APPENDICES

TABLE A-1 The Compound Sum of One Rupee										
Year	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.110
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797
15	1.161	1.346	1.553	1.801	2.079	2.397	2.759	3.172	3.642	4.177
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560
19	1.208	1.457	1.753	2.107	2.527	3.026	3.616	4.316	5.142	6.116
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.834
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.062	13.267	17.449

					TABLE A-1 The Compound Sum of One Rupee (Contd.)					
Year	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.231	1.254	1.277	1.300	1.322	1.346	1.369	1.392	1.416	1.440
3	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	2.305	2.476	2.658	2.856	3.059	3.278	3.511	3.759	4.021	4.300
9	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	3.498	3.896	4.334	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	4.310	4.887	5.535	6.621	7.076	7.987	9.007	10.147	11.420	12.839
15	4.785	5.474	6.254	7.138	8.137	9.265	10.539	11.974	13.589	15.407
16	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.171	18.488
17	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	6.543	7.690	9.024	10.575	12.375	14.462	16.879	19.673	22.900	26.623
19	7.263	8.613	10.197	12.055	14.232	16.776	19.748	23.214	27.251	31.948
20	8.062	9.646	11.523	13.743	16.366	19.461	23.105	27.393	32.429	38.337
25	13.585	17.000	21.230	26.461	32.918	40.874	50.656	62.667	77.387	95.395
30	22.892	29.960	39.115	50.949	66.210	85.849	111.061	143.367	184.672	237.373

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	1.210	1.220	1.230	1.240	1.250	1.260	1.270	1.280	1.290	1.300
2	1.46	1.488	1.513	1.538	1.562	1.588	1.613	1.638	1.664	1.960
3	1.772	1.816	1.861	1.907	1.953	2.000	2.048	2.097	2.147	2.197
4	2.144	2.215	2.289	2.364	2.441	2.520	2.601	2.684	2.769	2.856
5	2.594	2.703	2.815	2.932	3.052	3.176	3.304	3.436	3.572	3.713
6	3.138	3.297	3.463	6.635	3.815	4.001	4.196	4.398	4.608	4.827
7	3.797	4.023	4.259	4.508	4.768	5.042	5.329	5.629	5.945	6.275
8	4.595	4.908	5.239	5.589	5.960	6.353	6.767	7.206	7.669	8.157
9	5.560	5.987	6.444	6.931	7.451	8.004	8.595	9.223	9.893	10.604
10	6.727	7.305	7.926	8.594	9.313	10.086	10.915	11.806	12.761	13.786
11	8.140	8.912	9.749	10.657	11.642	12.708	13.862	15.112	16.462	17.921
12	9.850	10.872	11.991	13.251	14.552	16.012	17.605	19.343	21.236	23.298
13	11.918	13.264	14.749	16.386	18.190	20.175	22.359	24.759	27.395	30.287
14	14.421	16.182	18.141	20.319	22.737	25.420	28.395	31.691	35.339	39.373
15	17.449	19.742	22.314	25.195	28.422	30.030	36.062	40.565	45.587	51.185
16	21.113	24.085	27.446	31.242	35.527	40.357	45.799	51.923	58.808	66.541
17	25.547	29.384	33.758	38.740	44.409	50.850	58.165	66.461	75.862	86.503
18	30.912	35.848	41.523	48.038	55.511	64.071	73.869	85.070	97.862	112.454
19	37.404	43.735	51.073	59.567	69.389	80.730	93.813	108.890	126.242	146.190
20	45.258	53.357	62.820	73.863	86.736	101.720	119.143	139.379	162.852	190.047
25	117.388	144.207	176.857	261.539	264.698	323.040	393.628	478.901	581.756	705.627
30	304.417	389.748	497.904	634.810	807.793	1025.904	1300.477	1645.488	2078.208	2619.936

TABLE A-1 The Compound Sum of One Rupee (Contd.)

Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
TABLE A-2 The Compound Value of an Annuity of One Rupee										
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.368	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.578
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.65	17.560	18.531
12	12.682	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.598	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.023	21.578	23.276	25.129	27.152	29.361	31.772
16	17.258	18.639	20.157	21.824	23.657	25.672	27.888	30.324	33.003	35.949
17	18.430	20.012	21.761	23.697	25.840	28.213	30.840	33.750	36.973	40.544
18	19.614	21.412	23.414	25.645	28.132	30.905	33.999	37.540	41.301	45.599
19	20.811	21.840	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.158
20	22.019	24.297	26.870	29.778	33.066	36.785	40.995	45.762	51.169	57.274
25	28.243	32.030	36.459	41.645	47.726	54.864	63.248	73.105	84.699	98.346
30	34.784	40.567	47.575	56.084	66.438	79.057	95.459	113.282	136.305	164.491

