximization, resulting in increased profitability. Hence, it is expected that profitability to increase after disinvestment took place.

Table 5 portrays change in performance of OPM of the sample. Seven of the disinvested CPSEs, Paradeep Phosphates Ltd., Bharat Heavy Electricals Ltd., Jessop & Co. Ltd., GAIL (India) Ltd., Hindustan Petroleum Corpn. Ltd. and Indian Oil Corpn. Ltd. has shown positive improvements after disinvestment. Table 6 discloses the change in performance of NPM of selected disinvested CPSEs of Manufacturing Sector in India. Maruti Suzuki India Ltd., Bongaigaon refinery and Petrochemicals Ltd., Chennai Petroleum Corpn. Ltd. And BEML Ltd has shown negative performance after disinvestment. Table 7 reveals the change in performance of ROC of the sample firms. The ROC for Maruti Suzuki India Ltd., and BEML Ltd., declined after disinvestment while all the other firms show an improvement after disinvestment. Table 8 presents the results of ROA of the sample firms before and after disinvestment. The wilcoxon test for Jessop & Co.Ltd., and Lagan Engineering Co.Ltd. shows a significant increase in ROA after disinvestment. All the other firms showed positive improvement while ROA for Maruti Suzuki India Ltd., and BEML Ltd., declined after disinvestment. Table 9 shows performance change in ROE based on each sample firms. Seven of the firms have shown positive improvement after disinvestment. However, the wilcoxon test shows statistically insignificant results. Five firms show negative performance in ROE after disinvestment. The overall results of Bharat Heavy Electricals Ltd., Jessop & Co. Ltd., Lagan Engineering Co. Ltd., and Indian Oil Corpn. Ltd., recorded positive improvement in all profitability measures after disinvestment.

Table 10 depicts the overall profitability performance of whole sample. The mean (median) changes in OPM, NPM, ROC, ROA and ROE from 11.1618 (10.6892), -3.1332 (-4.8317), -3.6882 (-4.2717), 1.2492 (0.8567) and 16.4370 (17.0898) before disinvestment to 11.8003 (12.2433), 4.5213 (5.1758), 12.2373 (11.9667), 6.2277 (6.3408) and 15.2247 (18.8833) after disinvestment, respectively. The results show that OPM, NPM, ROC and ROA increase significantly after divestiture. The findings indicate that ROE show statistically insignificant based on Wilcoxon test and hence the hypothesis is rejected. More than 50 per cent of the firms experience increases in OPM (58.33%), NPM (66.67%), ROC (83.33%), ROA (83.33%), and ROE (58.33%). Though 58.33% the increase in ROE, this is not significant. Our findings tend to contrast the benchmark studies (Megginson et al., 1994; Boubakri and Cosset, 1998). Obviously, the findings reveal that disinvestment has not positive effect on profitability. So this hypothesis that disinvestment associates with improvement in firm profitability is rejected strongly in the case of India.

The second hypothesis captures this idea that the approach to disinvestment of CPSES plays an important role in performance improvement after disinvestment. To compare the profitability performance change of subsample groups, according to the approaches to disinvestment, the sample is made split into three sub samples; minority, majority and complete privatization. The sample is portioned into three subsamples based on the percentage of stake retained by the government after disinvestment. This section presents data analysis regarding to this hypothesis. In Table 12 and Table 14, compares the profitability performance changes of CPSEs based on approaches to disinvestment. As discussed above, the literature comes up with conflicting hypotheses regarding the approaches to disinvestment in improvement of performance after disinvestment. With respect to changes in profitability, the outcome of comparison show that minority disinvestment firms have greater performance improvements in NPM, ROC, ROA and ROE after disinvestment and show a decline in ROE after disinvestment. The majority disinvested firms shows a positive improvement in OPM, NPM, ROC and ROA and a negative ROE after disinvestment. The Complete Privatization firms show positive effect in ROC, ROA and ROE after disinvestment. To sum up, for most of the criteria except ROE majority disinvestment firms show a greater performance improvement when compared to minority disinvestment firms which also showed better improvement in profitability following disinvestment they are more flexible in adjusting to the new environment, Although the Kruskal-Wallis test shows that for OPM, ROC and ROE profitability measures the differences among the three subgroups is not statistically significant.

The third hypothesis examines change in firm performance among cognate group by using accounting measures. According to type of industry, the sample is made split into five subsamples. This section presents data analysis regarding to this hypothesis. The Table 13 and Table 14 present the changes in performance of profitability across cognate group. According to outcomes, except some cognate group such as Fertilizers and Heavy Engineering, both mean and median reveal an insignificant improvement in OPM after disinvestment. Moreover with regard to Kruskal-Wallis test, difference among subsamples is not statistically significant. The findings documents that cognate group such as Fertilizers and Heavy Engineering, reveal an insignificant improvement in NPM after disinvestment. Moreover with regard to Kruskal-Wallis test, difference among subsamples is not statistically significant. According to statistical results, average of ROC has been decreased for the cognate group Transportation Equipment only after disinvestment. While the criteria shows an insignificant improvement following disinvestment in other cognate group. Moreover with regard to Kruskal-Wallis test, difference among subsamples is not statistically significant. The medium and

Light Engineering and Transportation Equipment cognate group showed a decline in ROA. Kruskal-Wallis test result is statistically insignificant. ROE for Fertilizers and Transportation Equipment decreases after disinvestment among the cognate group. Kruskal-Wallis test for ROE is not statistically significant. To sum up, the profitability performance of Heavy engineering among cognate group showed a significant improvement in profitability performance after disinvestment in almost all the indicators. Though, the improvement is statistically insignificant based on Wilcoxon test at 1% and 5% level of significance.

The fourth hypothesis captures this idea that the listing and non-listing of CPSEs at Bombay Stock Exchange (BSE) plays an important role in performance improvement after disinvestment. To compare the profitability performance change of subsample groups, according to the listing and non-listing of CPSEs at BSE, the sample is made split into two sub samples; listed and unlisted CPSEs. This section presents data analysis regarding to this hypothesis. Table 15 portrays the profitability performance of listed and unlisted CPSEs at BSE, The listed firms show positive improvement in ROC, ROA and ROE after disinvestment. The unlisted firms show significant improvement in all the indicators of profitability measures after disinvestment except in ROE. However, in the Mann-Whitney Rank-Sum Test compares whether there is significant difference between listed and unlisted firms. The indicators OPM, ROC and ROE are not statistically significant.

## Conclusion

Upon analyzing and comparing profitability performance data of disinvested manufacturing CPSEs during the period from 1989-1990 to 2012-2013, the following conclusions were made: the overall results of Bharat Heavy Electricals Ltd., Jessop & Co. Ltd., Lagan Engineering Co. Ltd., and Indian Oil Corpn. Ltd., recorded positive improvement in all profitability measures after disinvestment. The findings tend to contrast the benchmark studies (**Meggison et al., 1994; Boubakri and Cosset, 1998**). Obviously, the findings reveal that disinvestment has no positive effect on profitability. So this hypothesis that disinvestment associates with improvement in firm profitability is rejected strongly in the case of India. To sum up, for most of the criteria except ROE majority disinvestment firms

show a greater performance improvement when compared to minority disinvestment firms which also showed better improvement in profitability following disinvestment they are more flexible in adjusting to the new environment. Although the Kruskal-Wallis test shows that for OPM, ROC and ROE profitability measure the differences among the three subgroups is not statistically significant. The profitability performance of Heavy engineering among cognate group showed a significant improvement in profitability performance after disinvestment in almost all the indicators. Though, the improvement is statistically insignificant based on Wilcoxon test at 1% and 5% level of significance. The profitability performance of listed CPSEs at BSE shows positive improvement in ROC, ROA and ROE after disinvestment. The unlisted firms show significant improvement in all the indicators of profitability measures after disinvestment except in ROE. However, in the Mann-Whitney Rank-Sum Test compares whether there is significant difference between listed and unlisted firms. The indicators OPM, ROC and ROE are not statistically significant. Thus the results reveal that approaches to disinvestment or cognate group or listing and non-listing of CPSEs at BSE could not have significant effect on performance improvement after disinvestment. It is more than two decades since disinvestment took place there is no significant improvement in profitability measures. It is time to assess the direction of policy.

