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ABSTRACT

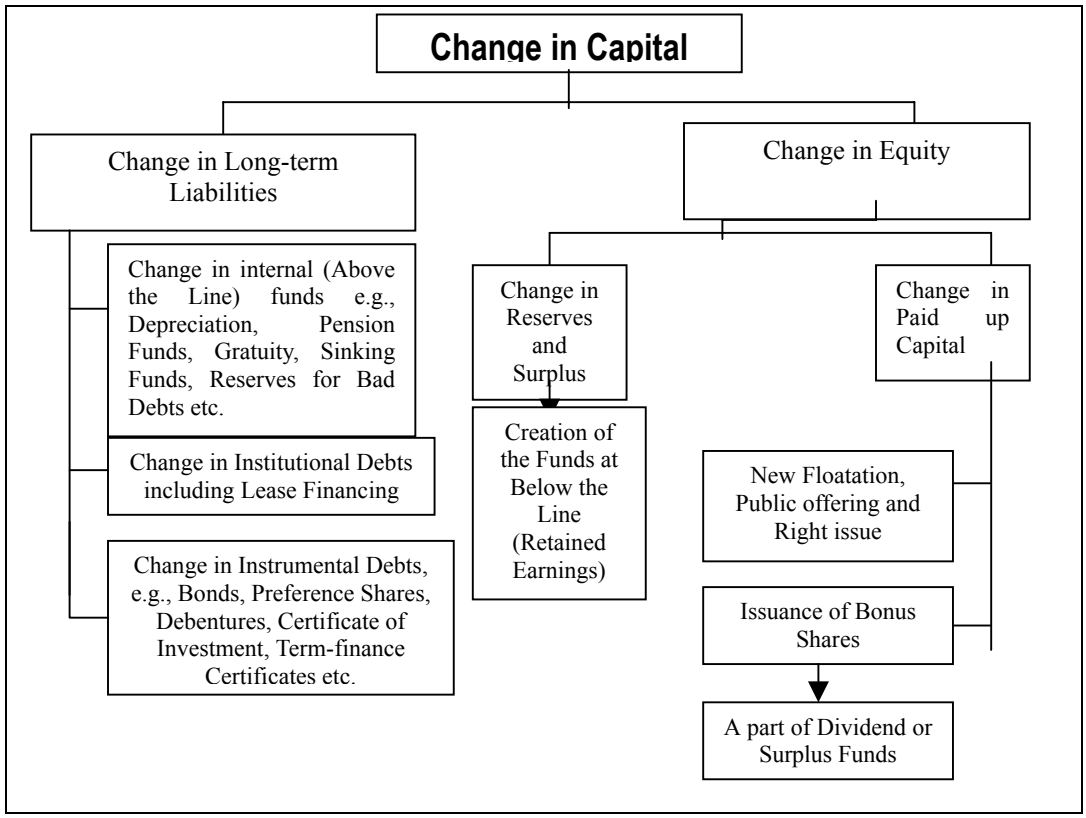
The core objective of this study is to ascertain a link between the investment in fixed assets and the changing in the patterns of working capital. The relation between the flow of funds and the fixed assets is a central issue of the study. It is concluded in this study that funds from different sources determine the investment in fixed assets by different ways. With the help of this model, corporate planners and financial analysts can quantify the impacts of the flows of various funds on the assets holding patterns. Important conclusion of the model is that "fixed assets and working capital are complements. Working capital of a firm will increase with the enhancement in fixed assets". The model is based on a single behavioral equation. The study is a mixture of the financial accounting postulates and econometric techniques.

I. THE OBJECTIVES AND METHODOLOGY

Investment in Fixed Assets is considered a real investment in economic literature. In their investment and lending policies, financial institutions emphasize on utilization of their funds only for approved objectives. Financial planners and strategists in corporate world believe that investments in fixed assets and working capital are the alternative uses of financial resources. However, it is commonly observed that investment in fixed assets is not independent from the liquidity position and funds flow patterns.

