Comparative Performance of Domestic and Foreign Owned Firms: Evidence from an Emerging Market

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ABSTRACT

We studied the performance of 45 companies, 15 each from three groups of firms namely, foreign subsidiaries, domestic private, and public sector companies. Our intent was to determine which of these displayed superior economic performance. We analyzed data for two points of time 2002-03 and 2011-2012 using four measures of economic performance. These include operating profit margin (OPM), net profit margin (NPM), return on net worth (RONW) and asset turnover ratio (ATR). We employed the WELCH Test (W-test), Bonferroni post-hoc test, the Linear Discriminant Analysis technique as well as Chi-square test. Our finding is that all three groups of firms performed at par.

Key words: Economic performance, competitiveness, India

1. INTRODUCTION:

There has been a long standing debate on the relationship between ownership and corporate performance. This is even more pronounced in emerging markets. Conventional thinking has it that subsidiaries of foreign companies are more efficient vis-à-vis domestic firms in emerging markets and over a period of time dominate the latter in the competitive arena. This line of argument stems from the assumption that foreign firms are better resource-endowed in terms of technology, capital, brands, and management practices. Such strengths are reflected in the products and services of these firms. Consequently consumers are attracted to product and service offerings of foreign companies and develop loyalty to such brands.

In view of this possibility, emerging market governments enact laws that protect and nurture domestic industry from foreign competition. Unfortunately protectionism becomes the breeding ground for inefficiencies and below par quality. Consumers are the victims of such outcomes, who in turn clamor for best-in-class products. With the onslaught of the internet, information on products and services are now available to consumers on a real-time basis. This puts pressure on both the government as well as the domestic industry. Governments in developing markets are virtually compelled to liberalize and open up the economy to global

competition while local players are forced to improve competitiveness leading to a situation of 'shape-up or ship-out'.

There is yet another dimension of competition that happens between domestic firms. This is the competition between the private and the public sector firms. The general perception is that the private sector is more efficient and proactive and therefore more competitive. Consequently products and services offered by the private sector are of superior quality in comparison to the public sector counterparts.

2. LITERATURE REVIEW:

Extent literature on corporate performance and firm ownership is divided when it comes to performance between foreign firms and domestically owned firms. Some of the studies find that foreign firms are more efficient compared to domestically owned firms while other studies have found that both these types of firms have performed equally well. Very similar is the debate between domestic government-owned firms vis-à-vis privately-owned firms.

2.1. Studies supporting superior performance of foreign firms over domestic firms:

A study conducted by **Asheghian** (1982) examined the comparative efficiencies of foreign firms, which consisted of Iranian-American joint venture firms (IAJV) and local firms in Iran during the pre-revolutionary 1971-76 period. This study of inter-firm efficiency comparison of eleven matched firms was based on three indexes of efficiency namely, labour productivity, capital productivity and total factor productivity. The study concluded that with minor exceptions the IAJV firms were more efficient that their Iranian firms' counterparts. **Willmore** (1986) analyzed data of 282 pairs of foreign-owned and Brazilian firms in the manufacturing industry. The study found that differences between the two types of firms were large and highly significant. Compared to their local counterparts, foreign firms operated fewer plants, had higher ratios of value-added to output, higher levels of advertisement and royalty payments, higher labour productivity, greater exports, higher wages and greater capital intensity.

Voicu (2004) examined whether foreign firms in Romania were technologically superior to domestic firms by separately estimating the technology-related productivity differentials between domestic firms and international joint ventures, and between domestic firms and foreign wholly owned enterprises. The study revealed that both types of foreign firms exhibited a technological advantage in virtually all manufacturing sectors compared to domestic Romanian firms. **Kimura and Kiyota** (2004) utilized micro-panel data for firms located in Japan to examine differences in static and dynamic corporate performance between foreign-owned and domestically-owned firms in the 1990s. The authors found that foreign-owned firms not only reflected superior static characteristics but also achieved faster growth. Further, foreign investors invested in firms that may not be immediately profitable at the time of investment but those that had profit potential.