						TABLE A-2 The Compound Value of an Annuity of One Rupee (Contd.)				
Year	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.342	3.374	3.407	3.440	3.472	3.506	3.539	3.572	3.606	3.640
4	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.338
5	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	7.913	8.115	8.323	8.535	8.754	9.897	9.207	9.442	9.683	9.930
7	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.141	12.523	12.916
8	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	14.164	14.776	15.416	16.085	16.786	17.518	18.285	19.086	19.923	20.799
10	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	19.561	20.655	21.814	23.044	24.349	25.733	27.200	28.755	30.403	32.150
12	22.713	24.133	25.650	27.271	29.001	30.850	32.824	34.931	37.180	39.580
13	26.211	28.029	29.984	32.088	34.352	36.786	39.404	42.218	45.244	48.496
14	30.095	32.392	34.882	37.581	40.504	43.672	47.102	50.818	54.841	59.196
15	34.405	37.280	40.417	43.842	47.580	51.659	56.109	60.965	66.260	72.035
16	39.190	42.753	46.671	50.980	55.717	60.925	66.648	72.938	79.850	87.442
17	44.500	48.883	53.738	59.117	65.075	71.673	78.978	87.067	96.021	105.930
18	50.396	55.749	61.724	68.393	75.836	84.140	93.404	103.739	115.265	128.116
19	56.939	63.439	70.748	78.968	88.211	98.603	110.283	123.412	138.165	154.739
20	64.202	72.052	80.946	91.024	102.443	115.379	130.031	146.626	165.417	186.687
25	114.412	133.333	155.616	181.867	212.790	249.212	292.099	342.598	402.038	471.976
30	199.018	241.330	293.192	356.778	434.738	530.306	647.423	790.932	966.698	1181.865

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
	TABLE A-2 The Compound Value of an Annuity of One Rupee (Contd.)									
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.210	2.220	2.230	2.240	2.250	2.260	2.270	2.280	2.290	2.300
3	3.674	3.708	3.743	3.778	3.813	3.848	3.883	3.918	3.954	3.990
4	5.446	5.524	5.604	5.684	5.766	5.848	5.931	6.016	6.101	6.187
5	7.589	7.740	7.893	8.048	8.207	8.368	8.533	8.700	8.870	9.043
6	10.183	10.442	10.708	10.980	11.259	11.544	11.837	12.136	12.442	12.756
7	13.321	13.740	14.171	14.615	15.073	15.546	16.032	16.534	17.051	17.583
8	17.119	17.762	18.430	19.123	19.842	20.588	21.361	22.361	22.995	23.858
9	21.714	22.670	23.669	24.712	25.802	26.940	28.129	29.369	30.664	32.015
10	27.274	28.657	30.113	31.643	33.253	34.945	36.723	38.592	40.556	42.619
11	34.001	35.962	38.039	40.238	42.566	45.030	47.639	50.398	53.318	56.405
12	42.141	44.873	47.787	50.895	54.208	57.738	61.501	65.510	69.510	74.326
13	51.991	55.745	59.778	64.109	68.760	73.750	79.106	84.853	91.016	97.624
14	63.909	69.009	74.528	80.496	86.949	93.925	101.465	109.611	118.411	127.912
15	78.330	85.191	92.669	100.815	109.687	119.346	129.860	141.302	153.750	167.285
16	95.779	104.933	114.983	126.010	138.109	151.375	165.922	181.867	199.337	218.470
17	116.892	129.019	142.428	157.252	173.636	191.733	211.721	233.790	258.145	285.011
18	142.439	158.403	176.187	195.993	218.045	242.583	269.855	300.250	334.006	371.514
19	173.351	194.251	217.710	244.031	273.556	306.654	343.754	385.321	431.868	483.968
20	210.755	237.986	268.783	303.598	342.945	387.384	437.568	494.210	558.110	630.157
25	554.230	650.944	764.596	898.082	1054.791	1238.617	1454.180	1706.790	2002.608	2348.765
30	1445.111	1767.044	2160.459	2640.881	3227.172	3941.953	4812.891	5873.172	7162.785	8729.805

Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
				TABLE A-3 The Present Value of One Rupee						
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.990	0.980	0.971	0.962	0.962	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.708	0.683
5	0.651	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.82	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.789	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.823	0.686	0.570	0.475	0.396	0.331	0.227	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057

TABLE A-3 The Present Value of One Rupee (Contd.)									
Year	**11%**	**12%**	**13%**	**14%**	**15%**	**16%**	**17%**	**18%**	**19%**	**20%**
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.656	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
	TABLE A-3 The Present Value of One Rupee (Contd.)									
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.826	0.820	0.813	0.806	0.800	0.794	0.787	0.781	0.775	0.769
2	0.683	0.672	0.661	0.650	0.640	0.630	0.620	0.610	0.601	0.592
3	0.564	0.551	0.537	0.524	0.512	0.500	0.488	0.477	0.466	0.455
4	0.467	0.451	0.437	0.423	0.410	0.397	0.384	0.373	0.361	0.350
5	0.386	0.370	0.355	0.341	0.328	0.315	0.303	0.291	0.280	0.269
6	0.319	0.303	0.289	0.275	0.262	0.250	0.238	0.227	0.217	0.207
7	0.263	0.249	0.235	0.222	0.210	0.198	0.188	0.178	0.168	0.159
8	0.218	0.204	0.191	0.179	0.168	0.157	0.148	0.139	0.130	0.123
9	0.180	0.167	0.155	0.144	0.134	0.125	0.116	0.108	0.101	0.094
10	0.149	0.137	0.126	0.116	0.107	0.099	0.092	0.085	0.078	0.073
11	0.123	0.112	0.103	0.094	0.086	0.079	0.072	0.066	0.061	0.056
12	0.102	0.092	0.083	0.076	0.069	0.062	0.057	0.052	0.047	0.043
13	0.084	0.075	0.068	0.061	0.055	0.050	0.045	0.040	0.037	0.033
14	0.069	0.062	0.055	0.049	0.044	0.039	0.035	0.032	0.028	0.025
15	0.057	0.051	0.045	0.040	0.035	0.031	0.028	0.025	0.022	0.020
16	0.047	0.042	0.036	0.032	0.028	0.025	0.022	0.019	0.017	0.015
17	0.039	0.034	0.030	0.026	0.023	0.020	0.017	0.015	0.013	0.012
18	0.032	0.028	0.024	0.021	0.018	0.016	0.014	0.012	0.010	0.009
19	0.027	0.023	0.020	0.017	0.014	0.012	0.011	0.009	0.008	0.007
20	0.022	0.019	0.016	0.014	0.012	0.010	0.008	0.007	0.006	0.005
25	0.009	0.007	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.001
30	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.000	0.000