**REFERENCES**

1. Megginson, William, Robert Nash, and Matthias van Randenborgh. (1994). "The financial and Operating Performance of Newly Privatized Finns: An International Empirical Analysis", *Journal of Finance*, 49: 403-452.
2. Boubakri, Narjess and Jean-Claude Cosset. (1998). "The Financial and Operating Performance of Newly-Privatized Firms: Evidence From Developing Countries", *Journal of Finance*, 53: 1081-1110.
3. D' Souza, J. and W. L. Megginson (1999). "The Financial and Operating Performance of Privatized Firms during 1990s", *The Journal of Finance*, 54(4): 1397-1438..
4. La Porta, R. and F. Lopez-de-Silanes (1999). "Benefits of Privatization: Evidence from Mexico", *Quarterly Journal of Economics*, 114: 1193-1242.
5. Harper, J. T. (2000). "The Performance of Privatized Firms in the Czech Republic." Working Paper, Florida Atlantic U., Boca Raton.
6. Harper, J. (2001). "Short-term effects of privatization on performance in the Czech Republic", *Journal of Financial Research*, 24 (1): 119-31.
7. Ray, K.K. and Maharana, S. (2002). "Restructuring PSEs through Disinvestment: Some Critical Issues", *Pratibimba, The Journal of MIS*, 2(2): 56-62.
8. Sudhir Naib (2003). "Partial Divestiture and Performance of Indian Public Sector Enterprises", *Economic and Political Weekly*, Pp. 3088 to 3093.
9. Torero, M. (2003). "Peruvian privatization: Impacts on firm performance", Research Network, Working paper No.R-481, Inter-American Development Bank, Washington, D.C.
10. Omran, M. (2004). "The Performance of State-Owned Enterprises and Newly Privatized Finns: Does Privatization Really Matter?", *World Development*. 32(6): 1019-1041.
11. Alovzat Muslumov (2005). "The Financial and Operating Performance of Privatized Companies in Turkish Cement Industry", *METU Studies in Development*, 32: 59-101.
12. Isnurhadi Banaluddin (2007). "The operating and financial performance of newly privatized state-owned enterprises in Malaysia" Doctoral Thesis, June 2007.
13. Ravinder Vinayek and Rupinder (2007). "The Effects of Disinvestment on Financial and Operational Performance of Public Sector Enterprises: Some Reflections", *The Journal of Institution of Public Enterprise*, Vol. 30, Nos. 1 and 2
14. Dr. Gagan Singh and Dr. Deepak Paliwal (2010). "Impact of Disinvestment on the Financial and Operating Performance of Competitive and Monopoly Units of Indian Public Sector Enterprises", *International Journal of Research in Commerce and Management*, Volume No. 1, Issue No. 2, June 2010.
15. Gupta Seema , P.K. Jain, Surendra S. Yadavand and V.K. Gupta (2011). "Financial performance of disinvested central public sector enterprises in India: An empirical study on select dimensions", *Journal of Applied Finance and Banking*, 1(4): 57-106 ISSN: 1792-6580 (print version), 1792-6599 (online) International Scientific Press,
16. Dr. Kishor C. Meher and Dr. Samiran Jana (2012). "Bottom Line of Divested PSE's in Post Privatization Scenario", *4D International Journal of Management and Science*, ISSN No: 2250-0669 @4D Crossconnect.com, Inc, 2012. www.4dinternationaljournal.com Vol. 3, Issue1, 2013 page 10 to 26.

**Table 1****Disinvestment based on Sector from 1991-92 to 2013-14 (As on 06 July 2013)**

| <b>Sector</b> | <b>No. of Enterprises Disinvested</b> | <b>No. of Disinvestments</b> | <b>% of Disinvestment to Total No. of Disinvestments</b> |
|---------------|---------------------------------------|------------------------------|--|
| Agriculture   | -                                     | -                            | -  |
| Electricity   | 6                                     | 9                            | 5.70   |
| Manufacturing | 28                                    | 64                           | 40.50  |
| Mining        | 11                                    | 31                           | 19.60  |
| Services      | 35                                    | 54                           | 34.20  |
| <b>Total</b>  | <b>80</b>                             | <b>158</b>                   | <b>100</b>   |

Source: Department of Disinvestment, Ministry of Finance, Government of India

**Table 2****Sample Based on Different Approaches to Disinvestments**

| <b>Cognate Group</b>                        | <b>Name of the enterprise</b>             | <b>Latest year of disinvestment Year</b> | <b>Type of disinvestment</b> | <b>% stake disinvested</b> | <b>% residual equity with govt.</b> |
|---|---|--|------------------------------|----------------------------|-------------------------------------|
| <b>Fertilizers</b>                          | Paradeep Phosphates Ltd.*                 | 2001-02                                  | Majority                     | 74                         | 26                                  |
| <b>Heavy Engineering</b>                    | Bharat Heavy Electricals Ltd.             | 1994-95                                  | Minority                     | 32.26                      | 67.72                               |
|   | Jessop & Company Ltd.*                    | 2003-04                                  | Majority                     | 72                         | 27                                  |
|   | Lagan Jute Machinery Company Ltd.*        | 2000-01                                  | Majority                     | 74                         | 26                                  |
| <b>Medium &amp; Light Engineering</b>       | Bharat Electronics Ltd.                   | 1994-95                                  | Minority                     | 24.16                      | 75.86                               |
|   | Maruti Udyog Ltd.                         | 2007-08                                  | Complete Privatization       | 45.79                      | 0                                   |
| <b>Petroleum (refinery &amp; Marketing)</b> | Bongaigaon Refinery & petrochemicals Ltd. | 2000-01                                  | Complete Privatization       | 100                        | 0                                   |
|   | Gail (India) Ltd.                         | 2003-04                                  | Minority                     | 42.65                      | 57.34                               |
|   | Hindustan Petroleum Corporation Ltd.      | 1994-95                                  | Minority                     | 48.57                      | 51.07                               |
|   | Indian Oil Corporation Ltd.               | 1999-00                                  | Minority                     | 17.84                      | 82.16                               |
|   | Madras Refineries Ltd.                    | 2000-01                                  | Complete Privatization       | 68.73                      | 0                                   |
| <b>Transportation Equipment</b>             | Bharat Earth Movers Ltd.                  | 1994-95                                  | Minority                     | 39.26                      | 60.81                               |

\*Unlisted CPSEs at BSE during the period of study.

Source: Department of Disinvestment, Ministry of Finance, Government of India

**Table 3**  
**Variable Description and Testable Prediction**

| Characteristic       | Variables and Measurements                                      | Testable Prediction |
|----------------------|---|---------------------|
| <b>Profitability</b> | 1. Operating Profit Margin Ratio (OPM) = $PBIDTA/Total\ Income$ | $OPM_A > OPM_B$     |
|                      | 2. Net Profit Margin Ratio (NPM) = $PAT/Total\ Income$          | $NPM_A > NPM_B$     |
|                      | 3. Return on Capital Employed (ROC) = $PAT/Capital\ Employed$   | $ROC_A > ROC_B$     |
|                      | 4. Return on Total Assets (ROA) = $PAT/Total\ Assets$           | $ROA_A > ROA_B$     |
|                      | 5. Return on Net worth (ROE) = $PAT/Net\ worth$                 | $ROE_A > ROE_B$     |

Source: Megginson et al (1994)

**Table 4**  
**Test of Normality of the Profitability Performance Measures**

|                                   | Skewness   |            | Kurtosis   |            | Shapiro-Wilk |          |            |          |
|-----------------------------------|------------|------------|------------|------------|--------------|----------|------------|----------|
|                                   | Before     | After      | Before     | After      | Before       |          | After      |          |
|                                   | Statistics | Statistics | Statistics | Statistics | Statistics   | P-Value  | Statistics | P-Value  |
| <b>Operating Profit margin</b>    | -0.3629    | 0.4688     | -0.0971    | 2.3189     | 0.9728       | 0.2001   | 0.9586     | 0.0402*  |
| <b>Net Profit Margin</b>          | -3.1767    | -0.9524    | 9.3975     | 3.2355     | 0.5024       | 0.0000** | 0.9099     | 0.0003** |
| <b>Return on Capital Employed</b> | -3.344     | 0.287      | 10.960     | 5.627      | 0.506        | 0.000**  | 0.865      | 0.000**  |
| <b>Return on Total Assets</b>     | -2.103     | -0.614     | 4.937      | 4.875      | 0.760        | 0.000**  | 0.900      | 0.000**  |
| <b>Return on Net worth</b>        | 3.884      | -2.825     | 28.364     | 15.265     | 0.522        | 0.000**  | 0.718      | 0.000**  |

\*Significant at 5% level and \*\*Significant at 1% level. According to these tests, if the lowest P-value amongst the test performed is significant, reject the idea that data come from a normal distribution.