Ayudin et al (2007) in a study investigated whether foreign-owned firms performed significantly better than domestically-owned Turkish corporations listed on Istanbul Stock

Exchange. The t-test statistic was applied to examine if there was significant differences in operating profit margin, return on assets and return on equity between the two groups of firms. The results revealed that firms with foreign ownership performed better than domestically-owned ones in respect of return on assets. **Kesari** (2010) empirically examined the differences in the relative characteristics, conduct and performance of two different ownership groups of firms, namely, foreign affiliates of multinational enterprises and domestic firms. The study was restricted to non-electrical machinery industry in India for the period 2001 to 2007. Three alternative techniques were employed, univariate statistical method based on Welch's t-test, the multivariate linear discriminant analysis and the dichotomous logit and probit models. The findings suggest that foreign affiliates had greater technological efficiency, firm size, export intensity, intensity of import of intermediate goods and intensity of import of disembodied technology along with lower advertisement and marketing intensity and financial leverage.

In a study which explored the differences between domestic and foreign-owned firms operating in Greece, **Valsamis et al** (2011) in particular focused on financial management characteristics of the firms under investigation for the year 2008. The firms were grouped into two categories based on the origin of their capital share. Using a non-linear model the study found that foreign enterprises made higher use of capital, managed more financial elements, had more access to long-term capital, while they fell short against domestic firms in short term financing. Overall, foreign firms had higher sales and presented greater profitability.

2.2 Studies that found no difference in performance between foreign and domestic firms:

In their study **Barbosa and Louri** (2003) investigated whether multinational corporations operating in Portugal and Greece performed differently than domestic firms. They used two sets of sample firms one set operating in Greece in 1997 and another set operating in Portugal in 1992. Results suggested that ownership ties did not make a significant difference with respect to performance of firms operating in both the countries. However, it was also found that when firms in the upper quartiles of gross profits were compared, MNCs were found to significantly perform better than domestic firms.

A study undertaken by **Basti and Akin** (2008) compared the relative productivities of foreign-owned and domestically-owned companies operating in Turkey. Non-financial sector companies listed in Istanbul Stock Exchange from the period 2003-2007 were included in the analysis. Malmquist index, which is a data envelopment analysis type nonparametric technique, was utilized as the productivity measurement tool. Study results indicated that there was no difference between productivity of foreign-owned and domestically-owned firms operating in Turkey. **Basti et al** (2011) analyzed the performance of foreign-owned firms in contrast to domestically-owned firms in the manufacturing sector in Turkey. The impact of several firm indicators like age, size, assets, firm risks on different corporate performance measures such as ROE, ROA, Basic Earning Power and Total Factor Productivity were investigated by a panel data regression model. Contrary to findings of

former studies in Turkey, the results of this study revealed that there was no significant difference between the performances of foreign-owned and domestically-owned firms.

Caves and Douglas (1980) compared the post-war productivity performance of a public firm (Canadian National Railroads) with a private firm (Canadian Pacific Railroad) through a case study approach. In their study they found no evidence of inferior performance by the government-owned railroad. Their study concluded that any tendency towards inefficiency resulting from public ownership was overcome by the benefits of competition.

2.3 Studies that had mixed findings:

Xu et al (2006) examined the performance of domestic Chinese firms in various ownership categories versus foreign-invested enterprises based on two nation-wide surveys conducted by the National Bureau of Statistics in 1998 and 2002. The study found that both domestic non-state-owned firms and foreign-invested enterprises performed better than state-owned enterprises. Meanwhile, three categories of Chinese firms - privately owned, collectively owned, and shareholding - had higher performance levels than the foreign-invested enterprises.