The core objective of this study is to ascertain a link between the investment in fixed assets and the changing in the patterns of working capital. The relation between the flow of funds and the fixed assets is a central issue of the study. We hypothesized that funds from different sources determine the investment in fixed assets by different ways. Funds flow patterns are examined either by the change in employed capital or changes in the components of working capital. The components of employed capital have been shown in the Figure: I. While the accounting relation between fixed assets and employed capital has been explained in Figure: II. The accountings model in figure II shows the theoretical relations between fixed assets and liquidity position of a firm.

FIGURE: I
DECOMPOSITION OF THE CHANGE IN EMPLOYED CAPITAL



The study will provide a use full model to the financial analysts and corporate planners to enable them to determine the effects of the flow of various funds on the assets holding patterns. With the help of such a model, one can quantify the impacts of the change in employed capital on the fixed assets and working capital of a firm.

In the study we want to test the statistical relations between the change in the components of working capital and the fixed assets of a company. Such a study may also be useful in investment and financing decisions.

The study is a mixture of the financial accounting postulates and econometric techniques. The exploration is based on the results of a simulation model (Mehar: 1994). The estimated results of the model have been shown in Figure: 4.

The study is divided into four sections. The construction and estimation of the model will be discussed in the next section. We discussed the empirical findings based on simulation exercises in section (III), while section (IV) describes the conclusions of the study.

FIGURE: II
ACCOUNTING RELATION BETWEEN FIXED ASSETS AND WORKING CAPITAL

$$TOTASST = TOTLIBL \quad (I)$$
$$FASSTC + TCRASST = EQUITY + LTDBT + CURLIBL \quad (II)$$

Where,

'TOTASST' means the book value of Total Assets and Properties of a firm
'TOTLIBL' means the Total Equities and Liabilities of a firm
'FASSTC' means Fixed Assets at the historical costs
'TCRASST' means the Total Current assets
'EQUITY' means Owners' Equity
'LTDBT' means Long-term Liabilities, other than Owners' Equity
'CURLIBL' means Current Liabilities
'CAPITAL' means Employed Capital, and
'WRKPTL' means Working Capital

$$CAPITAL = LTDBT + EQUITY \quad (III)$$
$$WRKPTL = TCRASST - CURLIBL \quad (IV)$$

So,

$$FASSTC + (TCRASST - CURLIBL) = CAPITAL \quad (V)$$
$$\mathbf{FASSTC + WRKPTL = CAPITAL} \quad (VI)$$

II. THE MODEL

By mean of the accounting identities, we can derive the relation between fixed assets and employed capital. Figure: II shows the accounting relations between fixed assets, employed capital and working capital; while the behavioral determinants of fixed assets have been shown in Figure: III. Basically, working

capital is a difference between the employed capital and fixed assets. We have contemplated that how working capital affects the fixed assets of a firm. The factors of working capital and fixed assets have also been identified in the model.

We adopted an econometric approach, however it is useful to recall the main insight of financial accounting on which the most of the corporate finances' models are based. The accounting and the economic approaches in the literature are differed fundamentally. The accounting studies focus attention on the preparation of the flow of funds - where from funds come and where to go – (AICPA: 1986; Chadwick: 1987; Smith: 1980; and Williamson: 1987). While attention in the economic theories are paid on the behavior of investors and managers; that why funds from come and why to go (Bandt and Pascal: 1992; Jensen and Zorn: 1988; Myers: 1984; Peterson and Bennett: 1983 and Robert and Cooper: 1982).

The Generally Accepted Accounting Principles (GAAP) were followed in the study and the standard accounting definitions have been adopted to explain the variables. The model has been estimated through the pooled data of annual audited accounts of 225 companies listed on the Karachi Stock Exchange. Those accounts cover the period of 1980 to 1994 giving us 3375 observations (225 companies and 15 years). The data have been obtained from a variety of sources, depending upon the definition and the nature of the variables. A large data on different variables have been extracted from the annual reports of the listed companies. However, the data for some variables have also been extracted from various issues of the Balance Sheet Analysis (State Bank of Pakistan: 1995-96, 19990-91, 1986-87, 1982-83). All the variables are in million of rupees.

Some important and interesting aspects of the equation of fixed assets at historical cost (FASSTC) will be discussed in the next section. It is hypothesized that paid up capital (OSCAP), reserves and surplus fund (SURPLUS), total current assets (TCRASST), net profit after tax (NPAT) and current liabilities (CURLIBL) are the explanatory variables of fixed assets (FASSTC).