					TABLE A-4 The Present Value of Annuity One Rupee					
Year	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	7.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.326	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.355
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.358	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.746	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.560	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	13.134	11.690	10.828	10.059	9.372	8.756	8.022
19	17.226	15.679	14.324	13.590	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.352	14.878	14.029	12.462	11.470	10.594	9.818	9.129	8.514
25	22.023	19.524	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.007
30	25.808	22.397	19.601	17.292	15.373	13.765	12.409	11.258	10.274	9.427

Year	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
TABLE A-4 The Present Value of Annuity One Rupee (Contd.)										
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.850	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.487	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	5.303	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.669	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.585	5.136	5.070	4.843
20	7.963	7.469	7.024	6.623	6.259	5.929	5.628	5.353	5.101	4.870
25	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979

Year	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
				TABLE A-4 The Present Value of Annuity One Rupee (Contd.)						
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.826	0.820	0.813	0.806	0.800	0.794	0.787	0.781	0.775	0.769
2	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361
3	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816
4	2.540	2.494	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166
5	2.926	2.864	2.803	2.745	2.689	2.635	2.583	2.532	2.483	2.436
6	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643
7	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.868	2.802
8	3.726	3.619	3.518	3.421	3.329	3.241	3.156	3.076	2.999	2.925
9	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019
10	4.054	3.923	3.799	3.682	3.570	3.465	3.364	3.269	3.178	3.092
11	4.177	4.035	3.902	3.776	3.656	3.544	3.437	3.335	3.239	3.147
12	4.278	4.127	3.985	3.851	3.752	3.606	3.493	3.387	3.286	3.190
13	4.362	4.203	4.053	3.912	3.780	3.656	3.583	3.427	3.322	3.233
14	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249
15	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268
16	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283
17	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295
18	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.304
19	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311
20	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316
25	4.721	4.514	4.323	4.147	3.985	3.834	3.694	3.564	3.442	3.329
30	4.746	4.534	4.339	4.160	3.995	3.842	3.701	3.569	3.447	3.332

Capital Budgeting
and
Financing Decisions

MBA Second Year
(Financial Management)
Paper No. 2.3

School of Distance Education
Bharathiar University, Coimbatore - 641 046

CONTENTS

CAPITAL BUDGETING AND FINANCING DECISIONS

SYLLABUS

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UNIT II

Estimation of cash flows - evaluation techniques - Project evaluation under risk and uncertainty - sensitivity analysis - certainty equivalent - Decision tree approach Risk adjusted discount rate approach - Analysis of non-financial aspects.

UNIT III

Capital Structure decisions - Cost of capital and capital structure determination optimum capital structure.

UNIT IV

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UNIT V

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UNIT I

LESSON

1

LONG-TERM FINANCE

CONTENTS

1.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Familiarise with the financial needs of a firm

- Discuss the methods of raising long-term finance

- Understand about the specialized financial institution

1.1 INTRODUCTION

Finance is the process of conversion of accumulated funds for productive use. Every business establishment needs finance irrespective of its size nature and volume. Financing decision involves the most important and complex areas of functional management. Effective management of financial matters is indispensable to every firm. The finance manager, in order to maximise the wealth of the firm, faces the real challenge for the procurement of necessary funds from the right source and also their effective utilisation in business. This lesson deals with the raising of funds aspect only.

1.2 TYPES OF FINANCIAL NEEDS

The need for finance arises in order to fulfill two basic objectives - (i) to set up a manufacturing facility, i.e., to acquire land, buildings, plant and equipments etc., collectively known as fixed assets and (ii) to purchase adequate inventories comprising of raw-materials, stock in progress and finished goods; to retain sufficient cash; and to extend credit to customers; collectively called as current assets. Thus, broadly speaking, a firm needs finance to meet its fixed capital requirements as well as working capital need. These requirements are met from two distinct and major sources of finance: long-term and short-term.

1.2.1 Fixed Capital

Fixed capital refers to that part of the total capital of a firm which is represented by investment in fixed assets like land, building, plant, machinery etc. It may also be defined as the investments in durable instruments of production and of goods in use which are only capable of giving up gradually the full yield of use or enjoyment.

1.2.2 Working Capital

Generally there are two concepts of working capital, namely, gross working capital and net working capital. While gross concept of working capital refers to the firm's investment in current assets, the net concept refers to the difference between the current assets and current liabilities of the firm. Current assets include inventories, trade debtors short term loans, advances and investments, cash and bank balances. Similarly, current liabilities include sundry creditors, trade advances, bank short-term borrowings and current provisions.

1.2.3 Long-term Finance

The requirements for long-term finance arises to purchase fixed assets and to meet the permanent part of the working capital requirements. These funds are required not only for establishing a new enterprise but also for expanding, diversifying and keeping intact the existing enterprise.

The use of long-term funds in the business involves scientific decision regarding two major aspects: (i) determining the size or amount of long-term funds required and (ii) selecting the appropriate sources. Generally the size of long-term funds requirement depends upon the size of the business, i.e., whether industrial, commercial or service. Similarly the composition of long-term funds refer to the capital structure of a firm and is nothing but a judicious mix of debt and equity.