Table 5

## Changes in Performance of Operating Profit Margin Ratio of Sample Firms

| CPSEs                                     | Statistics | Disinvestment |          | Change   | Paired T-test | Wilcoxon test | Industry Average |        |
|---|------------|---------------|----------|----------|---------------|---------------|------------------|--------|
|   |            | Before        | After    |          |               |               | Before           | After  |
| Paradeep Phosphates Ltd.                  | Mean       | 2.886         | 3.836    | 0.950    | 0.309         | -0.405        | 12.420           | 9.900  |
|   | Median     | 0.820         | 3.530    | 2.710    |               |               |                  |        |
|   | CV         | 2.019         | 1.046    | -0.973   |               |               |                  |        |
|   | CAGR(%)    | -226.81       | -253.35  | -26.540  |               |               |                  |        |
| Bharat Heavy Electricals Ltd.             | Mean       | 18.050        | 19.082   | 1.032    | 0.760         | -0.674        | 15.900           | 18.880 |
|   | Median     | 17.580        | 19.240   | 1.660    |               |               |                  |        |
|   | CV         | 0.130         | 0.123    | -0.007   |               |               |                  |        |
|   | CAGR(%)    | 4.339         | 3.212    | -1.127   |               |               |                  |        |
| Jessop & Co. Ltd.                         | Mean       | 2.184         | 16.412   | 14.228   | 1.625         | -1.214        | 14.640           | 24.120 |
|   | Median     | -3.230        | 18.630   | 21.860   |               |               |                  |        |
|   | CV         | 7.972         | 0.207    | -7.765   |               |               |                  |        |
|   | CAGR(%)    | -164.347      | 0.000    | 164.347  |               |               |                  |        |
| Lagan Engineering Co. Ltd.                | Mean       | -3.018        | 2.938    | 5.956    | 3.924*        | -2.023*       | 18.880           | 18.580 |
|   | Median     | 0.160         | 3.650    | 3.490    |               |               |                  |        |
|   | CV         | -2.480        | 2.814    | 5.294    |               |               |                  |        |
|   | CAGR(%)    | -48.248       | 26.978   | 75.226   |               |               |                  |        |
| Bharat Electronics Ltd.                   | Mean       | 21.024        | 16.950   | -4.074   | -3.026*       | -2.023*       | 21.360           | 13.720 |
|   | Median     | 21.280        | 16.790   | -4.490   |               |               |                  |        |
|   | CV         | 0.039         | 0.188    | 0.150    |               |               |                  |        |
|   | CAGR(%)    | 1.326         | 6.181    | 4.855    |               |               |                  |        |
| Maruti Suzuki India Ltd.                  | Mean       | 12.432        | 10.902   | -1.530   | -1.166        | -1.483        | 1.260            | -6.820 |
|   | Median     | 13.510        | 10.790   | -2.720   |               |               |                  |        |
|   | CV         | 0.219         | 0.148    | -0.071   |               |               |                  |        |
|   | CAGR(%)    | 13.559        | 0.170    | -13.389  |               |               |                  |        |
| Bongaigaon Refinery & Petrochemicals Ltd. | Mean       | 10.342        | 8.606    | -1.736   | -0.341        | -0.405        | 7.520            | 7.200  |
|   | Median     | 7.950         | 13.880   | 5.930    |               |               |                  |        |
|   | CV         | 0.541         | 1.213    | 0.672    |               |               |                  |        |
|   | CAGR(%)    | -22.940       | -190.673 | -167.733 |               |               |                  |        |
| GAIL (India) Ltd.                         | Mean       | 26.316        | 28.406   | 2.090    | 0.600         | -0.135        | 7.120            | 5.760  |
|   | Median     | 25.880        | 25.420   | -0.460   |               |               |                  |        |
|   | CV         | 0.143         | 0.293    | 0.150    |               |               |                  |        |
|   | CAGR(%)    | 4.252         | -7.208   | -11.460  |               |               |                  |        |
| Hindustan Petroleum Corpn. Ltd.           | Mean       | 5.224         | 6.634    | 1.410    | 2.134         | -1.753        | 7.460            | 7.520  |
|   | Median     | 5.320         | 6.790    | 1.470    |               |               |                  |        |
|   | CV         | 0.162         | 0.141    | -0.021   |               |               |                  |        |
|   | CAGR(%)    | -0.630        | -7.164   | -6.535   |               |               |                  |        |
| Indian Oil Corpn. Ltd.                    | Mean       | 6.360         | 6.952    | 0.592    | 0.580         | -0.405        | 7.620            | 7.300  |
|   | Median     | 6.030         | 6.710    | 0.680    |               |               |                  |        |
|   | CV         | 0.091         | 0.267    | 0.175    |               |               |                  |        |
|   | CAGR(%)    | 3.644         | -1.342   | -4.986   |               |               |                  |        |
| Chennai Petroleum Corpn. Ltd.             | Mean       | 11.462        | 6.730    | -4.732   | -4.959**      | -2.023*       | 7.520            | 7.200  |
|   | Median     | 12.220        | 7.820    | -4.400   |               |               |                  |        |
|   | CV         | 0.247         | 0.279    | 0.032    |               |               |                  |        |
|   | CAGR(%)    | -11.570       | -1.062   | 10.508   |               |               |                  |        |
| B E M L Ltd.                              | Mean       | 20.680        | 14.156   | -6.524   | -9.435**      | -2.023*       | 16.860           | 14.160 |
|   | Median     | 20.750        | 13.670   | -7.080   |               |               |                  |        |
|   | CV         | 0.053         | 0.151    | 0.098    |               |               |                  |        |
|   | CAGR(%)    | 1.788         | -6.673   | -8.461   |               |               |                  |        |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed from the Annual Reports of the respective units.

