

Industry-wise Dispersion of Investment Returns in Indian CPSEs: Experiential Confirmation on Aggregation

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ABSTRACT

Purpose: *The CPSEs play a vital role in the economic structure of the country by supplying necessary products and services. To sustain in the long run, it is essential to earn a reasonable amount of profit on a consistent basis. Thus, the higher the dispersion in investment returns, the higher is the risk and vice-versa. In this perspective, an industry-wise dispersion of investment returns in Indian CPSEs are carried out from 2010-11 to 2019-20.*

Design/Methodology/Approach: *To fulfill the research objectives of the study, secondary data is used. Dispersion is calculated for the investment ratios by coefficient of variation. Furthermore, paired 't' test is applied to locate any significant transform in the average dispersion of investment returns of all the selected industries taken together. One-way ANOVA is also applied to measure variation in investment returns among the selected industries.*

Findings/Result: *The study results reveal that the rate of fluctuation in investment returns has varied extensively among the industries. Moreover, most of the selected industries in the 1st sub-period have shown better consistency in investment returns as compared to the 2nd sub-period. Further, significant differences are observed in investment returns among the selected industries, which implies that investment returns in each selected industry has a significant bearing on the aggregate investment returns of the CPSEs.*

Originality/Value: *To recognize the rate of dispersal in investment returns generated by the CPSEs.*

Paper Type: *Empirical Research.*

Keywords: Investment Returns, CPSEs, Dispersion, ROA, ROCE, ROE.

1. INTRODUCTION :

Simply defined, investment return is the quantity of profit that is earned by an enterprise from their investment during a particular time period. Alternatively, it is known as ROI. To sustain in the long run, it is essential to earn a reasonable amount of profit on a consistent basis. Thus, higher the dispersion in investment returns, higher is the risk and vice-versa.

The benefits of having consistent ROI are indicated below:

- (1) Useful for comparison of funds invested in diverse projects.
- (2) Strengthening financial success of the organization.
- (3) Useful for comparative analysis between the departments of the company with other companies.

2. CPSES IN INDIA – A BRIEF OVERVIEW :

The Central Public Sector Enterprises (CPSEs) were established in India to achieve socio-economic development. At the beginning, the CPSEs had a capital expenditure of Rs. 29 crore, while the capital expenditure was Rs. 16,40,628 crore dated 31.3.2019.

The CPSEs play an imperative function in the financial structure by supplying necessary products and services. They also operate in various competitive markets. From 1991-92, the Indian Govt. introduced disinvestment of shares in the CPSEs to build them more efficient and effective in their operational activities.

3. PREVIOUS STUDIES :

An appraisal of previous studies linked to CPSEs is presented below in Table 1.

S. No.	Focus Area	References
1	The study explored the possibility of privatization in PSEs. They stated that the process of privatization in the industries could make the most of consumer wellbeing.	Mishra, R.K. and Nandagopal, R. (1989) [1]
2	The sick PSEs should be closed by selling their assets. Such fatally ill PSEs are mostly limited to those PSEs which were previously acquired as ill units from the private sector. Hence, these PSEs became a main issue for the overall substandard performance of the PSEs.	Gupta, K.L. and Kaur, H. (2004) [2]
3	The researcher stated that economic performance is not expected to be affected by disinvestment because the administration would continue to be the leading shareholder. The study suggested that disinvestment could bring positive results in the country provided the enterprises work in a cutthroat situation.	Nagaraj, R. (2005) [3]
4	The study examined the outcome of disinvestment of shares on monetary and on service of cutthroat and dominant units of Indian PSUs.	Singh, G. and Paliwal, D. (2010) [4]
5	The researchers concluded that unsatisfactory result of the disinvested CPSEs were due to high interference of the administration in the functioning of CPSEs, inefficient industrial structure, environment restrictions, and small proportion of disinvestment.	Seema, G., Jain, P.K., Yadav, S.S., and Gupta, V.K. (2011) [5]
6	The study discovered that ONGC, BEL, and RCF were in gray region. However, SAIL and NTPC were in suffering region.	Pardeshi, B. and Thorat, H. (2015) [6]
7	On the whole, the study showed improvement in financial and operating performance for at least more than 41% of the sample selected in the study.	Vijayakumar, A. and Jayachitra, S. (2015) [7]
8	The study concluded that CPSEs had contributed 6% to 7% of India's GDP, thereby making them an important part of the economic growth process in the country.	Menaka, R. (2015) [8]
9	The expansion pace of loss creation CPSEs augmented at an increasing rate, while the expansion pace of profit creation CPSEs augmented at a decreasing rate. The study further observed negative annual growth rate in ROCE which showed lack of efficiency in the CPSEs.	George, E. and Vinod, R. (2016) [9]
10	The study revealed that CPSEs in India have sufficiently maintained and utilized their cash balances during the period under study.	Ghosh, S. (2020) [10]

4. RESEARCH GAP :

The above review shows that several studies were conducted on various issues related to CPSEs. However, we found no industry-wise studies with respect to dispersion of investment returns in Indian CPSEs. Thus, this paper may well be considered as initial endeavour to add to the existing literature.