Equities (OSCAP plus SURPLUS) are obviously one of the most influential factors of the acquisition of fixed assets. So, its inclusion in the model is obvious. A higher magnitude of current assets (TCRASST) may be a cause of lower investment in fixed assets (FASSTC), because total financial resources are divided between these two categories of assets.

No correlation was observed between the debt financing (LTDEBT) and investment in fixed assets (FASSTC) in the context of Pakistan. This phenomenon is almost common in all those developing counties where bonds markets are not developed. Debt financing in those countries depend on the institutional borrowing only. The institutional borrowing through public sector commercial banks generates a large part of the Long-term Debts Financing (LTDBT) in

Pakistan. The magnitude of this institutional borrowing depends on the credit policy prepared by the State Bank. The social and political factors also determine the availability and conditionality of the long-term debts financing (LTDBT). Because of those factors, studies on investment behavior do not include debts as an explanatory variable, in the developing countries (Edward and Rao: 1990; Mehar: 1994; Myers: 1984; Peterson and Bennett: 1983 and Welch: 1994). The non-economic factors of debt financing and the lack of adequate information are the other causes of exclusion of long-term debt from the model.

Following model was derived in the light of above-mentioned detailed:

$$\mathbf{FASSTC = f (OSCAP, SURPLUS, CURLIBL, TCRASST, NPATX)} \quad (1)$$

$$\mathbf{FASSTC = a_0 + a_1 OSCAP + a_2 SURPLUS + a_3 CURLIBL + a_4 TCRASST + a_5 NPATX} \quad (2)$$

The estimated coefficients of paid up capital (OSCAP) and reserves funds (SURPLUS) were found statistically equal i.e. $a_1=a_2$. Similarly, we assumed that 'Profit belongs to the owners (not to the firm)'. So,

$$\mathbf{FASSTC = a_0 + a_1 EQUITY - a_3 TCRASST + a_4 CURLIBL} \quad (3)$$

It is assumed that effects of current assets and current liabilities on fixed assets are equal but in opposite directions. So,

$$\mathbf{FASSTC = a_0 + a_1 EQUITY + a_3 WRKPTL} \quad (4)$$

Where,

$$\mathbf{WRKPTL = EQUITY + LTDEBT - FASSTC} \quad (5)$$

$$\mathbf{FASSTC = a_0 + a_1 EQUITY + a_3 (EQUITY + LTDEBT - FASSTC)} \quad (6)$$

$$\mathbf{FASSTC = a_0 + a_1 EQUITY + a_3 EQUITY - a_3 FASSTC + a_3 LTDEBT} \quad (7)$$

$$\mathbf{(1 + a_3) FASSTC = a_0 + (a_1 + a_3) EQUITY + a_3 LTDEBT} \quad (8)$$

In the absence of long-term debts (LTDEBT), the equation will be described in the following short form:

$$\mathbf{FASSTC = \Omega_o + \Omega_1 CAPITAL} \quad (9)$$

Where,

$$\mathbf{\Omega_o = (a_0/1+a_3) \text{ and } \Omega_1 = (a_1+a_3/1+a_3)}$$

In real world, companies have different accounting policies. Particularly in depreciation accounting, inventories' valuation and bad debts estimates, policies are significantly differed. To eliminate accounting policy effects, we converted all the accounts into a "Uniform Accounting System". After transformation of data, we estimated the equation (3). The estimated parameters, their t-ratios and the adjusted coefficient of determination (R^2) are listed in Figure: IV. The high value of the adjusted coefficient of determination (R^2) confirms the validity of the results. The t-ratios are also highly significant, reflecting that the explanatory variables are the significant determinants of the dependent variables.