Erdogan (2010) analyzed the major aspects of conduct and performance that distinguishes foreign-owned and domestically-owned firms that operated in Turkey. Repeated measures logistic regression technique was used on 77 foreign-owned and 215 domestically-owned firms for the period 2004-2008. The results showed that domestically-owned firms had higher capital productivity vis-à-vis foreign-owned firms. In terms of the other performance variables studied such as pretax profit margin, return on equity and labour productivity there was no difference between foreign-owned and domestically-owned firms. The two groups of firms also do not differ in terms of size, capital intensity, export intensity, patent intensity and trademark intensity.

2.4 Studies supporting superior performance of private firms' vis-à-vis public sector firms':

A study undertaken by **Majumdar** (1998) evaluated performance difference between public sector, joint sector (joint venture between private and public sector firms) and private sector enterprises in India for the period 1973-74 to 1988-89. The study results established that enterprises owned by the central and state governments were less efficient than joint sector or private sector enterprises. Further, it found that joint sector enterprises were less efficient than those in private sector. **Boitani et al** (2013) focused on how the ownership and selection procedure of firms operating in the Local Public Transport sector affected their productivity. A comparative analysis of 77 firms operating in large European cities over the period 1997 to 2006 was conducted using the measure of Total Factor Productivity. The authors found that totally and partially public firms displayed lower productivity than privately owned firms.

3. RESEARCH METHODOLOGY

There appears to be little published research work on comparative performance of subsidiaries of MNCs and domestic firms in India. We decided to through this paper, make an attempt to study the comparative performance of foreign firms and domestic firms in India. This study, in fact, compares the functioning of three sets of firms. Besides foreign firms, domestic firms are categorized into two based on their ownership pattern, namely private-owned and government-owned. This research is designed to collect essentially objective data on performance of afore mentioned three sets of firms operating in India and to carry out statistical analyses with a view to establish efficiency of one set of firms vis-à-vis the others. Four financial measures have been considered. These include Operating Profit Margin (OPM), Net Profit Margin (NPM), Return on Net worth (RONW) and Asset Turnover Ratio (ATR). The study was done for two different time periods. Initially the study focused on data collected for 2002-03. Subsequently the data for 2011-12 were analyzed. This was done to observe changes in performance (if any) of the sets of firms over a nine-year period. Our hypothesis is that:

H0: There is no difference in the performance of foreign companies operating in India compared to domestic private-owned and state-owned companies.

3.1 Sample:

The data for this study have been extracted from secondary sources. The main source is the Ace Analyzer data base. We identified 45 firms in all divided equally between foreign firms, private sector firms and public sector (government-owned) firms.

3.2 Data Analyses Method:

We wanted to focus on determining the competitiveness of the three groups of firms using four performance measures mentioned earlier. We could not find any other study which compared performance efficiency of foreign firms, domestic private firms and government-owned firms. Our objective was to determine which group of firms displayed superior competitiveness in the base year and whether these firms continued to maintain their competitiveness after nearly a decade. This in our opinion would be our contribution to this body of knowledge. The firms were divided into three groups based on their Return on Capital Employed (ROCE) namely, low performers (<10%), medium performers (between 10% and 20%) and high performers (>20%).

It was proposed to use parametric tests for analyses as these are generally preferred since they tend to be more discriminating and powerful. To begin with we intended to employ the ANOVA test. One-way ANOVA is carried out when one wishes to compare three or more means to one another when there is only a single independent variable. We planned to carry out one-way ANOVA tests for each of the four independent variables (OPM, NPM, RONW and ATR) to assess if there is significant variation in the performance of the three groups of firms (low performers, medium performers and high performers). If significant variation is observed in the group means we next wanted to perform a Post-hoc test, in our case Bonferroni Test, to identify which group mean(s) is/are responsible for this variation in performance. Finally, our initial classification of firms (based on ROCE) was to be cross verified using Discriminant Analysis. Discriminant scores were to be computed for each

company by forming linear functions of predictor variables. Each function so formed would maximize the difference between the groups and would predict the group membership for each company. We intended to do these analyses initially for the base year 2002-03 and subsequently for 2011-12 after a gap of nine years. This would enable us to compare how foreign firms, private sector firms and government-owned firms performed over the nine-year period.