Broadly speaking there are three fundamental patterns of capital structure:

(i)   Financing of capital requirements exclusively by equity;

(ii)   Financing of capital requirements by equity and preferred stocks; and

(iii)   Financing of capital requirements by equity, preferred stocks, bonds and debentures.

A prudent financial manager tries to make an optimum utilisation of different sources of funds and hence the third technique of financing long-term requirements is very popular.

1.2.4 Short-term Finance

By convention all sources of financing that must be repaid within one year are considered to be short-term. Short-term financial decisions are generally concerned with short-lived assets and liabilities. A financial manager responsible for short-term financial decision does not have to look far into the future.

Raising short-term finance for a firm involves two main issues: (i) deciding the amount of short-term finance, (ii) selecting the appropriate sources. While determination of the amount of the short-term finance is guided by the principle of "self-liquidating debt" or principle of 'hedging'; the selection of short-term source is governed by (a) the effective cost of credit, (b) the availability of credit, and (c) the influence of the use of a particular credit source on the cost and availability of other sources.

1.3 METHODS OF RAISING LONG-TERM FINANCE

Broadly there are four sources from which a firm can obtain its long-term finance. They are: Equity capital, Preference capital, Debenture and Term-loans. Each of these four sources has its own merits and demerits.

1.3.1 Equity Capital

Equity capital, also called as common stock, is a principal source of long-term finance for a firm. These are the ownership capital and the equity holders are thus the real owner of the business who bear the ultimate risk of ownership.

Issue of equity share capital has many implications both to the firm as well as to the investors or the equity holders. Listed below are some of these implications:

Implications to the firm

(a) ***Advantages***

    i)   It represents permanent capital, and hence there is no liability for repayment.

    ii)   It does not involve fixed obligation for payment of dividends; hence can increase retained earnings and consequently internal funds.

    iii)   It increases the credit worthiness of the firm, for other things remaining constant, larger the equity base, higher the ability of the firm to obtain credit.

(b) *Disadvantages*

    i) The cost of equity capital is high, in some cases highest too.

    ii) The rate of return required by equity holders is generally higher than the rate of return required by other investors.

    iii) Equity dividends are payable from post-tax earnings and are not tax deductible payments.

    iv) The cost of issuing of equity capital is higher than that of debt capital.

Implications to the investors

(a) *Advantages*

    i) Equity stock holders enjoy the controlling power of the firm.

    ii) Liability of equity stock holders is limited to the extent of their capital contribution.

    iii) Equity dividends get preferential tax treatment.

(b) *Disadvantages*

    i) Equity stock holders enjoy the lowest priority as they have only a residual claim over income as well as assets of the company.

    ii) Equity stock prices generally fluctuate and therefore investment in equity is risky.

    iii) Equity stock holders cannot participate in the company's dividend decision.

1.3.2 Preference Capital

Preference capital is another important source of long-term finance of a company. It is hybrid kind of security, possessing some characteristics of equity and some of debt. Legally, it is part of a company's equity base - preference dividends are not tax-deductible expense to the business, and unless the company's charter or the contract with the preferred stock holders runs to the contrary, owners of preferred stock have almost the same rights as equity stock holders have.

Preferred stock carries a specified dividend rate. This fixed rate plus the preferred holder's prior claims to income and assets however make it resembles with debt. The limited claims on corporate earnings possessed by creditors and preferred stock holders provide the equity stock holders with an opportunity to gain (or lose) from the use of financial leverage in the corporate capital structure.

Depending upon the types such as cumulative or non-cumulative, participative or non-participative, redeemable or irredeemable etc., the preferred stocks too have many implications to the firm as well as to the investors.

Implications to the firm

(a) *Advantages*

    i) There is no legal obligation to pay dividend. A firm does not face bankruptcy or legal action if it skips payment of preference dividend.

    ii) Preference capital is generally treated as part of net worth. Hence it increases credit worthiness of the firm.

iii) Preference stock holders do not, under normal circumstances carry the voting right; hence there is no dilution of control.

(b) *Disadvantages*

i) Raising finance through preferred stock is costly in comparison to debt capital.

ii) Skipping the payments of preference dividends may adversely affect the image of the firm in the capital market.

iii) Non-payment of preference dividend is likely to create some controlling problems too.

Implications to the stock holders

(a) *Advantages*

i) It earns stable dividend.

ii) A part of the preference dividend is tax-deductible.

(b) *Disadvantages*

i) Preference stock holders are vulnerable to arbitrary managerial actions.

ii) Price fluctuation of preference shares is greater than that of debentures.

1.3.3 Debenture

Debenture is one of the most frequently used methods of raising long-term funds by a firm. It is a written instrument signed by the company under its common seal acknowledging the debt due by it to its holders. It carries a fixed rate of interest and the interest is payable irrespective of whether the company earns profit or not. The interest paid on debenture is chargeable against profit and hence is a tax-deductible. Capital collected through issue of debentures can be secured, unsecured, convertible, non-convertible, redeemable and irredeemable.

Funds raised through issue of debentures in the pattern of financing has got wider and deeper significance. Recourse to debt generally tends to reduce the cost of capital and consequently help and improve the overall return of the company. Debt is considered a cheaper source of financing not only because it is less expensive in terms of interest cost and issuance cost than any other form of security but essentially due to the availability of tax benefits. Faced with alternative methods of long-term financing, the finance manager should favour the use of long-term debt if he is satisfied that sales and earnings of the company are relatively stable and will remain so in the ensuing years.

Implication to the firm

(a) *Advantages*

i) It is a cheaper source of raising funds.

ii) It increases value of the firm.

iii) It does not affect the controlling process of the firm.