5. OBJECTIVES :

- (1) To examine industry-wise dispersion in investment returns.
- (2) To examine whether there is any variation in investment returns among the industries.

6. MODEL FOR HYPOTHESES OF THE STUDY :

6.1 The Model: The model for development of hypotheses is shown below in Fig.1:

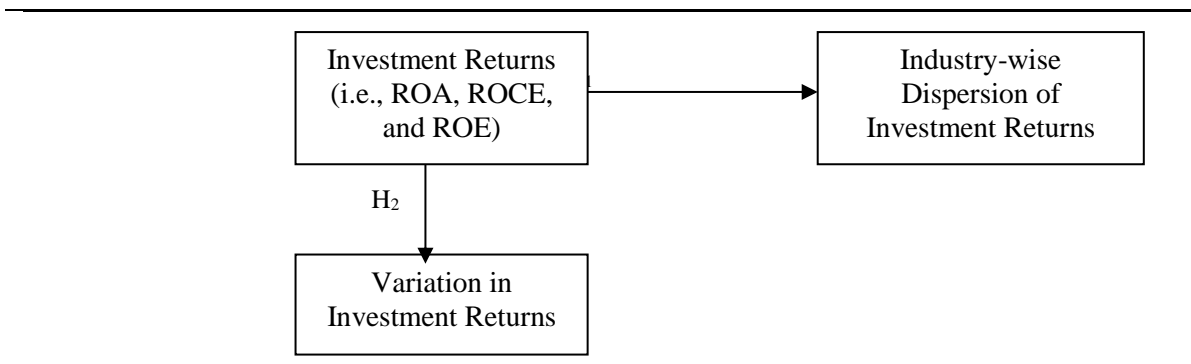


Fig. 1: The Model for Hypotheses Development

6.2 Hypotheses: On the basis of Fig.1, the hypotheses of the study are affirmed underneath:

1st Hypothesis (H₁):

Null Hypothesis (H₀₁): There is no significant change in the average dispersion of investment returns of the total industry.

Alternative Hypothesis (H_{A1}): There is significant change in the average dispersion of investment returns of the total industry.

2nd Hypothesis (H₂):

Null Hypothesis (H₀₂): There is no significant variation in investment returns among the industries.

Alternative Hypothesis (H_{A2}): There is significant variation in investment returns among the industries.

7. RESEARCH METHODOLOGY :

7.1 Sample Frame: The industries selected in the study are shown below in Table 2.

Table 2: CPSEs by Sector and Industry	
MANUFACTURING SECTOR	
1	Agro Industry (AI)
2	Coal Industry (CI)
3	Crude Oil Industry (COI)
4	Other Minerals & Metals Industry (OMMI)
5	Steel Industry (SI)
6	Petroleum (Refinery & Marketing) Industry (PRMI)
7	Fertilizers Industry (FI)
8	Chemicals & Pharmaceuticals Industry (CPI)
9	Heavy & Medium Engineering Industry (HMEI)
10	Transportation Vehicle & Equipment Industry (TVEI)
11	Industrial and Consumer Goods Industry (ICGI)
12	Textiles Industry (TI)
13	Power Generation Industry (PGI)
SERVICE SECTOR	
14	Power Transmission Industry (PTI)
15	Trading & Marketing Industry (TMI)
16	Transport & Logistic Services Industry (TLSI)
17	Contract & Construction and Tech. Consultancy Services Industry (CCTCSI)
18	Hotel and Tourist Services Industry (HTSI)
19	Financial Services Industry (FSI)
20	Telecommunication & Information Technology Industry (TITI)
<i>Source: Published Annual Reports of Public Enterprises Survey, Department of Public Enterprises, Govt. of India. [11]</i>	

7.2 Study Period: The study period ranges from 2010-2011 to 2019-2020. Further, the whole study period is sub-divided into two sub-periods (i) 1st sub-period: 2010-11 to 2014-15 and (ii) 2nd sub-period: 2015-16 to 2019-20.