4. DISCUSSION:

We intended to formally test the data vis-à-vis the two main conditions –normality of population and homogeneity-of-variance – for reliable results for the one-way ANOVA. To test for normality we used the Shapiro-Wilk Test (since our n is <50), as it assesses whether there is a significant departure from normality in the population distribution of the four variables being studied.

The test statistic is:

$$W = \frac{\left(\sum_{i=1}^{n} a_i x_{(i)}\right)^2}{\sum_{i=1}^{n}(x_i - \overline{x})^2}$$

Where:

$x_{(i)}$ (With parentheses enclosing the subscript index *i*) is the *i*th order statistic, i.e., the *i*th-smallest number in the sample;
$\overline{x} = (x_1 + \ldots + x_n)/n$ is the sample mean;
the constants $a_i$are given by

$$(a_1, \ldots, a_n) = \frac{m^\top V^{-1}}{(m^\top V^{-1} V^{-1} m)^{1/2}}$$

When we look at the test statistic and significance column (see table 1) for each of the variables for both 2002-03 and 2011-12, we find that the P-values are less than the chosen α (.05), so we reject the null hypothesis and conclude that the data violates normality assumption.

Table 1: Shapiro-Wilk Test

	Shapiro-Wilk		
	Statistic	df	Sig.
NPM2003	.926	45	.007
NPM2012	.738	45	.000
OPM2003	.821	45	.000

OPM2012	.711	45	.000
RONW2003	.889	45	.000
RONW2012	.762	45	.000
ATR2003	.934	45	.013
ATR2012	.911	45	.002

To test homogeneity (equality)-of-variance assumption we used Levene's Test, which assesses whether the population variances for the variables are significantly different from each other.

The Levene's test statistic, *W*, is defined as follows:

$$W = \frac{(N-k)}{(k-1)} \frac{\sum_{i=1}^{k} N_i (Z_{i\cdot} - Z_{\cdot\cdot})^2}{\sum_{i=1}^{k} \sum_{j=1}^{N_i} (Z_{ij} - Z_{i\cdot})^2},$$

Where:

W is the result of the test,
k is the number of different groups to which the samples belong,
N is the total number of samples,
N_i is the number of samples in the ith group,
Y_{ij} is the value of the jth sample from the ith group,

$$Z_{ij} = \begin{cases} |Y_{ij} - \bar{Y}_{i\cdot}|, & \bar{Y}_{i\cdot} \text{ is a mean of i-th group} \\ |Y_{ij} - \tilde{Y}_{i\cdot}|, & \tilde{Y}_{i\cdot} \text{ is a median of i-th group} \end{cases}$$

When we look at table 2 we see that the P-values for all four variables for 2002-03 are <.05, which is less than our chosen α (.05), we reject the null hypothesis and conclude that the data violates the homogeneity assumption. For the year 2011-12 the P-values for three of the four variables are >.05 (see table 3). Therefore, we do not reject the null hypothesis and conclude that these data do not violate the homogeneity assumption. However, in case of the RONW variable we rejected the null hypothesis as the P-value is <.05.

Table 2 Test of Homogeneity of Variances for 2002-03

	Levene's Statistic	df1	df2	Sig.
NPM2003	4.842	2	42	.013

OPM2003	3.691	2	42	.033
RONW2003	3.475	2	42	.040
ATR2003	5.133	2	42	.010

Table 3: Test of Homogeneity of Variances for 2011-12

	Levene's Statistic	df1	df2	Sig.
NPM2012	2.501	2	41	.094
OPM2012	3.144	2	41	.054
RONW2012	5.858	2	41	.006
ATR2012	.116	2	41	.891