(b) *Disadvantages*

i) Raising funds through issue of debentures is risky unless the firm's earnings are stable.

ii) There exists a legal binding on the firm to pay interest on debentures.

Implication to the debenture holders

(a) *Advantages*

    i)   Debenture holders have priority of claim to income and assets over stock holders.

    ii)   Debenture holders are assured of a fixed return.

(b) *Disadvantages*

    i)   Debenture holders do not have controlling power,

    ii)   Debenture holders do not have voting rights.

1.3.4 Term Loans

Term loans represents yet another source of debt finance which is generally repayable after one year but within ten years. They are utilised to finance the acquisition of fixed assets and working capital margin. Term loans differ from short-term bank loans in as much as the latter are utilised to finance short-term working capital needs and are liquidated within a year.

Term loans typically represent secured borrowings. The interest on term loans is a statutory obligation and is payable irrespective of the financial condition of the firm.

The principal amount of a term loan is generally repayable over a period of six to eight years after an initial grace of one to two years. So far as the mode of repayment is concerned, term loans provided by financial institutions are repayable in equal semiannual installments, whereas those granted by commercial banks are repayable in equal quarterly instalments.

Financial institutions in order to protect their interest very often impose certain restrictions on the borrowers which may include formation of the board of directors and the management set-up according to their satisfaction. Besides, financial institutions, in certain cases, also dictate the convertibility clause of the term loans.

Term loans generally include borrowings from banks, financial institutions, Government and Semi-Government bodies and public deposits.

Check Your Progress 1

1.   Define fixed capital.

    ....

    ....

2.   What is working capital?

    ....

    ....

1.4 SOURCES OF LONG-TERM FINANCE

A firm can meet its financial requirements from a variety of sources which may broadly be divided into (i) Capital Market, (ii) Specialised Financial Institutions, (iii) Leasing, (iv) Foreign Sources and (v) Retained Profits. Each of these five sources of finance has its own strengths and weaknesses and hence the finance manager of the firm faces

rather a formidable challenge as to the selection of the particular source or sources of finance which is/are most suitable to the firm. While a scientific and rational selection of the right source(s) of finance will result in a smooth sail of the firm to its destiny, a faulty selection will necessarily endanger its very survival. Hence, the finance manager, while keeping the firm's objective in one hand and its financial requirements and managerial policies on the other, has to make a judicious selection of the particular source(s) of finance which will put the firm on the right track.

1.5 CAPITAL MARKET

Capital Market is the most vital limb of the financial market of a country. The financial market consists of both the capital market and the money market. However, it is the capital market from which the corporate firms raise a substantial part of their financial requirements.

Defined as a complex of institutions, instruments and practices which establish a link between the demand for and the supply of different types of capital funds, the capital market facilitates the movement of the stream of command over the capital to the point of highest yield. It is concerned with the supply of long-term funds for productive use by industrial and commercial undertakings. It facilitates the transfer of funds from those who have funds to those who need funds. The flow of funds may come from industrial and commercial undertakings, Government and Semi-Government bodies and other organisations who raise their capital by issuing securities like shares, debentures, bonds and certificates.

1.5.1 Classification of Capital Market

Capital market can be classified in many ways. Sectoral classification and the functional classification are however prominent among them. According to sectoral classification, a capital market can be organised or an unorganised one. On the other hand, a capital market can be a primary market of a secondary market, as far as the functional classification is concerned.

Organised

Organised market refers to the regular financial institutions organised on modern lines and consist mainly of commercial and co-operative banks and non-banking financial institutions like the IFCI, IDBI, ICICI etc.

The organised market has two components–short-term market, also called as the money market and the long-term market popularly known as the capital market. Under the short-term market included are the commercial and cooperative markets, the call money market, the bill market, the collateral loan market, and the giltedged market. Similarly, long-term capital market includes the new issue market, the stock market, the private loan/bond market together with the development banks.

Unorganised

Unorganised market refers to the indigenous system of financial institutions such as rural and urban money lenders and indigenous bankers who do not have regular recourse either to deposits from the public or to borrowings from banks. The peculiarity of indigenous bankers lies with the fact that they provide only seasonal finance especially for producing and marketing of crops.

Primary Market

Primary markets are those where securities are offered for the first time to potential investors. A new issue of equity stock by a company is an example of primary market transaction. Primary market transaction increases the total stock of financial assets outstanding in the company. Prices and yields at which securities are sold in the primary capital market are closely related to the prices and yields on similar obligations traded in secondary capital market.

Secondary Market

Secondary markets are those where currently outstanding securities of companies are traded. For example, if the first buyer of the stocks of a company XYZ subsequently sells it, he does so in the secondary market. Thus all transactions after the initial purchases of securities take place in the secondary market. In this process therefore the sales do not affect the total stock of financial assets that exist in the economy. The secondary market sets the levels of the prices of already issued securities indicating the yields, interest rates and price-earning levels that must be placed on the new securities in order to float them successfully on the primary market. The secondary market consists of (i) organised stock exchanges, and (ii) over the counter markets.

Organised Stock Exchanges

Organised Stock Exchanges are tangible entities. They physically occupy space such as building or part thereof, and outstanding financial instruments are traded on their premises. The mechanism of the stock exchanges are so designed that it provides a free, close, continuous, efficient and relatively inexpensive market for the securities.