Table 6

## Changes in Performance of Net Profit Margin Ratio of Sample Firms

| CPSEs                                     | Statistics | Disinvestment |          | Change   | Paired T-test | Wilcoxon test | Industry Average |         |
|---|------------|---------------|----------|----------|---------------|---------------|------------------|---------|
|   |            | Before        | After    |          |               |               | Before           | After   |
| Paradeep Phosphates Ltd.                  | Mean       | -8.004        | -1.694   | 6.310    | 1.775         | -1.483        | 1.940            | 1.180   |
|   | Median     | -8.030        | -0.940   | 7.090    |               |               |                  |         |
|   | CV         | -0.981        | -3.169   | -2.188   |               |               |                  |         |
|   | CAGR(%)    | 19.478        | -189.977 | -209.455 |               |               |                  |         |
| Bharat Heavy Electricals Ltd.             | Mean       | 3.192         | 7.830    | 4.638    | 7.876**       | -2.023*       | 0.440            | 7.200   |
|   | Median     | 3.500         | 7.470    | 3.970    |               |               |                  |         |
|   | CV         | 0.383         | 0.173    | -0.209   |               |               |                  |         |
|   | CAGR(%)    | -1.423        | 4.383    | 5.805    |               |               |                  |         |
| Jessop & Co. Ltd.                         | Mean       | -68.210       | 10.632   | 78.842   | 4.399*        | -2.023*       | 3.580            | 11.000  |
|   | Median     | -86.340       | 12.480   | 98.820   |               |               |                  |         |
|   | CV         | -0.573        | 0.301    | 0.875    |               |               |                  |         |
|   | CAGR(%)    | -363.173      | 6.966    | 370.139  |               |               |                  |         |
| Lagan Engineering Co. Ltd.                | Mean       | -7.026        | 0.286    | 7.312    | 4.832**       | -2.023*       | 7.200            | 5.720   |
|   | Median     | -5.900        | 0.910    | 6.810    |               |               |                  |         |
|   | CV         | -1.051        | 30.928   | 31.979   |               |               |                  |         |
|   | CAGR(%)    | -260.152      | 64.663   | 324.815  |               |               |                  |         |
| Bharat Electronics Ltd.                   | Mean       | 3.970         | 4.288    | 0.318    | 0.341         | -0.135        | 4.060            | -0.120  |
|   | Median     | 3.720         | 4.140    | 0.420    |               |               |                  |         |
|   | CV         | 0.140         | 0.433    | 0.293    |               |               |                  |         |
|   | CAGR(%)    | 2.178         | 30.443   | 28.264   |               |               |                  |         |
| Maruti Suzuki India Ltd.                  | Mean       | 5.780         | 5.372    | -0.408   | -0.370        | -0.948        | -1.200           | -11.700 |
|   | Median     | 6.200         | 5.010    | -1.190   |               |               |                  |         |
|   | CV         | 0.486         | 0.246    | -0.239   |               |               |                  |         |
|   | CAGR(%)    | 41.266        | -0.98%   | -41.276  |               |               |                  |         |
| Bongaigaon Refinery & Petrochemicals Ltd. | Mean       | 5.502         | 3.242    | -2.260   | -0.540        | -0.405        | 3.320            | 3.340   |
|   | Median     | 3.530         | 8.370    | 4.840    |               |               |                  |         |
|   | CV         | 0.641         | 2.965    | 2.324    |               |               |                  |         |
|   | CAGR(%)    | -25.810       | -172.695 | -146.886 |               |               |                  |         |
| GAIL (India) Ltd.                         | Mean       | 13.288        | 13.624   | 0.336    | 0.222         | -0.405        | 3.040            | 2.440   |
|   | Median     | 12.100        | 13.660   | 1.560    |               |               |                  |         |
|   | CV         | 0.172         | 0.113    | -0.059   |               |               |                  |         |
|   | CAGR(%)    | -1.885        | -5.442   | -3.557   |               |               |                  |         |
| Hindustan Petroleum Corpn. Ltd.           | Mean       | 2.136         | 3.310    | 1.174    | 3.475*        | -2.023*       | 3.000            | 3.320   |
|   | Median     | 2.130         | 3.350    | 1.220    |               |               |                  |         |
|   | CV         | 0.311         | 0.044    | -0.267   |               |               |                  |         |
|   | CAGR(%)    | -3.263        | -2.314   | 0.949    |               |               |                  |         |
| Indian Oil Corpn. Ltd.                    | Mean       | 2.660         | 3.542    | 0.882    | 1.231         | -0.944        | 3.380            | 3.360   |
|   | Median     | 2.630         | 3.090    | 0.460    |               |               |                  |         |
|   | CV         | 0.124         | 0.380    | 0.255    |               |               |                  |         |
|   | CAGR(%)    | 4.514         | 7.030    | 2.516    |               |               |                  |         |
| Chennai Petroleum Corpn. Ltd.             | Mean       | 4.152         | 2.846    | -1.306   | -3.344*       | -2.023*       | 3.320            | 3.340   |
|   | Median     | 4.220         | 3.490    | -0.730   |               |               |                  |         |
|   | CV         | 0.243         | 0.472    | 0.228    |               |               |                  |         |
|   | CAGR(%)    | -9.443        | 13.232   | 22.674   |               |               |                  |         |
| B E M L Ltd.                              | Mean       | 4.962         | 0.978    | -3.984   | -5.735**      | -2.023*       | 3.700            | 0.960   |
|   | Median     | 4.260         | 1.080    | -3.180   |               |               |                  |         |
|   | CV         | 0.227         | 0.599    | 0.372    |               |               |                  |         |
|   | CAGR(%)    | -7.935        | -5.193   | 2.742    |               |               |                  |         |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed from the Annual Reports of the respective units.

Table 7

## Changes in Performance of Return on Capital Employed Ratio of Sample Firms

| CPSEs                                     | Statistics | Disinvestment |          | Change   | Paired T-test | Wilcoxon test | Industry Average |         |
|---|------------|---------------|----------|----------|---------------|---------------|------------------|---------|
|   |            | Before        | After    |          |               |               | Before           | After   |
| Paradeep Phosphates Ltd.                  | Mean       | -14.476       | -0.896   | 13.580   | 1.772         | -1.483        | 2.180            | 2.140   |
|   | Median     | -11.700       | -3.070   | 8.630    |               |               |                  |         |
|   | CV         | -1.004        | -10.717  | -9.713   |               |               |                  |         |
|   | CAGR(%)    | 26.439        | -211.256 | -237.695 |               |               |                  |         |
| Bharat Heavy Electricals Ltd.             | Mean       | 6.116         | 18.3640  | 12.248   | 7.753**       | -2.023*       | 0.880            | 17.880  |
|   | Median     | 5.940         | 17.4600  | 11.520   |               |               |                  |         |
|   | CV         | 0.400         | 0.205    | -0.195   |               |               |                  |         |
|   | CAGR(%)    | -7.584        | 3.490    | 11.074   |               |               |                  |         |
| Jessop & Co. Ltd.                         | Mean       | -109.220      | 15.118   | 124.338  | 3.993*        | -2.023*       | 7.940            | 27.400  |
|   | Median     | -117.040      | 13.290   | 130.330  |               |               |                  |         |
|   | CV         | -0.617        | 0.291    | 0.908    |               |               |                  |         |
|   | CAGR(%)    | -355.066      | -11.292  | 343.774  |               |               |                  |         |
| Lagan Engineering Co. Ltd.                | Mean       | -7.952        | 3.982    | 11.934   | 3.064*        | -1.753        | 17.880           | 12.680  |
|   | Median     | -7.430        | 0.910    | 8.340    |               |               |                  |         |
|   | CV         | -0.994        | 30.928   | 31.923   |               |               |                  |         |
|   | CAGR(%)    | -263.291      | 83.396   | 346.687  |               |               |                  |         |
| Bharat Electronics Ltd.                   | Mean       | 5.546         | 9.878    | 4.332    | 1.779         | -1.753        | 4.820            | 1.120   |
|   | Median     | 5.220         | 8.650    | 3.430    |               |               |                  |         |
|   | CV         | 0.271         | 0.556    | 0.285    |               |               |                  |         |
|   | CAGR(%)    | -4.484        | 37.856   | 42.340   |               |               |                  |         |
| Maruti Suzuki India Ltd.                  | Mean       | 16.898        | 14.9680  | -1.930   | -0.592        | -0.944        | -3.720           | -60.460 |
|   | Median     | 19.430        | 13.0800  | -6.350   |               |               |                  |         |
|   | CV         | 0.476         | 0.301    | -0.175   |               |               |                  |         |
|   | CAGR(%)    | 41.585        | 1.19     | -40.395  |               |               |                  |         |
| Bongaigaon Refinery & Petrochemicals Ltd. | Mean       | 8.428         | 26.716   | 18.288   | 1.033         | -0.944        | 10.000           | 13.020  |
|   | Median     | 5.290         | 34.820   | 29.530   |               |               |                  |         |
|   | CV         | 0.597         | 1.486    | 0.889    |               |               |                  |         |
|   | CAGR(%)    | -21.374       | -188.040 | -166.666 |               |               |                  |         |
| GAIL (India) Ltd.                         | Mean       | 16.384        | 19.412   | 3.028    | 1.958         | -1.214        | 10.080           | 10.480  |
|   | Median     | 14.870        | 19.340   | 4.470    |               |               |                  |         |
|   | CV         | 0.189         | 0.037    | -0.153   |               |               |                  |         |
|   | CAGR(%)    | 1.343         | -0.841   | -2.184   |               |               |                  |         |
| Hindustan Petroleum Corpn. Ltd.           | Mean       | 13.822        | 15.030   | 1.208    | 0.698         | -0.674        | 8.960            | 10.000  |
|   | Median     | 14.680        | 14.570   | -0.110   |               |               |                  |         |
|   | CV         | 0.283         | 0.116    | -0.167   |               |               |                  |         |
|   | CAGR(%)    | -4.430        | -4.813   | -0.383   |               |               |                  |         |
| Indian Oil Corpn. Ltd.                    | Mean       | 8.262         | 13.506   | 5.244    | 2.056         | -1.483        | 10.280           | 12.700  |
|   | Median     | 8.440         | 12.470   | 4.030    |               |               |                  |         |
|   | CV         | 0.115         | 0.415    | 0.300    |               |               |                  |         |
|   | CAGR(%)    | 2.156         | 8.378    | 6.222    |               |               |                  |         |
| Chennai Petroleum Corpn. Ltd.             | Mean       | 7.530         | 9.822    | 2.292    | 1.132         | -0.944        | 10.000           | 13.020  |
|   | Median     | 6.900         | 10.900   | 4.000    |               |               |                  |         |
|   | CV         | 0.244         | 0.434    | 0.191    |               |               |                  |         |
|   | CAGR(%)    | 1.675         | 30.259   | 28.583   |               |               |                  |         |
| B E M L Ltd.                              | Mean       | 4.404         | 0.948    | -3.456   | -4.711**      | -2.023*       | 3.520            | 0.920   |
|   | Median     | 4.140         | 1.180    | -2.960   |               |               |                  |         |
|   | CV         | 0.255         | 0.578    | 0.323    |               |               |                  |         |
|   | CAGR(%)    | -4.474        | 0.997    | 5.471    |               |               |                  |         |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed from the Annual Reports of the respective units.