Since the data did not satisfy the assumptions of one-way ANOVA i.e. normal population and homogeneity of population variances, we decided not to use one-way ANOVA and instead use the WELCH Test (W-test), also known as Robust Tests of Equality of Means to determine variances if any. WELCH Test uses the following equation:

$$\mathbf{Fw} = \frac{\sum_{i=1}^{k} \mathbf{Wi}(\bar{\mathbf{X}}\mathbf{i}. - \mathbf{X}'..)/(\mathbf{K}-\mathbf{1})}{[\mathbf{1} + \mathbf{2}/\mathbf{3}(\mathbf{K}-\mathbf{2})\Lambda]}$$

Where $\mathbf{Wi} = \frac{\mathbf{ni}}{\mathbf{Si}^2}$ $\mathbf{X}'.. = \frac{\sum_{i=1}^{k} \mathbf{Wi}\bar{\mathbf{X}}\mathbf{i}}{\sum_{i=1}^{k} \mathbf{Wi}}$ and $\Lambda = \frac{3\sum(1-\mathbf{Wi}/\sum_{i=1}^{k} \mathbf{Wi})^2/(\mathbf{ni}-1)}{(\mathbf{i}^2-1)}$

Fw Statistic also follows F distribution but with (K-1) and (1/ Λ) degrees of freedom.

If we look at the P-values for the test statistic (F) for the year 2002-03 on table 4 we find that except for OPM variable, where P is > α (.05), for the remaining variables P is < α (.05). In case of the former we do not reject the null hypothesis and conclude that there is no significant difference in performance of the three groups of firms. In case of the latter we reject the null hypothesis and conclude that these data provides substantial evidence of at least one significant difference in means of the three groups of firms.

Table 4: Robust Tests of Equality of Means 2002-03

		Statistic[a]	df1	df2	Sig.
NPM2003	Welch	8.614	2	16.339	.003
	Brown-Forsythe	5.510	2	9.978	.024
OPM2003	Welch	6.406	2	16.862	.009

	Brown-Forsythe	1.525	2	9.612	.266
RONW2003	Welch	20.804	2	17.155	.000
	Brown-Forsythe	30.850	2	20.820	.000
ATR2003	Welch	8.050	2	21.244	.002
	Brown-Forsythe	3.991	2	22.066	.033

a. Asymptotically F distributed.

Since Robust Tests of Equality of means for 2002-03 revealed significant differences in P-values for three variables NPM, RONW, and ATR, we attempted post-hoc tests using these variables to determine which group of firms was responsible for differences in means. There are many different post-hoc tests but we decided to employ a commonly used procedure called Bonferroni Test. This test reduces family-wise error (FWE) which represents the probability that pair-wise comparisons show significant results due to chance. This is calculated as,

$$\alpha_{FWE} \leq 1-(1-\alpha_{EC})^{c}$$

Where α_{EC} is usually taken as 0.05 and C is number of comparisons. The new pair-wise alpha is calculated as,

$$\alpha = \frac{\alpha_{FWE}}{c}$$

This test attempts to prevent data from incorrectly appearing to be statistically significant by lowering the alpha value. The results for this test can be seen on table 5, which reveals that in case of NPM the P-value is significant for low and high performing firms. Similarly, for RONW, significant differences are there for all three groups of firms. And for ATR the result is significant only for low and medium performing firms as well as low and high performing firms.

Table 5: Bonferroni Test for 2002-03

Dependent Variable	(I) PERF2003	(J) PERF2003	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
NPM	Low	Medium	-9.29966	3.98770	.074	-19.2436	.6443
		High	-15.77367*	3.61571	.000	-24.7900	-6.7573