Organised stock exchanges perform several functions prominent of which are the following:

- It provides liquidity and smooth flow of funds.
- It ensures continuity of prices and provides for healthy speculations.
- It facilitates open market appraisal and ensures faithful market quotations for the securities.
- It mobilises and directs the flow of capital.
- It facilitates new issues and accelerates the process of capital formation together with economic growth.

Over the Counter Market (OTCEI)

Over the counter markets include all security markets except the organised stock exchanges. In other words, over the counter markets do not provide actual physical facilities for conducting securities transaction in any one place; they are rather made up of a complex network of brokerage houses and dealer offices located throughout the country and linked together by the various standard means of communications. Some even call the 'over the counter market' as over the telephone market.

1.6 CAPITAL MAKET IN INDIA

The Indian capital market has a history of a century and a half. Private trading in shares and stocks, government bonds and the securities of the East-India Company is reported to have taken place from 1830 onwards. By 1850, the share brokers in Bombay started meeting at regular intervals to trade in shares. Eventually the Bombay Stock Exchange

came into being in 1875 which became not only the first stock exchange of India but also of the entire Asia. The Calcutta and Madras stock exchanges were the second and third to join the Indian Stock Exchanges Club. And at present India is having 22 recognised stock exchanges.

Recent Developments

In a view to bring about a major reform in the financial sector the Government of India has taken a number of steps which include, among others, establishment of SEBI and of course very recently the NSE in order to streamline the capital market activities in the country. The following paragraphs give a brief outline of these two organisations which are expected to pay a very dominating role in the development of the country's capital market.

1.6.1 Securities and Exchange Board of India (SEBI)

The Securities and Exchange Board of India was established in 1987 in order to regulate the Indian capital market in one hand and to protect the investors interest in the other. With the implementation of Narasimha Committee Report, however, the Government of India has assigned a greater role to SEBI enhancing its scope of operation by making an amendment to its Act (SEBI Act) in 1992. With this amendment the SEBI has now become an autonomous body with more power and role to regulate and control the country's securities market including mutual funds and business and foreign capital investment in the country. The Board has also been empowered to take necessary steps to prevent inside trading, to promote investors' education, to regulate take-over of corporate bodies, to undertake market research, to regulate collective investment schemes and last but not the least to regulate the primary as well as the secondary market as a whole.

1.6.2 National Stock Exchange (NSE)

In a view to strengthen the Indian capital market further, the Government of India has set up the National Stock Exchange (NSE) which has become operational with effect from 20th June, 1994. The NSE is having a totally automatic trading system with a nation-wide network. Contrary to the regional based trading operation of other local stock exchanges, the NSE will have a totally transparent trading system wherein script will be traded on the screen and not on the floors as are generally found in the local stock exchanges.

As far as the area of operation is concerned, besides covering the normal areas, NSE will cover certain segments which other stock exchanges do not cover at present. The debt market, for example, is one of such areas which the local stock exchanges do not cover but the NSE is going to cover basically for the financial institutions. The NSE will have a national trading through a V-Sat based system and the price differences which generally exist for the same scrip in different stock exchanges will now be bridged through this mechanism.

The NSE has started its debut with the listing of 268 issues of securities and with a total initial market capitalisation of Rs.1,38,600 crores. Although NSE has started with the trading in the wholesale debt market segment as a primary step, it will cover the capital market and the retail debt market segments later when active trading interest develops among the members of the NSE. Not only the investors but also the local stock exchanges are expected to be benefited by the NSE.

Check Your Progress 2

State whether the following statements are true or false:

1.   Corporate firms raise huge funds by issuing securities in the capital market.

2.   Capital Market is the most vital limb of the financial market of a country.

3.   The financial market does not consist both the capital market and the money market.

4.   NSE does not cover the segments which other stock exchanges do not cover at present.

5.   The capital market facilitates the movement of the stream of command over the capital to the point of highest yield.

1.7 CAPITAL MARKET INSTRUMENTS

Corporate firms raise huge funds by issuing securities in the capital market. These securities generally include equity shares, preference shares and debentures. With the changing market environment and investors' choice and perception, however, certain new instruments have also emerged in the capital market. In this connection mention may be made of instruments like Non-voting equity shares, zero coupon bonds, dollar denominated convertible Eurobonds/GDRs, mortgage-backed securities, secured premium notes, convertibles, mutual funds, financial futures and option contracts and swaps. Floating Rate Notes (FRNs), Industrial Revenue Bonds (IRBs), clip and strip Donds, (also called as coupon notes), dual convertible bonds, commodity bonds, indexed rate notes, income share notes, stepped coupon bonds, dual option warrants and extendable notes, are yet some of the new instruments which have either entered the capital market or are about to enter.

1.8 LET US SUM UP

While taking long-term financial decisions a finance manager has to seriously consider about the financial requirements to implement the strategy of the firm. He may meet the financial requirements from a variety of sources which may broadly be divided into (i) Capital Market, (ii) Specialised Financial Institutions, (iii) Leasing, (iv) Foreign Sources, and (v) Retained Profits. Each of these five sources of finance has its own strengths and weaknesses and hence the finance manager of the firm faces rather a formidable challenge as to the selection of the particular source or sources of finance which is/ are most suitable to the firm. While a scientific and rational selection of the right source(s) of finance will result in a smooth sail of the firm to its destiny, a faulty selection will necessarily endanger its very survival. Capital Market is the most vital limb of the financial market of a country. The financial market consists of both the capital market and the money market. However, it is the capital market from which the corporate firms raise a substantial part of their financial requirements. Defined as a complex of institutions, instruments and practices, which establish a link between the demand for and the supply of different types of capital funds, the capital market facilitates the movement of the stream of command over the capital to the point of highest yield. It is concerned with the supply of long-term funds for productive use by industrial and commercial undertakings. It facilitates the transfer of funds from those who have funds to those who need funds.