7.3 Data Source: Secondary data is used which is collected from the published annual reports of the Public Enterprises Survey, Govt. of India. Furthermore, aggregate level data is applied in order to reach at a meaningful conclusion.

7.4 Tools: The following accounting and statistical tools are applied in the study which is stated below:

Accounting Ratios: The investment returns are indicated by the following ratios: [12]

ROA = Net Returns after Levy ÷ Total Assets

ROCE = EBIT ÷ Capital Employed

ROE = Net Returns after Levy ÷ Shareholders' Equity

Coefficient of Variation (C.V.): To capture industry-wise dispersion in investment returns of the CPSEs, C.V. is used which is shown below: [13]

C.V. = [(S.D.) ÷ Mean] × 100

To judge the consistency of investment returns at aggregate level, sector-wise level, and industry-wise level, it has been arbitrarily separated into relatively stable (C.V. ≤ 25%), moderately fluctuating (25.1% ≤ C.V. ≤ 50.0%), highly fluctuating (50.1% ≤ C.V. ≤ 75.0%), and erratically fluctuating (C.V. > 75.0%). [14]

Paired 't' Test and One-way ANOVA: Paired 't' test has been applied to find out whether there is any significant change in the average dispersion of investment returns of the total industry (i.e., all the selected industries taken together) during the period under study.

The test statistic in this respect is shown below:

$$t = \left(\frac{\bar{d}}{s} \right) \div \left(\frac{1}{\sqrt{n-1}} \right)$$

Where: \bar{d} indicates mean and 's' indicates standard deviation of the differences d_i i.e., $\bar{d} = (\sum d_i \div n)$, and $s = \sqrt{\sum d_i^2 \div n - (\sum d_i \div n)^2}$.

The paired 't' test follows t allocation with (n – 1) d.f. To examine whether there is any significant variation in investment returns among the selected industries, the method of one-way ANOVA has been employed in the study. For this purpose, average of 10 years investment ratio (i.e., 2010-11 to 2019-20) is calculated for each industry selected in the study [15].

8. FINDINGS AND ANALYSIS :

8.1 Industry-wise Dispersion of Investment Returns:

8.1.1 Dispersion in ROA: According to Table 3, the lowest variation in ROA (C.V. 7.50%) is observed in CCTCSI, while TI with C.V. at 1400.00% reveals highest variation in ROA during the whole period. Moreover, out of twenty industries, fifteen industries (i.e., 75.00% of the total industries) show low rate of dispersion in ROA than that of average dispersion in ROA of the total industry. On further analysis of Table 3, it is observed that the rate of flux in ROA has varied extensively among the selected industries.

Nine industries (i.e., AI, SI, FI, CPI, ICGI, TI, TMI, TLSI, and HTSI) show erratic fluctuation; six industries (i.e., COI, OMMI, PRMI, HMEI, TVEI, and FSI) reveal moderate fluctuation; four industries (i.e., CI, PGI, PTI, and CCTCSI) show relatively stable performance; and one industry (i.e., TITI) reveals high fluctuation with respect to ROA during the entire study period. The average dispersion of ROA in the total industry is found to be erratic (C.V. 193.42%) during the entire study period.

In terms of sub-period analysis, eleven industries (i.e., CI, OMMI, SI, PRMI, CPI, TVEI, ICGI, PGI, TLSI, CCTCSI, and FSI) reveal lower variation in ROA during the 1st half as compared to that in the 2nd half, while eight industries (i.e., AI, COI, FI, HMEI, TI, TMI, HTSI, and TITI) have shown lower variation in ROA during the 2nd half as compared to that in the 1st half. The remaining one industry (i.e., PTI) shows same variation in ROA during the two sub-periods.

The average dispersion of ROA (C.V. 98.31%) of the total industry in the 1st half is found to be higher than that of the average dispersion of ROA (C.V. 80.51%) of the total industry in the 2nd half.