FIGURE: III
BEHAVIORAL RELATION BETWEEN FLOW OF FUNDS AND FIXED ASSETS

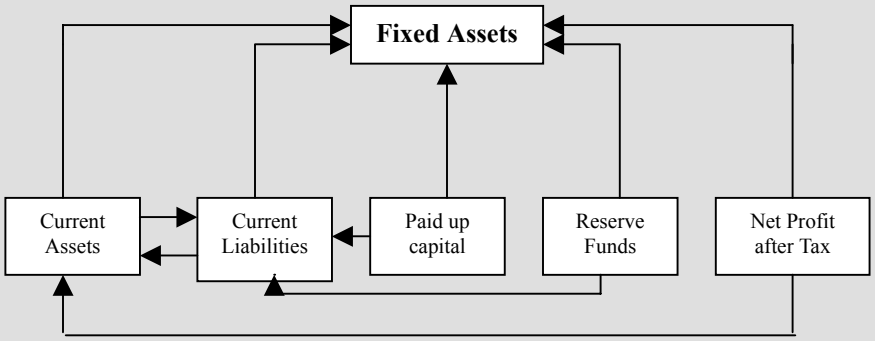


FIGURE: IV
DETERMINANTS OF FIXED ASSETS
ESTIMATED RESULTS

FASSTC= -26.95 +3.29*CAPITAL –2.31*TCRASST +2.37*CURLIBL

(- 3.83) (18.80) (-21.83) (22.90)

Adjusted R-Square= 0.9148

To eliminate the assets revaluation effects, we incorporated fixed assets at their historical cost. A negative sign with the total current assets in the equation shows the distribution of total financial resources between the current and non-current assets. The parameter associated with the current assets (TCRASST) indicates that forty-three percent of additional resources will be transferred in the current assets and addition in fixed assets will be 2.3 times of the addition in current assets (TCRASST). A forty-three percent deletion in current assets will create a hundred percent additional debit balance in non-current assets.

Addition in equities - either through external financing (new shares) or through retained earnings - will be a cause of enhancement in fixed assets. Investment in

fixed assets will be three times of the additional equities. Surprisingly, short-term financing also leads to enhancement in fixed assets.

III. SIMULATION ANALYSIS AND EMPIRICAL FINDINGS

In the estimated results, a_0= -26.95, a_1=3.29 and a_3= 2.31.

So,

Ω_o= 20.57 and Ω_1=4.27

We analyzed the results through simulation exercises. On the basis of our econometric model, we simulated the equation for the year 1995. Following factors have been defined as policy variables to determine the fixed assets in the model: -

1) Paid-up Capital (OSCAP)
2) Reserves and Surplus Funds (SURPLUS)
3) Depreciation Fund (ACMDEP)
4) Current liabilities (CURLIABL)
5) Current Assets (TCRASST)

To measure the effects of those variables on fixed assets, we simulated the model under the following three alternative scenarios: -

1) The value of independent variables raised by 20 percent.
2) The value of independent variables raised by 50 percent.
3) The value of independent variables raised by 100 percent.

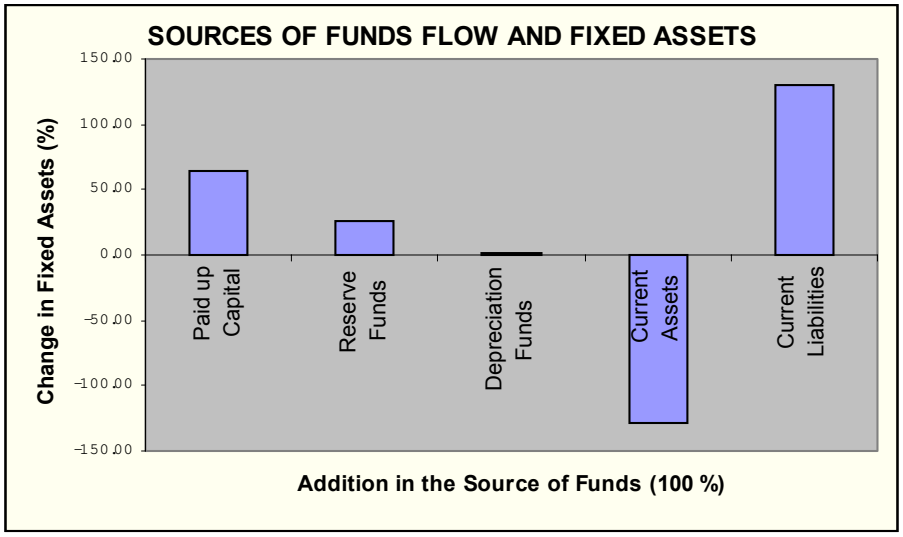
We compared the results with the base simulations. The results of simulations have been mentioned in Figure: V. With the simulation analysis, we are in a position to compare the net effects of change in Paid up Capital, Reserves Funds, Depreciation Funds, Current Assets and Current Liabilities**.**