1.9 LESSON END ACTIVITY

Write a study note on the sources of long term finance from different financial institutions for a firm.

1.10 KEYWORDS

Term Loans: Term loans represent yet another source of debt finance which is generally repayable after one year but within ten years.

Fixed Capital: Fixed capital refers to that part of the total capital of a firm which is represented by investment in fixed assets like land, building, plant, machinery etc.

Working Capital: Generally there are two concepts of working capital, namely, gross working capital and net working capital.

Long-term Finance: The requirements for long-term finance arises to purchase fixed assets and to meet the permanent part of the working capital requirements.

SEBI: The Securities and Exchange Board of India was established in 1987 in order to regulate the Indian capital market in one hand and to protect the investors interest in the other.

1.11 QUESTIONS FOR DISCUSSION

1. What do you understand by the long-term financial decisions?

2. Term-loans represent yet another source of debt finance. Analyse the statement.

3. Write a note on the concept of fixed capital.

4. What do you understand by the Indian financial market?

Check Your Progress: Model Answers

CYP 1

1. Fixed capital refers to that part of the total capital of a firm which is represented by investment in fixed assets like land, building, plant, machinery etc.

2. Generally there are two concepts of working capital, namely, gross working capital and net working capital.

CYP 2

1. T, 2. T, 3. F, 4. F, 5. T

1.12 SUGGESTED READINGS

Prasanna Chandra, *Financial Management*, Tata McGraw-Hill.

Pandey I.M., *Financial Management.*

LESSON

2

PUBLIC ISSUE

CONTENTS

2.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept of public issue.

- Learn about institutional finance.

- Attempt on the innovative modes of financing.

2.1 INTRODUCTION

Capital instruments, namely, shares and debentures can be issued to the market by adopting any of the four modes: public issues, private placement, rights issues and bonus issues. Let us briefly explain these different modes of issues.

Only public limited companies can adopt this issue when it wants to raise capital from the general public. The company has to issue a prospectus as per the requirements of the corporate law in force, inviting the public to subscribe to the securities issued, which may be equity shares, preference shares or debentures/ bonds. A private company cannot adopt this route to raise capital. The prospectus shall give an account of the prospects of investment in the company. The convinced public apply to the company for a specified

number of shares/debentures paying the application money, i.e. money payable at the time of application for the shares/debentures, usually 20 to 30 percent of the issue price of the shares/debentures. A company must receive subscription for at least 95 percent of the shares/bonds offered within the specified days, otherwise the issue has to be scrapped. If the public applies for more than the number of shares/debentures offered, the situation is called over-subscription. In under-subscription, the public subscribes for less number of shares/debentures offered by the company. For good companies coupled with better market conditions, over-subscription results. Prior to issue of shares/debentures and until the subscription list is open, the company go on promoting the issue. In western countries such kind of promoting the issue is called 'road-show'. When there is over-subscription a part of the excess subscription usually up to 15 percent of the offer, can be retained and allotment proceeded with. This is called the green-shoe option.

When there is over-subscription, pro-rata allotment (proportionate basis allotment, i.e. say when there is 200 percent subscription, for every 200 shares applied 100 shares allotted) may be adopted. Alternatively, pro-rata allotment for some applicants, full-scale allotment for some applicants and nil allotment for the rest of the applicants can also be followed. Usually the company co-opts authorities from the stock-exchange where listing is done, from securities regulatory bodies (SEBI in Indian, SEC in USA and so on), etc., in finalizing mode of allotment.

Public issues enable broad-based shareholding. General public's savings directed into corporate investment, the economy, company and individual investors benefit. The company management does not face the challenge of dilution of control over the affairs of the company. And good price for the shares and competitive interest rate on debentures are quite possible.

2.2 INSTITUTIONAL FINANCE (FINANCIAL INSTITUTIONS)

In addition to the capital market, firms can also approach the financial institutions for satisfying their long-term financial needs. Financial institutions while themselves raising resources from a large number of small investors, make the funds available to business concerns thereby reducing their burden in raising resources directly from the small investors. Thus, financial institutions act as a channel through which scattered savings are collected and then invested in business firms.

In India we have a number of financial institutions operating in the capital market which directly or indirectly extend financial assistance to the needy firms. These institutions may broadly be divided into three categories, viz., commercial banks, development banks and investing institutions.

This section, however, deals with the development banks and the investing institutions which are considered to be the wings of specialised financial institutions.

2.2.1 Development Banks

Development banks are the financial institutions which supply capital, knowledge and expertise to the business firms. In India a number of development banks are operating both at the national as well as state level, These institutions are specialised in providing long-term funds, entrepreneurial and managerial assistance to the needy and deserving firms.

Given below is the present structure of different developmental financial institutions operating in the country.

At the National Level	At the State Level
1. Industrial Finance Corporation of India (IFCI)	1. State Financial Corporations (SFCs)
2. Industrial Credit and Investment Corporation of India (ICICI)	2. State Industrial Development Corporations (SIDCs)
3. Industrial Development Bank of India (IDBI)	3. State Small Industries Development Corporations (SSIDCs)
4. Industrial Reconstruction Bank of India (IRBI)	
5. Shipping Credit and Investment Company of India (SCICI)	
6. Tourism Finance Corporation of India (TFCI)	
7. Small Industries Development Bank of India (SIDBI)	
8. Risk Capital and Technology Finance Corporation (RCTFC)	
9. Technology Development and Information Company of India (TDICI)	

Discussions here, however, are confined to the leading development banks at the national and state level.