Table 3: Dispersion of Investment Returns (represented by ROA) in Selected Industries during 2010-11 to 2019-20

Selected Industries	Whole Period		1 st Sub-Period		2 nd Sub-Period	
	C.V. of ROA (%)	Nature of Dispersion	C.V. of ROA (%)	Nature of Dispersion	C.V. of ROA (%)	Nature of Dispersion
Manufacturing Sector:						
AI	80.00	Erratic	83.33	Erratic	66.67	High
CI	21.05	Stable	20.00	Stable	22.22	Stable
COI	50.00	Moderate	30.00	Moderate	20.00	Stable
OMMI	33.33	Moderate	20.00	Stable	37.50	Moderate
SI	300.00	Erratic	66.67	High	200.00	Erratic
PRMI	50.00	Moderate	33.33	Moderate	50.00	Moderate
FI	211.11	Erratic	287.50	Erratic	177.78	Erratic
CPI	116.67	Erratic	75.00	High	133.33	Erratic
HMEI	50.00	Moderate	60.00	High	25.00	Stable
TVEI	33.33	Moderate	33.33	Moderate	50.00	Moderate
ICGI	83.33	Erratic	53.85	High	118.18	Erratic
TI	1400.00	Erratic	800.00	Erratic	466.67	Erratic
PGI	20.00	Stable	16.67	Stable	25.00	Stable
Service Sector:						
PTI	25.00	Stable	25.00	Stable	25.00	Stable
TMI	1000.00	Erratic	100.00	Erratic	0.00	-
TLSI	200.00	Erratic	40.00	Moderate	50.00	Moderate
CCTCSI	7.50	Stable	0.00	-	25.00	Stable
HTSI	80.00	Erratic	150.00	Erratic	25.00	Stable
FSI	50.00	Moderate	0.00	-	50.00	Moderate
TITI	57.14	High	71.43	High	42.86	Moderate
Average	193.42	Erratic	98.31	Erratic	80.51	Erratic

Source: Author's Calculation.

8.1.2 Dispersion in ROCE: According to Table 4, CCTCSI reveals lowest dispersion in ROCE (C.V. 8.33%), while TI shows highest dispersion in ROCE (C.V. 800.00%) during the entire period. Out of twenty industries, sixteen industries (i.e., 80.00% of the total selected industries) indicate low rate of dispersion in ROCE as compared to the average dispersion in ROCE of the total industry. Further, the rate of fluctuation in ROCE has varied comprehensively among the twenty industries selected in the study.

Seven industries (i.e., AI, SI, FI, CPI, ICGI, TI, and TLSI) indicate erratic fluctuation; four industries (i.e., COI, OMMI, PRMI, and HMEI) show moderate fluctuation; four industries (i.e., TVEI, TMI, HTSI, and TITI) indicate high fluctuation; and five industries (i.e., CI, PGI, PTI, CCTCSI, and FSI) show relatively stable performance in respect of ROCE during the whole period. On the average, investment returns in terms of ROCE of the total industry has fluctuated erratically (C.V. 133.96%) throughout the entire study period.

On the basis of sub-period analysis, twelve industries (i.e., CI, OMMI, SI, PRMI, CPI, TVEI, ICGI, TI, PGI, PTI, TMI, and FSI) show lower dispersion in ROCE during the 1st sub-period as compared to that in the 2nd sub-period, while seven industries (i.e., AI, FI, HMEI, TLSI, CCTCSI, HTSI, and TITI) show lower dispersion in ROCE during the 2nd sub-period as compared to that in the 1st sub-period of the study. The remaining one industry (i.e., COI) has shown same dispersion in ROCE during the two sub-periods.

The average variation of ROCE (C.V. 107.30%) of the total industry in the 1st half is found to be lower than that of the average variation of ROCE (C.V. 259.64%) of the total industry in the 2nd half.

Table 4: Dispersion of Investment Returns (represented by ROCE) in Selected Industries during 2010-11 to 2019-20

Selected Industries	Whole Period		1 st Sub-Period		2 nd Sub-Period	
	C.V. of ROCE (%)	Nature of Dispersion	C.V. of ROCE (%)	Nature of Dispersion	C.V. of ROCE (%)	Nature of Dispersion
Manufacturing Sector:						
AI	600.00	Erratic	700.00	Erratic	100.00	Erratic
CI	20.00	Stable	10.53	Stable	25.81	Moderate
COI	38.46	Moderate	22.22	Stable	22.22	Stable
OMMI	33.33	Moderate	19.23	Stable	31.25	Moderate
SI	120.00	Erratic	33.33	Moderate	600.00	Erratic
PRMI	46.67	Moderate	23.08	Stable	52.94	High
FI	120.00	Erratic	132.26	Erratic	124.14	Erratic
CPI	280.00	Erratic	163.64	Erratic	350.00	Erratic
HMEI	33.33	Moderate	41.67	Moderate	25.00	Stable
TVEI	60.00	High	6.67	Stable	40.00	Moderate
ICGI	192.31	Erratic	139.13	Erratic	266.67	Erratic
TI	800.00	Erratic	425.00	Erratic	3300.00	Erratic
PGI	11.11	Stable	10.00	Stable	12.50	Stable
Service Sector:						
PTI	11.11	Stable	0.00	-	11.11	Stable
TMI	64.00	High	33.33	Moderate	94.12	Erratic
TLSI	85.71	Erratic	200.00	Erratic	8.33	Stable
CCTCSI	8.33	Stable	18.18	Stable	8.33	Stable
HTSI	68.18	High	63.64	High	35.29	Moderate
FSI	20.00	Stable	16.67	Stable	25.00	Stable
TITI	66.67	High	87.50	Erratic	60.00	High
Average	133.96	Erratic	107.30	Erratic	259.64	Erratic