Table 8

## Changes in Performance of Return on Total Asset Ratio of Sample Firms

| CPSEs                                     | Statistics | Disinvestment |          | Change   | Paired T-test | Wilcoxon test | Industry Average |         |
|---|------------|---------------|----------|----------|---------------|---------------|------------------|---------|
|   |            | Before        | After    |          |               |               | Before           | After   |
| Paradeep Phosphates Ltd.                  | Mean       | -6.826        | -0.378   | 6.448    | 1.658         | -1.483        | 1.600            | 1.440   |
|   | Median     | -6.140        | -1.620   | 4.520    |               |               |                  |         |
|   | CV         | -0.897        | -14.397  | -13.501  |               |               |                  |         |
|   | CAGR(%)    | 17.803        | -213.794 | -231.597 |               |               |                  |         |
| Bharat Heavy Electricals Ltd.             | Mean       | 2.302         | 6.372    | 4.070    | 6.458**       | -2.023*       | 0.340            | 5.900   |
|   | Median     | 2.440         | 6.180    | 3.740    |               |               |                  |         |
|   | CV         | 0.386         | 0.224    | -0.162   |               |               |                  |         |
|   | CAGR(%)    | -4.527        | 5.320    | 9.847    |               |               |                  |         |
| Jessop & Co. Ltd.                         | Mean       | -27.760       | 7.278    | 35.038   | 4.994**       | -2.023*       | 2.800            | 8.440   |
|   | Median     | -32.680       | 7.660    | 40.340   |               |               |                  |         |
|   | CV         | -0.588        | 0.219    | 0.807    |               |               |                  |         |
|   | CAGR(%)    | -341.264      | 10.701   | 351.965  |               |               |                  |         |
| Lagan Engineering Co. Ltd.                | Mean       | -5.026        | 2.036    | 7.062    | 3.660*        | -2.023*       | 5.900            | 4.520   |
|   | Median     | -4.470        | 0.880    | 5.350    |               |               |                  |         |
|   | CV         | -1.013        | 4.276    | 5.289    |               |               |                  |         |
|   | CAGR(%)    | -258.990      | 80.484   | 339.474  |               |               |                  |         |
| Bharat Electronics Ltd.                   | Mean       | 2.448         | 3.318    | 0.870    | 1.127         | -1.214        | 2.500            | 0.320   |
|   | Median     | 2.180         | 3.140    | 0.960    |               |               |                  |         |
|   | CV         | 0.164         | 0.493    | 0.329    |               |               |                  |         |
|   | CAGR(%)    | 0.185         | 34.664   | 34.480   |               |               |                  |         |
| Maruti Suzuki India Ltd.                  | Mean       | 11.996        | 8.6920   | -3.304   | -1.436        | -0.944        | -2.240           | -20.760 |
|   | Median     | 13.890        | 7.6300   | -6.260   |               |               |                  |         |
|   | CV         | 0.487         | 0.300    | -0.187   |               |               |                  |         |
|   | CAGR(%)    | 42.211        | 1.250    | -40.961  |               |               |                  |         |
| Bongaigaon Refinery & Petrochemicals Ltd. | Mean       | 6.414         | 10.580   | 4.166    | 0.490         | -0.405        | 6.480            | 7.560   |
|   | Median     | 4.150         | 15.030   | 10.880   |               |               |                  |         |
|   | CV         | 0.577         | 1.805    | 1.228    |               |               |                  |         |
|   | CAGR(%)    | -20.475       | -184.061 | -163.586 |               |               |                  |         |
| G A I L (India) Ltd.                      | Mean       | 10.766        | 11.586   | 0.820    | 0.854         | -0.944        | 6.400            | 6.240   |
|   | Median     | 10.220        | 11.680   | 1.460    |               |               |                  |         |
|   | CV         | 0.161         | 0.072    | -0.089   |               |               |                  |         |
|   | CAGR(%)    | -2.466        | 2.133    | 4.600    |               |               |                  |         |
| Hindustan Petroleum Corpn. Ltd.           | Mean       | 8.650         | 10.228   | 1.578    | 1.407         | -1.214        | 5.780            | 6.480   |
|   | Median     | 8.890         | 10.250   | 1.360    |               |               |                  |         |
|   | CV         | 0.292         | 0.098    | -0.194   |               |               |                  |         |
|   | CAGR(%)    | -3.022        | -4.450   | -1.427   |               |               |                  |         |
| Indian Oil Corpn. Ltd.                    | Mean       | 5.636         | 7.946    | 2.310    | 1.717         | -1.483        | 6.640            | 7.500   |
|   | Median     | 5.690         | 7.010    | 1.320    |               |               |                  |         |
|   | CV         | 0.117         | 0.353    | 0.237    |               |               |                  |         |
|   | CAGR(%)    | 2.792         | 4.669    | 1.876    |               |               |                  |         |
| Chennai Petroleum Corpn. Ltd.             | Mean       | 3.018         | 6.384    | 3.366    | 2.711         | -1.753        | 6.480            | 7.560   |
|   | Median     | 3.000         | 7.410    | 4.410    |               |               |                  |         |
|   | CV         | 0.128         | 0.421    | 0.293    |               |               |                  |         |
|   | CAGR(%)    | -0.460        | 24.699   | 25.159   |               |               |                  |         |
| B E M L Ltd.                              | Mean       | 3.372         | 0.690    | -2.682   | -4.818**      | -2.023*       | 2.680            | 0.680   |
|   | Median     | 3.110         | 0.840    | -2.270   |               |               |                  |         |
|   | CV         | 0.255         | 0.584    | 0.329    |               |               |                  |         |
|   | CAGR(%)    | -4.125        | -1.588   | 2.537    |               |               |                  |         |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed from the Annual Reports of the respective units.