FIGURE: V
SIMULATION ANALYSIS
IMPACTS OF DISCRETIONARY CHANGE IN CAPITAL STRUCTURE ON FIXED ASSETS

Rs/ Million

Explanatory Variable	Base Simulation (No Change)	Raise in Explanatory Variables		
		20 %	50%	100%
Paid-up Capital	352	398	466	581
Reserves and Surplus Funds	352	371	399	445
Depreciation Funds	352	353	353	355
Current Assets	352	261	125	-102
Current Liabilities	352	444	582	811

FIGURE: VI
IMPACTS OF 100 PERCENT INCREASE IN VARIOUS COMPONENTS OF WORKING CAPITAL



The graphical presentation of simulation exercise is shown in Figure: VI. Results show that net change in fixed assets is less than change in the employed capital. But, the changes in fixed assets are always greater than change in working capital.

IV. RESULTS AND CONCLUSIONS

On the bases of simulation analysis, we concluded the following results:

(1) If Paid up Capital increases by 10 percent, the magnitude of fixed assets in the balance sheet will increase by 6.5 percent. Although, regression parameters show that change in fixed assets would be 3.3 times of the change in paid up capital. But, it is the gross change; to calculate the net effects we have to estimate the effects of paid p capital on current liabilities. As a result of decrease in current liabilities, fixed assets will also decrease. So, net effects of increase in paid up capital will be lower than expected. Almost the same situation would be happened in case of the enhancement in the reserve funds (Mehar: 1994)

(2) The magnitude of the effects of current assets and current liabilities on fixed assets is equal but, in opposite directions. If current assets increase by 10 percent, fixed assets will go down by 13 percent. Similarly, if current liabilities increase by 10 percent, the fixed assets will go up by 13 percent. But, we have observed that the net effects of current assets and current liabilities are lower than their expected effects. In fact, when current assets increase, the current liabilities would also increase. Simultaneous increase in current assets and current liabilities sets off their effects on fixed assets (Mehar: 1994).

FIGURE: VII
RELATION BETWEEN WORKING CAPITAL AND FIXED ASSETS

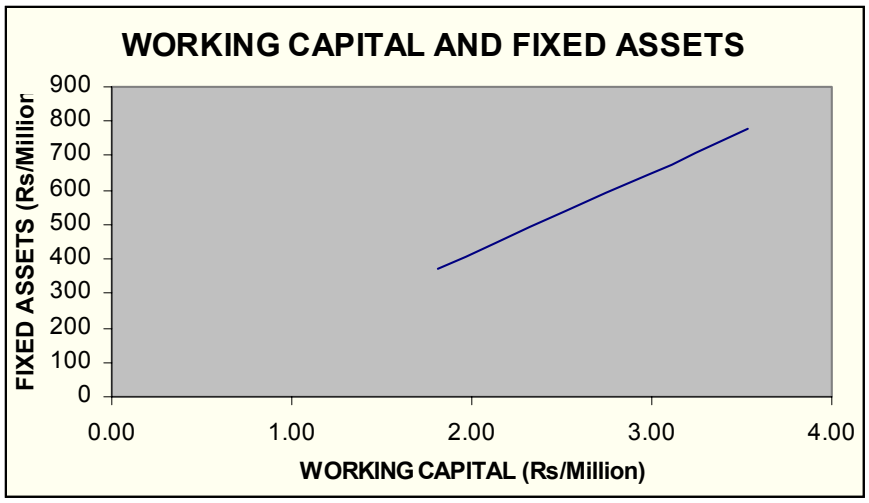


FIGURE: VIII
THE CHANGING PATTERN OF FIXED ASSETS, EMPLOYED CAPITAL AND NET CURRENT ASSET

Rs/Million

Employed Capital	Fixed Assets	Working Capital
376	374	2
451	449	2
542	539	3
650	647	3
780	776	4

FIGUTRE: IX
IMPACTS OF THE MODE OF FINANCING ON INVESTMENT IN FIXED ASSETS: A BIRD EYES VIEW

Source of Fund	Impact on Fixed Assets
Paid-up Capital	Increased
Reserves and Surplus Funds	Increased
Depreciation Fund	No Effect
Current Assets	Decreased
Current Liabilities	Increased

With the help of this model, corporate planners and financial analysts can quantify the impacts of the flows of various funds on the assets holding patterns. Important conclusion of the model is that "fixed assets and working capital are complements. Working capital of a firm will increase with the enhancement in fixed assets".