Source: Author's Calculation.

8.1.3 Dispersion in ROE: From Table 5, it is observed that PGI shows lowest variation in ROE (C.V. 10.00%), while SI shows highest variation in ROE (C.V. 800.00%) during the whole period. It is further observed that out of twenty industries, sixteen industries (i.e., 80.00% of the total selected industries) reveal low rate of dispersal in ROE as compared to the average dispersal in ROE of the total industry. Furthermore, the rate of fluctuation in ROE has varied widely among the twenty industries under study.

Nine industries (i.e., AI, SI, FI, CPI, ICGI, TI, TMI, TLSI, and HTSI) show erratic fluctuation; three industries (i.e., COI, OMMI, and PRMI) reveal moderate fluctuation; three industries (i.e., HMEI, TVEI, and TITI) show high fluctuation; and five industries (i.e., CI, PGI, PTI, CCTCSI, and FSI) indicate relatively stable performance with respect to ROE during the entire study period. The average ROE of the total industry has fluctuated erratically (C.V. 171.84%) during the entire study period.

So far as the sub-period analysis of ROE is concerned, ten industries (i.e., OMMI, SI, PRMI, CPI, TVEI, ICGI, PGI, TMI, FSI, and TITI) show lower dispersal in ROE during the 1st half as compared to that in the 2nd half, while nine industries (i.e., AI, CI, FI, HMEI, TI, PTI, TLSI, CCTCSI, and HTSI) indicate lower dispersal in ROE during the 2nd half as compared to that in the 1st half. The remaining one industry (i.e., COI) shows same dispersion in ROE (i.e., 25.00%) during the two sub-periods.

The average dispersion of ROE (C.V. 73.23%) of the total industry in the 2nd half is found to be lower as compared to the average dispersion of ROE (C.V. 126.40%) of the total industry in the 1st half.

Table 5: Dispersion of Investment Returns (represented by ROE) in Selected Industries during 2010-11 to 2019-20

Selected Industries	Whole Period		1 st Sub-Period		2 nd Sub-Period	
	C.V. of ROE (%)	Nature of Dispersion	C.V. of ROE (%)	Nature of Dispersion	C.V. of ROE (%)	Nature of Dispersion
Manufacturing Sector:						
AI	162.79	Erratic	139.71	Erratic	82.35	Erratic
CI	19.67	Stable	11.54	Stable	11.43	Stable
COI	41.67	Moderate	25.00	Stable	25.00	Stable
OMMI	35.71	Moderate	16.67	Stable	27.27	Stable
SI	800.00	Erratic	42.86	Moderate	120.00	Erratic
PRMI	50.00	Moderate	27.27	Stable	56.25	Moderate
FI	780.00	Erratic	195.12	Erratic	181.69	Erratic
CPI	80.00	Erratic	72.22	High	100.00	Erratic
HMEI	53.33	High	61.11	High	36.36	Moderate
TVEI	72.73	High	21.05	Stable	25.00	Stable
ICGI	82.35	Erratic	11.54	Stable	175.00	Erratic
TI	540.00	Erratic	1600.00	Erratic	300.00	Erratic
PGI	10.00	Stable	9.09	Stable	10.00	Stable
Service Sector:						
PTI	13.33	Stable	7.14	Stable	6.25	Stable
TMI	366.67	Erratic	40.00	Moderate	120.00	Erratic
TLSI	143.24	Erratic	51.25	High	50.00	Moderate
CCTCSI	20.00	Stable	11.11	Stable	7.69	Stable
HTSI	81.25	Erratic	114.29	Erratic	40.00	Moderate
FSI	15.38	Stable	6.67	Stable	16.67	Stable
TITI	68.75	High	64.29	High	73.68	High
Average	171.84	Erratic	126.40	Erratic	73.23	High

Source: Author's Calculation.