**Table 9**  
**Changes in Performance of Return on Net Worth Ratio of Sample Firms**

| CPSE                                      | Statistics | Disinvestment |          | Change   | Paired T-test | Wilcoxon test | Industry Average |         |
|---|------------|---------------|----------|----------|---------------|---------------|------------------|---------|
|   |            | Before        | After    |          |               |               | Before           | After   |
| Paradeep Phosphates Ltd.                  | Mean       | 49.278        | -16.360  | -65.638  | -1.272        | -0.944        | 3.660            | 4.200   |
|   | Median     | 60.730        | 7.073    | -53.657  |               |               |                  |         |
|   | CV         | 2.658         | -3.415   | -6.073   |               |               |                  |         |
|   | CAGR(%)    | -193.700      | -251.732 | -58.032  |               |               |                  |         |
| Bharat Heavy Electricals Ltd.             | Mean       | 14.062        | 24.658   | 10.596   | 5.324**       | -2.023*       | 4.260            | 36.320  |
|   | Median     | 15.500        | 26.500   | 11.000   |               |               |                  |         |
|   | CV         | 0.401         | 0.229    | -0.172   |               |               |                  |         |
|   | CAGR(%)    | -1.257        | -6.810   | -5.553   |               |               |                  |         |
| Jessop & Co. Ltd.                         | Mean       | 13.514        | 13.564   | 0.050    | 0.005         | -0.135        | 11.380           | 32.960  |
|   | Median     | 15.258        | 20.937   | 5.679    |               |               |                  |         |
|   | CV         | 0.606         | 1.478    | 0.872    |               |               |                  |         |
|   | CAGR(%)    | -302.440      | -200.000 | 102.440  |               |               |                  |         |
| Lagan Engineering Co. Ltd.                | Mean       | -9.198        | 4.570    | 13.768   | 3.073*        | -1.753        | 36.320           | 17.900  |
|   | Median     | -9.710        | 1.660    | 11.370   |               |               |                  |         |
|   | CV         | -0.959        | 3.851    | 4.810    |               |               |                  |         |
|   | CAGR(%)    | -270.698      | 81.987   | 352.685  |               |               |                  |         |
| Bharat Electronics Ltd.                   | Mean       | 11.830        | 15.542   | 3.712    | 1.200         | -1.214        | 14.100           | 2.760   |
|   | Median     | 10.940        | 16.240   | 5.300    |               |               |                  |         |
|   | CV         | 0.151         | 0.405    | 0.254    |               |               |                  |         |
|   | CAGR(%)    | 1.712         | 29.775   | 28.063   |               |               |                  |         |
| Maruti Suzuki India Ltd.                  | Mean       | 18.546        | 16.108   | -2.438   | -0.724        | -0.944        | -6.340           | -51.280 |
|   | Median     | 21.460        | 14.170   | -7.290   |               |               |                  |         |
|   | CV         | 0.442         | 0.297    | -0.145   |               |               |                  |         |
|   | CAGR(%)    | 37.151        | 0.650    | -36.501  |               |               |                  |         |
| Bongaigaon Refinery & Petrochemicals Ltd. | Mean       | 9.604         | 32.098   | 22.494   | 1.052         | -0.944        | 19.000           | 22.760  |
|   | Median     | 5.850         | 49.530   | 43.680   |               |               |                  |         |
|   | CV         | 0.622         | 1.493    | 0.871    |               |               |                  |         |
|   | CAGR(%)    | -22.441       | -185.730 | -163.289 |               |               |                  |         |
| GAIL (India) Ltd.                         | Mean       | 23.910        | 22.604   | -1.306   | -0.655        | -0.405        | 6.400            | 6.240   |
|   | Median     | 22.070        | 22.340   | 0.270    |               |               |                  |         |
|   | CV         | 0.165         | 0.087    | -0.078   |               |               |                  |         |
|   | CAGR(%)    | 0.020         | -3.650   | -3.670   |               |               |                  |         |
| Hindustan Petroleum Corpn. Ltd.           | Mean       | 22.602        | 19.636   | -2.966   | -0.958        | -1.214        | 5.780            | 6.480   |
|   | Median     | 22.660        | 19.580   | -3.080   |               |               |                  |         |
|   | CV         | 0.333         | 0.074    | -0.258   |               |               |                  |         |
|   | CAGR(%)    | -6.130        | -2.200   | 3.930    |               |               |                  |         |
| Indian Oil Corpn. Ltd.                    | Mean       | 17.410        | 25.260   | 7.850    | 1.885         | -1.753        | 6.440            | 7.500   |
|   | Median     | 17.250        | 19.990   | 2.740    |               |               |                  |         |
|   | CV         | 0.065         | 0.345    | 0.280    |               |               |                  |         |
|   | CAGR(%)    | 3.120         | 1.880    | -1.240   |               |               |                  |         |
| Chennai Petroleum Corpn. Ltd.             | Mean       | 15.162        | 22.946   | 7.784    | 1.748         | -1.483        | 19.000           | 22.760  |
|   | Median     | 13.510        | 26.050   | 12.540   |               |               |                  |         |
|   | CV         | 0.214         | 0.454    | 0.239    |               |               |                  |         |
|   | CAGR(%)    | 0.870         | 31.970   | 31.100   |               |               |                  |         |
| B E M L Ltd.                              | Mean       | 10.526        | 2.070    | -8.456   | -5.944**      | -2.023*       | 8.440            | 2.060   |
|   | Median     | 9.560         | 2.530    | -7.030   |               |               |                  |         |
|   | CV         | 0.195         | 0.578    | 0.383    |               |               |                  |         |
|   | CAGR(%)    | -2.540        | -0.620   | 1.920    |               |               |                  |         |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed from the Annual Reports of the respective units.

**Table 10**

**Test for Significance Changes in Profitability Performance for Full Sample**

| Profitability Ratios          | Statistics | Disinvestment |         | Change (After-Before) | Paired T-test Difference in Mean (After-Before) |         | Wilcoxon test (After-Before) |         | Proportion test Firms changed as Predicted |         |
|-------------------------------|------------|---------------|---------|-----------------------|---|---------|------------------------------|---------|--|---------|
|                               |            | Before        | After   |                       | T-Value   | P-Value | Z-Statistic                  | P-Value | Percentage                                 | P-Value |
| Operating Profit Margin Ratio | Mean       | 11.162        | 11.800  | 0.639                 | 0.4047  | 0.6935  | 0.0000                       | 1.0000  | 58.3333                                    | 0.7740  |
|                               | Median     | 10.689        | 12.243  | 1.554                 |   |         |                              |         |  |         |
|                               | SD         | 4.276         | 4.032   | -0.243                |   |         |                              |         |  |         |
|                               | CV         | 0.761         | 0.572   | -0.189                |   |         |                              |         |  |         |
|                               | CAGR       | -37.136       | -35.911 | 1.225                 |   |         |                              |         |  |         |
| Net Profit Margin Ratio       | Mean       | -3.133        | 4.521   | 7.655                 | 1.1700  | 0.2670  | -1.1770                      | 0.2390  | 66.6667                                    | 0.3880  |
|                               | Median     | -4.832        | 5.176   | 10.008                |   |         |                              |         |  |         |
|                               | SD         | 5.657         | 3.044   | -2.612                |   |         |                              |         |  |         |
|                               | CV         | 0.010         | 2.791   | 2.780                 |   |         |                              |         |  |         |
|                               | CAGR(%)    | -50.471       | -20.743 | 29.728                |   |         |                              |         |  |         |
| Return on Capital Employed    | Mean       | -3.688        | 12.237  | 15.926                | 1.586   | 0.141   | -2.510                       | 0.012*  | 83.3333                                    | 0.0390* |
|                               | Median     | -4.272        | 11.967  | 16.238                |   |         |                              |         |  |         |
|                               | SD         | 9.817         | 7.433   | -2.384                |   |         |                              |         |  |         |
|                               | CV         | 0.018         | 2.053   | 2.035                 |   |         |                              |         |  |         |
|                               | CAGR(%)    | -48.959       | -20.890 | 28.069                |   |         |                              |         |  |         |
| Return on Total Asset         | Mean       | 1.249         | 6.228   | 4.979                 | 1.729   | 0.112   | -2.197                       | 0.028*  | 83.3333                                    | 0.0390* |
|                               | Median     | 0.857         | 6.341   | 5.484                 |   |         |                              |         |  |         |
|                               | SD         | 3.710         | 4.020   | 0.311                 |   |         |                              |         |  |         |
|                               | CV         | 0.006         | -0.463  | -0.468                |   |         |                              |         |  |         |
|                               | CAGR(%)    | -47.695       | -19.998 | 27.697                |   |         |                              |         |  |         |
| Return on Net Worth           | Mean       | 16.437        | 15.225  | -1.213                | -0.191  | 0.852   | -0.784                       | 0.433   | 58.3333                                    | 0.7740  |
|                               | Median     | 17.090        | 18.883  | 1.793                 |   |         |                              |         |  |         |
|                               | SD         | 15.626        | 15.464  | -0.162                |   |         |                              |         |  |         |
|                               | CV         | 0.408         | 0.490   | 0.082                 |   |         |                              |         |  |         |
|                               | CAGR(%)    | -63.028       | -42.040 | 20.988                |   |         |                              |         |  |         |

\*Significant at 5% level.  
 Source: Computed.