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APPENDIX

LIST OF COMPANIES

Serial Number	Company
	(1) TEXTILE GROUP
PRIVATE SECTOR	
1	Adamjee Industries.
2	Ahmed Spinning Mills.
3	Ali Asghar Textile Mills.
4	Allawasaya Textile & Finishing .
5	Annoor Textile.
6	Anwar Textile.
7	Ayesha Textile.
8	Babri Cotton
9	Bahawalpur Textile.
10	Burewala Textile.
11	Central Cotton.
12	Chaudhry Textile
13	Chenab Textile
14	Colony Sarhad
15	Colony Thal
16	Crescent Textile
17	D.M. Textile
18	Dawood Cotton
19	Dewan Textile
20	Dost Muhammad Cotton
21	Elahi Cotton
22	Elite Textile
23	Fateh Textile
24	Fazal Cloth
25	Fazal Textile
26	F.P. Textile
27	Ghafur Textile
28	Globe Textile
29	(OE) Globe Textile
30	Gul Ahmed Textile
31	Gulistan Textile
32	Hafiz Textile
33	Hamraz Industries
34	Hussein Industries
35	Indus Dyeing & Manufacturing
36	Island Textile
37	Jubilee Spinning & Weaving
38	Junaid Cotton
39	Karim Cotton
40	Khalid Textile
41	Khyber Textile
42	Kohat Textile
43	Kohinoor Industries
44	Kohinoor Spinning

45	Kohinoor Textile
46	Kotri Textile
47	M.F.M.Y. Industries
48	Mahmood Textile
49	Modern Textile
50	Muhammad Farooq
51	Mushtaq Textile
52	Nafees Cotton
53	Nakshbandi Aindustries
54	Naveed Tex
55	Nishat Mills
56	Noon Textile
57	Olympia Spinning & Weaving
58	Quetta Textile
59	Rasihid Textile
60	Sadiqabad Textile
61	Sally Textile
62	Sapphire Textile
63	Service Industries
64	Shafiq Textile
65	Shahyar Textile
66	Shaheen Cotton
67	Shams Textile
68	Sind Fine Texitle
69	Star Textile
70	Sunshine Cotton
71	Universal Textile
72	Usman Textile
73	Yousuf Textile
74	Zaman Textile
75	Bengal Fibre
76	Colony Woollen
77	Dilon Ltd
78	Karim Silk
79	Lawrencepur Wollen & Textile
80	Liberty Mills
81	Moonlite (Pak)
82	Nilom Nylon
83	Noor Silk
84	Polypropylene Products
85	United Carpets
86	Valika Art Fabrics
PUBLIC SECTOR	
88	Harnai Woollen
89	Ravi Rayon
	(2) CHENICAL AND PHARMACEUTICAL GROUP
PRIVATE SECTOR	
90	Abbott Laboratories
91	Bawany Oxygen
92	Berger Paints
93	Chemicals Ltd