	Medium	Low	9.29966	3.98770	.074	-.6443	19.2436
		High	-6.47401	3.19094	.147	-14.4312	1.4831
	High	Low	15.77367*	3.61571	.000	6.7573	24.7900
		Medium	6.47401	3.19094	.147	-1.4831	14.4312
OPM	Low	Medium	-1.87034	5.96306	1.000	-16.7402	12.9995
		High	-10.58329	5.40680	.171	-24.0660	2.8995
	Medium	Low	1.87034	5.96306	1.000	-12.9995	16.7402
		High	-8.71294	4.77162	.225	-20.6118	3.1859
	High	Low	10.58329	5.40680	.171	-2.8995	24.0660
		Medium	8.71294	4.77162	.225	-3.1859	20.6118
RONW	Low	Medium	-27.73051*	7.74885	.003	-47.0536	-8.4074
		High	-50.43449*	7.02601	.000	-67.9550	-32.9140
	Medium	Low	27.73051*	7.74885	.003	8.4074	47.0536
		High	-22.70398*	6.20061	.002	-38.1663	-7.2417
	High	Low	50.43449*	7.02601	.000	32.9140	67.9550
		Medium	22.70398*	6.20061	.002	7.2417	38.1663
ATR	Low	Medium	-1.13838*	.42286	.030	-2.1928	-.0839
		High	-.96005*	.38341	.049	-1.9161	-.0040
	Medium	Low	1.13838*	.42286	.030	.0839	2.1928
		High	.17833	.33837	1.000	-.6654	1.0221
	High	Low	.96005*	.38341	.049	.0040	1.9161
		Medium	-.17833	.33837	1.000	-1.0221	.6654

*. The mean difference is significant at the 0.05 level.

Having identified the variables responsible for significant variation in performance in 2002-03, only these variables were considered to cross verify the initial classification based on ROCE. For this purpose the Linear Discriminant Analysis technique was employed as it enables classification of objects into groups based on knowledge of some variables related to them. Discriminant Analysis equation used to calculate the linear discriminant function is:

$$D_i = d_o + d_1 x_1 + d_2 x_2 + \ldots . d_p x_p$$

Where:
D_i = score on discriminant function i
d_i's = weighting coefficients (standardized)
d_o = a constant
x_s = values of the discriminating/ predictor variable

If we observe table 6, which shows the classification results we find that the discriminant function obtained is able to classify 84.4% of the original grouped cases correctly. Therefore, this points towards the model being good for future classification as well. Further, the calculated Wilk's Lambda value is 0.343 (see table 7), which is close to 0 and indicates better discriminating power of the model. The P-value is 0.00, which indicates that there is only one percent chance of committing type-I error by rejecting the hypothesis that there is no significant difference in the means.

After having completed the analyses for the base year 2002-03 we focused our attention on the latest year for which data were available i.e. 2011-12. We again began with the Robust Tests of Equality of Means to determine variance if any. The P-values for the F-test given in Table 8 reveal that except for RONW, where P is < α (.05), for the remaining three variables we find that P is > α (.05). In case of the former variable we reject the null hypothesis and

Table 6: Discriminant Analysis Classification Results 2002-03

			Predicted Group Membership			
		PERF2003	Low	Medium	High	Total
Original	Count	Low	6	2	1	9
		Medium	0	9	4	13
		High	0	0	23	23
	%	Low	66.7	22.2	11.1	100.0
		Medium	.0	69.2	30.8	100.0
		High	.0	.0	100.0	100.0
Cross-validated	Count	Low	6	2	1	9
		Medium	0	9	4	13
		High	0	0	23	23
	%	Low	66.7	22.2	11.1	100.0
		Medium	.0	69.2	30.8	100.0
		High	.0	.0	100.0	100.0

84.4% of original grouped cases correctly classified. 84.4% of cross-validated grouped cases correctly classified.

Table 7: Wilk's Lambda 2002-03

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	.343	43.909	6	.000
2	.903	4.193	2	.123

conclude that the data provides substantial evidence of at least one significant difference in means of the three groups of firms. In case of the latter we do not reject the null hypothesis and conclude that data on this variable indicate no significant difference in performance of the groups of firms being studied.

Since Robust Tests of Equality of means revealed significant differences in P-values for RONW, we attempted post-hoc tests using this variable alone to determine which group of firms was responsible for the difference in means. Again the Bonferroni Test was used. The results can be seen in table 9, which reveals that the P-values are significant for low and high performing firms.