**Table 11**

**Proportion Test Results - Profitability Ratios - Comparison**

| S.No. | Profitability Ratios          | Sample firms changed as predicted |                        |                 | Proportion Test |         |
|-------|-------------------------------|-----------------------------------|------------------------|-----------------|-----------------|---------|
|       |                               | APC                               | Sign Description (+/-) | H <sub>a1</sub> | Percentage      | P-Value |
| 1.    | Operating Profit Margin Ratio | 0.639                             | +                      | Accepted        | 58.33           | 0.7740  |
| 2.    | Net Profit Margin Ratio       | 7.655                             | +                      | Accepted        | 66.67           | 0.3880  |
| 3.    | Return on Capital Employed    | 15.926                            | +                      | Accepted        | 83.33           | 0.039*  |
| 4.    | Return on Total Assets        | 4.979                             | +                      | Accepted        | 83.33           | 0.039*  |
| 5.    | Return on Net worth           | -1.213                            | -                      | Rejected        | 58.33           | 0.774   |

\*Significant at 5% level.  
 Source: Computed.

**Table 12**

**Comparison of changes in Profitability Ratios based on approaches to Disinvestment**

| Approaches to Disinvestment          | N | Statistics | Absolute Performance Change Method |        |         | Paired T- test (After-Before) |          | Wilcoxon test (After-Before) |          | Kruskal-Wallis test Across Sub-Samples |          |
|--------------------------------------|---|------------|------------------------------------|--------|---------|-------------------------------|----------|------------------------------|----------|--|----------|
|                                      |   |            | Disinvestment                      |        | APC     | T- Value                      | P- Value | Z- Statistics                | P- Value | Chi-Square                             | P- Value |
|                                      |   |            | Before                             | After  |         |                               |          |                              |          |  |          |
| <b>Operating Profit Margin Ratio</b> |   |            |                                    |        |         |                               |          |                              |          |  |          |
| Minority                             | 6 | Mean       | 16.276                             | 15.363 | -0.912  | -0.635                        | 0.553    | -0.105                       | 0.917    | 4.731                                  | 0.094    |
|                                      |   | Median     | 16.140                             | 14.770 | -1.370  |                               |          |                              |          |  |          |
| Majority                             | 3 | Mean       | 0.684                              | 7.729  | 7.045   | 1.820                         | 0.210    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | -0.750                             | 8.603  | 9.353   |                               |          |                              |          |  |          |
| Complete Privatization               | 3 | Mean       | 11.412                             | 8.746  | -2.666  | -2.577                        | 0.123    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | 11.227                             | 10.830 | -0.397  |                               |          |                              |          |  |          |
| <b>Net Profit Margin Ratio</b>       |   |            |                                    |        |         |                               |          |                              |          |  |          |
| Minority                             | 6 | Mean       | 5.035                              | 5.595  | 0.561   | 0.499                         | 0.639    | -1.153                       | 0.249    | 7.615                                  | 0.022*   |
|                                      |   | Median     | 4.723                              | 5.465  | 0.742   |                               |          |                              |          |  |          |
| Majority                             | 3 | Mean       | -27.747                            | 3.075  | 30.821  | 1.284                         | 0.328    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | -33.423                            | 4.150  | 37.573  |                               |          |                              |          |  |          |
| Complete Privatization               | 3 | Mean       | 5.145                              | 3.820  | -1.325  | -2.477                        | 0.132    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | 4.650                              | 5.623  | 0.973   |                               |          |                              |          |  |          |
| <b>Return on Capital Employed</b>    |   |            |                                    |        |         |                               |          |                              |          |  |          |
| Minority                             | 6 | Mean       | 9.089                              | 12.856 | 3.767   | 1.785                         | 0.134    | -1.572                       | 0.116    | 3.808                                  | 0.149    |
|                                      |   | Median     | 8.882                              | 12.278 | 3.397   |                               |          |                              |          |  |          |
| Majority                             | 3 | Mean       | -43.883                            | 6.068  | 49.951  | 1.343                         | 0.311    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | -45.390                            | 3.710  | 49.100  |                               |          |                              |          |  |          |
| Complete Privatization               | 3 | Mean       | 10.952                             | 17.169 | 6.217   | 1.010                         | 0.419    | -1.069                       | 0.285    |  |          |
|                                      |   | Median     | 10.540                             | 19.600 | 9.060   |                               |          |                              |          |  |          |
| <b>Return on Total Assets</b>        |   |            |                                    |        |         |                               |          |                              |          |  |          |
| Minority                             | 6 | Mean       | 5.529                              | 6.690  | 1.161   | 1.274                         | 0.259    | -1.153                       | 0.249    | 6.385                                  | 0.041*   |
|                                      |   | Median     | 5.422                              | 6.517  | 1.095   |                               |          |                              |          |  |          |
| Majority                             | 3 | Mean       | -13.204                            | 2.979  | 16.183  | 1.716                         | 0.228    | -1.604                       | 0.109    |  |          |
|                                      |   | Median     | -14.430                            | 2.307  | 16.737  |                               |          |                              |          |  |          |
| Complete Privatization               | 3 | Mean       | 7.143                              | 8.552  | 1.409   | 0.595                         | 0.612    | -1.069                       | 0.285    |  |          |
|                                      |   | Median     | 7.013                              | 10.023 | 3.010   |                               |          |                              |          |  |          |
| <b>Return on Net Worth</b>           |   |            |                                    |        |         |                               |          |                              |          |  |          |
| Minority                             | 6 | Mean       | 16.723                             | 18.295 | 1.572   | 0.539                         | 0.613    | -0.524                       | 0.600    | 0.692                                  | 0.707    |
|                                      |   | Median     | 16.330                             | 17.863 | 1.533   |                               |          |                              |          |  |          |
| Majority                             | 3 | Mean       | 17.865                             | 0.591  | -17.273 | -0.705                        | 0.554    | 0.000                        | 1.000    |  |          |
|                                      |   | Median     | 22.093                             | 9.890  | -12.203 |                               |          |                              |          |  |          |
| Complete Privatization               | 3 | Mean       | 14.437                             | 23.717 | 9.280   | 1.282                         | 0.328    | -1.069                       | 0.285    |  |          |
|                                      |   | Median     | 13.607                             | 29.917 | 16.310  |                               |          |                              |          |  |          |

\*Significant at 5% level.  
 Source: Computed.

Table 13

Comparison of changes in Profitability Ratios following disinvestment among Cognate Group