94	Cyanamid (Pak) Ltd
95	Dawood Hercules Chemicals
96	Exxon Chemicals Pakistan
97	Ferozsons Laboratories
98	Glaxo Laboratories
99	Hoechst (Pak) Ltd.
100	I.C.I. (Pak) Ltd
101	P.Leiner & Sons Chemicals & Feeds
102	Pakistan Gum & Chemical
103	Pakistan Industrial Gases
104	Pakistan Oxygen
105	Reckitt & Colman
106	Sandoz Pakistan
107	Wellcome Pakistan
108	Pakistan P.V.C.Ltd.
109	Sind Alkalies.
	(3) ENGINEERING GROUP
PRIVATE SECTOR	
110	Allwin Engineering Industries
111	Aslo Electrical Industries
112	Atlas Autos
113	Climax Engineering
114	Johnson & Philips
115	K.S.B.Pumps
116	Nowshera Engineering
117	Pakistan Cables
118	Philips Electrical Industries
119	Punjab Lamp Eorks
120	R.C.D.Ball Bearings
121	Regnis Pakistan
122	Saif Nadeem Kawasaki
123	Saifee Development Corporation
124	Shaigon Electrical & Engineering
125	Siemens Engineering (pak)
PUBLIC SECTOR	
126	Bela Engineers
127	Karachi Pipe
128	Mack Trucks of Pakistan
129	Metropolitan Steel Corporation
130	Millat Tractors
131	National Motors
132	Pakistan Engineering
133	Quality Steel
	(4) SUGAR AND ALLIED GROUP
PRIVATE SECTOR	
134	Al-Noor Sugar
135	Bawany Sugar
136	Charsadda Sugar
137	Crescent Sugar
138	Facto Sugar
139	Frontier Sugar

140	Habib Arkady
141	Husein Sugar
142	Kohinoor Sugar
143	Mehran Sugar
144	Mirpurkhas Sugar
145	Noon Sugar
146	Premier Sugar
147	Shahtaj Sugar
148	Shakarganj Mils
149	United Sugar
PUBLIC SECTOR	
150	Thal Industries Corportation
	(5) PAPER BOARD AND ALLIED GROUP
PRIVATE SECTOR	
151	Adamjee Paper & Board
152	Baluchistan Partical Board
153	Chilya Corrugated Board
154	Crescent Board
155	Orient Straw Board & Paper
156	Packages Limited (Pvt)
157	Pakistan Paper Corporation
158	Pakistan Paper Products
159	Pakistan Paper Sack Corporation
PUBLIC SECTOR	
160	Security Papers
	(6) CEMENT GROUP
PRIVATE SECTOR	
161	Asbestos Cement Industries
PUBLIC SECTOR	
162	Gharibwal Cement
163	Javedan Cement
164	Mustehkham Cement Industries
165	Zeal Pak Cement Factory
	(7) FUEL AND ENERGY GROUP
PRIVATE SECTOR	
166	Atlas Battery
167	Burshan (Pak) Ltd
168	Haroon Oil Ltd
169	Pakistan Burmah Shell
170	Pakistan Refinery
PUBLIC SECTOR	
171	Attock Refinery
172	Karachi Electric Supply Corp
173	National Refinery
174	Pakistan Oil Fields
175	Pakistan State Oil
176	Sui Gas Transmission Co
177	Sui Northern Gas Pipelines
	8) THE 'MISCELLANEOUS GROUP

PRIVATE SECTOR	
178	Amin Fabrics
179	Crescent Jute Production
180	Indus Jute
181	Latif Jute
182	Mehran Jute
183	Pakistan Jute & Synthetics
184	Thal Jute
185	Exteaction Pakistan
186	Lever Brothers Pakistan
187	Arpak International
188	Bari Rice
189	Bata Pakistan
190	U.D.L Industries
191	Benz Industries
192	Brooke Bond Pakistan
193	Dadabhoy Padube
194	General Tyer & Rubber
195	Haji Dossa
196	Hashimi Can Company
197	Hilal Flour & General
198	Karachi Can Companyt
199	Lipton Pakistan
200	Milk Pak
201	Noon Pakistan
201	Pakistan Fisheries
203	Pakistan House International
204	Pakistan Services
205	Prince Glass
206	Security Safe Deposit Co
207	Service Industries (Shoes)
208	Shabbir Tiles & Ceramics
209	Spencers & Co. Pakiistan
210	Syed Match Co.
211	Taj Mahal Hotels
215	Trans-Pak Corporation
213	Treet Corporation
214	Universal Leather & Footwear Industries
PRIVATE SECTOR	
215	Associated Industries
216	Burma Oil Mills
217	Fazal Vegetable Ghee
218	Kakakhel Industries
219	Kohinoor Oil
220	Maqbool Company
221	Maorafco Industreis
222	Sh.Fazal Rehman & Sons
223	Suraj Ghee Industries
224	Universal Oil Vegetable Ghee
225	Wazir Ali Industries