Table 8: Robust Tests of Equality of Means 2011-12

		Statistic[a]	df1	df2	Sig.
NPM	Welch	2.931	2	9.911	.100
	Brown-Forsythe	1.118	2	6.293	.384
OPM	Welch	2.382	2	9.841	.143
	Brown-Forsythe	.800	2	5.869	.493
RONW	Welch	21.279	2	20.899	.000
	Brown-Forsythe	34.321	2	28.391	.000
ATR	Welch	.644	2	10.822	.544
	Brown-Forsythe	.690	2	11.645	.521

a. Asymptotically F distributed.

Table 9: Bonferroni Test for 2011-12

Dependent Variable	(I) PEF 2012	(J) PEF 2012	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound

RONW	Low	Medium	-3.18600	6.36019	1.000	-19.0623	12.6903
		High	-23.93600*	6.12541	.001	-39.2262	-8.6458
	Medium	Low	3.18600	6.36019	1.000	-12.6903	19.0623
		High	-20.75000*	4.04123	.000	-30.8377	-10.6623
	High	Low	23.93600*	6.12541	.001	8.6458	39.2262
		Medium	20.75000*	4.04123	.000	10.6623	30.8377

Having identified the variable responsible for significant variation in performance of the three groups only this variable was considered to cross verify the initial classification based on ROCE by using the Linear Discriminant Analysis. If we observe table 10, which shows the classification results we find that the discriminant function obtained is able to classify 77.3% of the original grouped cases correctly. The hit ratio indicates that the model is good. Further, the calculated Wilk's Lambda value is 0.553 (see table 11), which is equidistant between 0 and 1 and indicates good discriminating power of the model. The P-value is 0.00, which means that the difference in the groups mean is significant even at 0.01 levels.

Table 10: Discriminant Analysis Classification Results 2011-12

			Predicted Group Membership			
		PERF	Low	Medium	High	Total
Original	Count	Low	0	5	0	5
		Medium	0	15	1	16
		High	0	4	19	23
		Ungrouped cases	0	0	1	1
	%	Low	.0	100.0	.0	100.0
		Medium	.0	93.8	6.2	100.0
		High	.0	17.4	82.6	100.0
		Ungrouped cases	.0	.0	100.0	100.0
Cross-validated	Count	Low	0	5	0	5
		Medium	0	15	1	16
		High	0	4	19	23
	%	Low	.0	100.0	.0	100.0
		Medium	.0	93.8	6.2	100.0

	High	.0	17.4	82.6	100.0

77.3% of original grouped cases correctly classified.

Table 11: Wilk's Lambda 2011-12

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.553	24.324	2	.000

We now wanted to compare how companies were grouped by the discriminant analysis technique in 2002-03 with the grouping of the same companies in 2011-12 (shown in table 12). This would enable us to track movements in competitiveness. Interestingly, we found that the number of firms that lost competitiveness were nearly the same for the three groups of firms. In terms of maintaining competitiveness we observed that foreign companies were the largest. But with regard to gaining competitiveness the Indian public sector firms were the largest (see table 13).

Table 12: Listing of companies in 2002-03 and 2011-12 based on DA

	2003		**2012**		**2003 - 2012**
Name of the Co.	Actual Group	Predicted Group	Actual Group	Predicted Group	Change
NHPC Ltd	1	3	1	2	-1
BEML Ltd	1	2	1	2	0
India Cements Ltd.	1	1	2	2	1
SAIL	1	1	2	2	1
Hindustan Organic Chemicals Ltd	1	1	2	2	1
Hindustan Copper Ltd	1	1	3	2	1
Caterpillar India Pvt. Ltd.	1	1	3	3	2
Titan Industries Ltd.	1	2	3	3	1
Bata India Ltd	1	1	3	3	2
Hindalco Industries Ltd.	2	3	1	2	-1
Tata Motors Ltd	2	2	1	2	0
Hindustan Petroleum Corpn. Ltd.	2	2	1	2	0
Indian Oil Corpn. Ltd.	2	2	2	2	0