| Cognate Group                        | N | Statistics     | Absolute Performance |                  |                  | Paired T- test |         | Wilcoxon test  |        | Kruskal-Wallis test |       |
|--------------------------------------|---|----------------|----------------------|------------------|------------------|----------------|---------|----------------|--------|---------------------|-------|
|                                      |   |                | Change Method        |                  |                  | (After-Before) |         | (After-Before) |        | Across Sub- Samples |       |
|                                      |   |                | Disinvestment        |                  | APC              |                |         |                |        |                     |       |
|                                      |   |                | Before               | After            |                  | T-             | P-Value | Z-Statistics   | P-     | Chi-                | P-    |
| <b>Operating Profit Margin Ratio</b> |   |                |                      |                  |                  |                |         |                |        |                     |       |
| Fertilizers                          | 1 | Mean<br>Median | 2.886<br>0.820       | 3.836<br>3.530   | 0.950<br>2.710   | 0.309          | 0.773   | -0.405         | 0.686  | 6.733               | 0.151 |
| Heavy Engineering                    | 3 | Mean<br>Median | 5.739<br>4.837       | 12.811<br>13.840 | 7.072<br>9.003   | 1.837          | 0.208   | -1.604         | 0.109  |                     |       |
| Medium & Light Engineering           | 2 | Mean<br>Median | 16.728<br>17.395     | 13.926<br>13.790 | -2.802<br>-3.605 | -2.203         | 0.271   | -1.342         | 0.180  |                     |       |
| Petroleum (Refinery & Marketing)     | 5 | Mean<br>Median | 11.941<br>11.480     | 11.466<br>12.124 | -0.475<br>0.644  | -0.382         | 0.722   | -0.135         | 0.893  |                     |       |
| Transportation Equipment             | 1 | Mean<br>Median | 20.680<br>20.750     | 14.156<br>13.670 | -6.524<br>-7.080 | -9.435         | 0.001** | -2.023         | 0.043* |                     |       |
| <b>Net Profit Margin Ratio</b>       |   |                |                      |                  |                  |                |         |                |        |                     |       |
| Fertilizers                          | 1 | Mean<br>Median | -8.004<br>-8.030     | -1.694<br>-0.940 | 6.310<br>7.090   | 1.775          | 0.151   | -1.483         | 0.138  | 8.541               | 0.074 |
| Heavy Engineering                    | 3 | Mean<br>Median | -24.015<br>-29.580   | 6.249<br>6.953   | 30.264<br>36.533 | 1.245          | 0.339   | -1.604         | 0.109  |                     |       |
| Medium & Light Engineering           | 2 | Mean<br>Median | 4.875<br>4.960       | 4.830<br>4.575   | -0.045<br>-0.385 | -0.124         | 0.921   | -0.447         | 0.655  |                     |       |
| Petroleum (Refinery & Marketing)     | 5 | Mean<br>Median | 5.548<br>4.922       | 5.313<br>6.392   | -0.235<br>1.470  | -0.354         | 0.741   | -0.405         | 0.686  |                     |       |
| Transportation Equipment             | 1 | Mean<br>Median | 4.962<br>4.260       | 0.978<br>1.080   | -3.984<br>-3.180 | -0.213         | 0.842   | -0.674         | 0.500  |                     |       |
| <b>Return on Capital Employed</b>    |   |                |                      |                  |                  |                |         |                |        |                     |       |
| Fertilizers                          | 1 | Mean<br>Median | -14.476<br>-11.700   | -0.896<br>-3.070 | 13.580<br>8.630  | 1.772          | 0.151   | -1.483         | 0.138  | 6.641               | 0.156 |
| Heavy Engineering                    | 3 | Mean<br>Median | -37.019<br>-39.510   | 12.488<br>10.553 | 49.507<br>50.063 | 1.323          | 0.317   | -1.604         | 0.109  |                     |       |
| Medium & Light Engineering           | 2 | Mean<br>Median | 11.222<br>12.325     | 12.423<br>10.865 | 1.201<br>-1.460  | 0.384          | 0.767   | -0.447         | 0.655  |                     |       |
| Petroleum (Refinery & Marketing)     | 5 | Mean<br>Median | 10.885<br>10.036     | 16.897<br>18.420 | 6.012<br>8.384   | 1.915          | 0.128   | -2.023         | 0.043* |                     |       |
| Transportation Equipment             | 1 | Mean<br>Median | 4.404<br>4.140       | 0.948<br>1.180   | -3.456<br>-2.960 | -4.711         | 0.009** | -2.023         | 0.043* |                     |       |
| <b>Return on Total Assets</b>        |   |                |                      |                  |                  |                |         |                |        |                     |       |
| Fertilizers                          | 1 | Mean<br>Median | -6.826<br>-6.140     | -0.378<br>-1.620 | 6.448<br>4.520   | 1.658          | 0.173   | -1.483         | 0.138  | 8.449               | 0.076 |
| Heavy Engineering                    | 3 | Mean<br>Median | -10.161<br>-11.570   | 5.229<br>4.907   | 15.390<br>16.477 | 1.561          | 0.251   | -1.604         | 0.109  |                     |       |
| Medium & Light Engineering           | 2 | Mean<br>Median | 7.222<br>8.035       | 6.005<br>5.385   | -1.217<br>-2.650 | -0.583         | 0.664   | -0.447         | 0.655  |                     |       |
| Petroleum (Refinery & Marketing)     | 5 | Mean<br>Median | 6.897<br>6.390       | 9.345<br>10.276  | 2.448<br>3.886   | 4.074          | 0.015*  | -2.023         | 0.043* |                     |       |
| Transportation Equipment             | 1 | Mean<br>Median | 3.372<br>3.110       | 0.690<br>0.840   | -2.682<br>-2.270 | -4.818         | 0.009** | -2.023         | 0.043* |                     |       |

**Return on Net Worth**

|                                  |   |                |                  |                  |                  |        |         |        |        |       |       |
|----------------------------------|---|----------------|------------------|------------------|------------------|--------|---------|--------|--------|-------|-------|
| Fertilizers                      | 1 | Mean<br>Median | 49.278<br>60.730 | -16.360<br>7.073 | 49.278<br>60.730 | -1.272 | 0.272   | -0.944 | 0.345  | 5.792 | 0.215 |
| Heavy Engineering                | 3 | Mean<br>Median | 6.126<br>7.016   | 14.264<br>16.366 | 6.126<br>7.016   | 1.963  | 0.189   | -1.604 | 0.109  |       |       |
| Medium & Light Engineering       | 2 | Mean<br>Median | 15.188<br>16.200 | 15.825<br>15.205 | 15.188<br>16.200 | 0.207  | 0.870   | -0.447 | 0.655  |       |       |
| Petroleum (Refinery & Marketing) | 5 | Mean<br>Median | 17.738<br>16.268 | 24.509<br>27.498 | 17.738<br>16.268 | 1.497  | 0.209   | -1.214 | 0.225  |       |       |
| Transportation Equipment         | 1 | Mean<br>Median | 10.526<br>9.560  | 2.070<br>2.530   | 10.526<br>9.560  | -5.944 | 0.004** | -2.023 | 0.043* |       |       |

\*Significant at 5% level and \*\*Significant at 1% level.

Source: Computed.

**Table 14**  
**Kruskal -Wallis Test Results - Profitability Ratios - Comparison**

| S.No. | Profitability Ratios          | Among Approaches to Disinvestment |         |                 |                 | Among Cognate Group |         |                 |                 |
|-------|-------------------------------|-----------------------------------|---------|-----------------|-----------------|---------------------|---------|-----------------|-----------------|
|       |                               | Chi-Square                        | P-Value | Null Hypothesis | H <sub>a2</sub> | Chi-Square          | P-Value | Null Hypothesis | H <sub>a3</sub> |
| 1.    | Operating Profit Margin Ratio | 4.731                             | 0.094   | Accepted        | Rejected        | 6.733               | 0.151   | Accepted        | Rejected        |
| 2.    | Net Profit Margin Ratio       | 7.615                             | 0.022*  | Rejected        | Accepted        | 8.541               | 0.074   | Accepted        | Rejected        |
| 3.    | Return on Capital Employed    | 3.808                             | 0.149   | Accepted        | Rejected        | 6.641               | 0.156   | Accepted        | Rejected        |
| 4.    | Return on Total Assets        | 6.385                             | 0.041*  | Rejected        | Accepted        | 8.449               | 0.076   | Accepted        | Rejected        |
| 5.    | Return on Net worth           | 0.692                             | 0.707   | Accepted        | Rejected        | 5.792               | 0.215   | Accepted        | Rejected        |

\*Significant at 5% level.

Source: Computed.

**Table 15**  
**Comparison of changes in Profitability Ratios based on Listed and Unlisted CPSEs at BSE**

| Ratios | Status   | N | Absolute Performance Change Method |            |         | Mann-Whitney Rank-Sum Test |              |         | H <sub>a4</sub> |
|--------|----------|---|------------------------------------|------------|---------|----------------------------|--------------|---------|-----------------|
|        |          |   | Disinvestment                      |            |         | Average Rank               | Z-Statistics | P-Value |                 |
|        |          |   | Mean Before                        | Mean After | APC     |                            |              |         |                 |
| OPM    | Listed   | 9 | 14.654                             | 13.158     | -1.497  | 5.333                      | -1.941       | 0.052   | Rejected        |
|        | Unlisted | 3 | 0.684                              | 7.729      | 7.045   | 10.000                     |              |         |                 |
| NPM    | Listed   | 9 | 5.071                              | 5.004      | -0.068  | 5.000                      | -2.496       | 0.013*  | Accepted        |
|        | Unlisted | 3 | -27.747                            | 3.075      | 30.821  | 11.000                     |              |         |                 |
| ROC    | Listed   | 9 | 9.71                               | 14.294     | 4.584   | 5.333                      | -1.941       | 0.052   | Rejected        |
|        | Unlisted | 3 | -43.883                            | 6.068      | 49.951  | 10.000                     |              |         |                 |
| ROA    | Listed   | 9 | 6.067                              | 7.311      | 1.244   | 5.000                      | -2.496       | 0.013*  | Accepted        |
|        | Unlisted | 3 | -13.204                            | 2.979      | 16.183  | 11.000                     |              |         |                 |
| ROE    | Listed   | 9 | 15.961                             | 20.102     | 4.141   | 6.667                      | -0.277       | 0.782   | Rejected        |
|        | Unlisted | 3 | 17.865                             | 0.591      | -17.273 | 6.000                      |              |         |                 |

\*Significant at 5% level.

Source: Computed.