8.2 Paired 't' Test for Dispersion in Investment Returns: To examine whether there is any noteworthy change in the average dispersion of investment returns of the total industry between the two sub-periods, paired 't' test is employed in the study. Table 6 reveals insignificant results for ROA (t = 0.83), ROCE (t = -1.01), and ROE (t = 0.80). Thus, paired 't' test leads to the acceptance of the first null hypothesis of the study.

Table 6: Paired 't' Test for Dispersion in Investment Returns of Selected Industries during 2010-11 to 2019-20

Particulars	Coefficient of Variation (C.V.)		
	ROA (%)	ROCE (%)	ROE (%)
Average C.V. (1 st Sub-Period)	98.31	107.30	126.40
Average C.V. (2 nd Sub-Period)	80.51	259.64	73.23
Calculated value of t	0.83 ⁱ	-1.01 ⁱ	0.80 ⁱ

ⁱ insignificant.

Source: Author's Calculation.

8.3 Variation in Investment Returns among the Selected Industries: Table 7 reveals significant results at 1% level for all the selected investment ratios (i.e., ROA, ROCE, and ROE) of the study, thereby leading to the rejection of the second null hypothesis of the study. This implies that there are momentous differences in investment returns among the selected industries during the period under study.

Table 7: One-way ANOVA of Investment Returns among the Selected Industries during 2010-11 to 2019-20

Investment Returns	Basis of Variation	Sum of Squares	D.F.	Mean Square	F-Ratio
Return on Assets (ROA)	Between Groups	1.034	19	0.054	11.19***
	Within Groups	0.876	180	0.005	
Return on Capital Employed (ROCE)	Between Groups	2.243	19	0.118	5.94***
	Within Groups	3.575	180	0.020	
Return on Equity (ROE)	Between Groups	9.557	19	0.503	3.96***
	Within Groups	22.893	180	0.127	

***significant at 1% level.
 Source: Author's Calculation.

8.4 Results of the Model: The results of the model based on established hypotheses are shown below in Fig. 2:

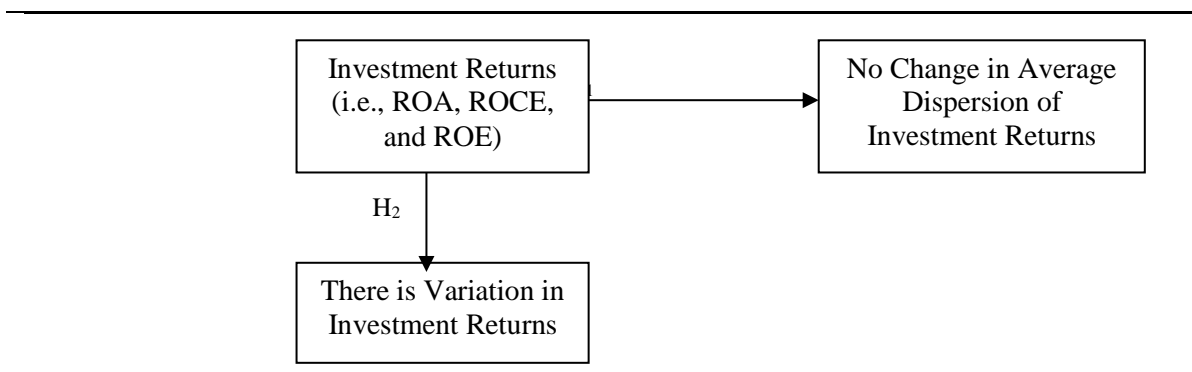


Fig. 2: Results of the Model based on established Hypotheses of the Study

9. CONCLUSIONS :

The above analysis of dispersion in investment returns reveals that the rate of fluctuation in investment returns has varied extensively among the industries selected in the study. Moreover, majority of the selected industries in the 1st half has shown better consistency in investment returns than that of the 2nd half.

Further, the study indicates significant differences in investment returns among the selected industries throughout the period under study. Thus, investment returns in each selected industry has a significant bearing on the aggregate investment returns of the CPSEs.

10. RECOMMENDATION :

The investment returns have fluctuated widely among the selected industries. Moreover, there are variations in investment returns among the selected industries. Hence, necessary measures should be adopted to ensure consistent returns on investment for sustainable growth of the CPSEs in the long run.

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