NTPC Ltd	2	3	2	2		-1	
Maruti Suzuki India Ltd.	2	2	2	2		0	
Voltas Ltd	2	2	2	2		0	
Grasim Industries Ltd.	2	3	2	2		-1	
Larsen & Toubro Ltd.	2	2	3	2		0	
Mahindra & Mahindra Ltd.	2	2	3	3		1	
National Building Construction Corpn. Ltd.	2	2	3	3		1	
Cummins India Ltd.	2	3	3	3		0	
BHEL	2	2	3	3		1	
National Fertilizers Ltd.	3	3	2	2		-1	
ABB Ltd	3	3	2	2		-1	
AstraZeneca Pharma India Ltd.	3	3	2	2		-1	
Apollo Tyres Ltd	3	3	2	2		-1	
3M India Ltd	3	3	2	2		-1	
Novartis India Ltd.	3	3	2	3		0	
Cipla Ltd	3	3	2	2		-1	
Bharat Forge Ltd	3	3	2	2		-1	
GAIL (India) Ltd	3	3	3	2		-1	
Gillette India L	3	3	3	2		-1	
Oil and Natural	3	3	3	3		0	
Hindustan Zinc L	3	3	3	3		0	
Alstom India Ltd	3	3	3	3		0	
Procter & Gamble	3	3	3	3		0	
Marico Ltd	3	3	3	3		0	
Bosch Ltd	3	3	3	3		0	
Siemens Ltd	3	3	3	3		0	
GCPL	3	3	3	3		0	
ITC Ltd	3	3	3	3		0	
NMDC Ltd	3	3	3	3		0	
Asian Paints Ltd	3	3	3	3		0	
Hindustan Unilever Ltd.	3	3	3	3		0	
Colgate-Palmolive(India) Ltd.	3	3	ungrouped	3		0	

Table 13: Movement in Competitiveness of the Groups of Companies

Group	Lost Competitiveness		Maintained Competitiveness		Gained Competitiveness	
	High to medium	Medium to low	At high level	At medium level	Low to medium/ high	Medium to high
Public Sector (Indian)	4	0	3	3	3 (L to M)	2
Private Sector (Indian)	5	0	4	3	1(L to M)	2
Foreign Companies	4	0	8	1	2(L to H)	0

We next wanted to use the Chi-square test to statistically arrive at a conclusion about competitiveness about the government-owned, private-owned and foreign firms being studied. The test result revealed that the calculated P-value was lower than α (.05). Thus the null hypothesis that there is no significant association between the performances of the three groups of companies was not rejected. In other words, all the groups of firms studied performed similarly. However, it has to be noted that a constraint in our study was the small sample size of 45 firms. Because of this the observations in some of the cells were <5, which as a rule is not allowed for undertaking a Chi-square test. This gives scope for future research using larger sample size.

Table 15: Chi-square Analysis

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.136[a]	4	.711
Likelihood Ratio	2.255	4	.689
Linear-by-Linear Association	.000	1	1.000
N of Valid Cases	45		

a. 6 cells (66.7%) have expected count less than 5. The minimum expected count is 3.67.

5. Conclusion:

In this study, we analyzed the performance of 45 companies drawn equally from domestic public sector, domestic private sector and foreign companies. We tested the hypothesis that foreign firms operating in India are superior in performance vis-à-vis domestic firms. The hypothesis was arrived at based on the survey of several research studies indicating that foreign company subsidiaries performed better than domestic firms in several countries. Our study concluded that all three group firms showed similar performance. One of the limitations of our study was the small sample size because of which the Chi-square test was used with some constraints. This gives scope for further research using larger sample size and test for definitive results. At the same time the study portrays the fact that domestic Indian firms have withstood the forces of competition almost two decades after the liberalization of the Indian economy in the early 90s. This bodes well for Indian industry.

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