1. ***Industrial Finance Corporation of India (IFCI):*** Set up in 1948 by the Special Act of Parliament, the IFCI was the first national level development bank which extends medium and long-term loans to industrial concerns especially the limited companies in the private, public or joint sector. IFCI provides financial assistance by granting term loans, underwriting the issues of shares and debentures and by directly susbscribing to the securities of such industrial concerns. The corporation also helps the business firms in raising share capital from the capital market and also in procuring term loans from other financial institutions. IFCI independently meets the financial needs of medium and large projects costing up to Rs.5 crores. It, however, makes a joint financing with other all-India financial institutions to projects costing over Rs.5 crores. Generally, IFCI grants loan for a period of 12 to 15 years which may extend up to a maximum of 25 years. In a view to help the firms in raising funds from the market, the corporation has assumed the role of merchant banking from 1982 and further that with effect from May 1988 it has undertaken leasing business. It is, however, important to note here that the Government of India has granted the IFCI the full status of a public limited company with effect from July, 1993.

2. ***Industrial Credit and Investment Corporation of India Ltd. (ICICI):*** The ICICI was set up in 1955 as a part of the government effort to build necessary financial infrastructure for industrial development in the country. The main object of the corporation is to meet the long-term and medium-term financial requirements of the private sector industry in India through rupee and foreign currency loans underwriting and direct subscription to capital issues and guarantee of loans. In addition to this the corporation provides necessary assistance for the creation, expansion and modernisation of industrial units in the private sector. The loans granted by ICICI are repayable within a period of 15 years and the minimum amount of loan advanced is Rs.5 lac. Like IFCI, the ICICI has also assumed the role of merchant banking and further that the corporation extends venture capital for projects involving development and/or commercialisation of new technologies.

3. ***Industrial Development Bank of India (IDBI):*** The IDBI was established in 1964 with a view to making if an apex bank in the structure of industrial financing institutions in the country. Although the basic objectives of establishing IDBI are manifold, may divide them into three major categories, namely, financing function, promotional function and coordinating function.

As far as the financial functions are concerned IDBI assists all deserving projects irrespective of their size, nature and status by granting term loan and advances, subscribing to purchasing or underwriting the issue of shares and debentures and guaranteeing deferred payment due from industrial concerns to third parties. Similarly as an indirect financier, IDBI's assistance include refinancing of industrial loans provided by commercial banks and SFCs, refinancing of medium-term export credit granted by commercial banks, rediscounting of bills and providing financial assistance to term financing institutions by subscribing to shares and debentures issued by them.

The IDBI is authorised to perform promotional activities for industrial development especially in the backward areas. These promotional activities include balanced regional development, creation of new classes of entrepreneurs- and improvements in formulation, appraisal and implementation of projects.

IDBI coordinates the functions and operations of all the financial institutions including the IFCI, ICICI, LIC and UTI into a single integrated financial structure so that each may contribute towards the industrial development.

4. ***State Financial Corporation (SFCs):*** SFCs form an integral part of the structure of development financing institutions in India They strive to promote small and medium enterprises in their respective states thereby bringing about balanced regional growth, catalysing greater investment, generating larger employment and aiding wider ownership of industry.

At present there are 18 SFCs, 17 of which were set up under the SFCs Act, 1951. SFCs provide assistance to industries by way of term loans, direct subscription to equity and debentures, discounting of bills and guarantees.

5. ***State Industrial Development Corporations (SIDCs):*** SIDCs were established in the sixties and early seventies under the Companies Act as wholly-owned State Government undertakings for promotion and development of medium and large industries. There are 26 SIDCs operating in India at present. Besides providing assistance to industrial projects by way of term loans, underwriting and direct subscription to securities and guarantees, SIDCs undertake a variety of promotional activities such as preparation of feasibility reports, entrepreneurship development programmes, etc., The activities of some SIDCs also include participation in risk capital.

6. ***State Small Industries Development Corporations (SSIDCs):*** The SSIDCs were set up under the Companies Act, 1956 as State Government undertakings to perform important functions for the development of small, tiny and cottage industries in their respective jurisdiction. These functions include, among other, extending seed capital assistance, providing managerial assistance.

2.2.2 Investing Institutions

Investing institutions represent those financial intermediaries which mobilise savings from different section of the society mainly through the sale of their securities and channelise these savings in productive channels mainly through investment in shares and debentures

of industrial firms. Included under the investing institutions are the different investment companies in the private sector, the UTI, the LIC and the GIG.

1. ***Investment Companies:*** There are as many as 560 private sector investment companies belonging to different business houses in India at present. These companies seldom mobilise funds. They simply assist only those organisations in which the concerned business house has vested interest by investing in the equity shares of such organisations.

2. ***Life Insurance Corporation of India (LIC):*** LIC was constituted under the LIC Act in 1956 after taking over life insurance business from private companies to carry on the business of life insurance and deploy the funds in accordance with the plan priorities. Although the Corporation primarily aims at life insurance business, still its rule in the capital market can hardly be overemphasised.

Mentioned below are some of the specific objectives *vis-a-vis* functions of LIC:

❖ To invest its mobilised funds in the shares of promising industrial enterprises.

❖ To underwrite new issues and to grant loans for the corporate firms.

❖ To invest in Government securities.

❖ To maintain close interactions with other financial institutions like IDBI, IFCI, ICICI and UTI in matters of its investment programmes.

❖ To underwrite securities of industrial concerns.

❖ To directly subscribe to the securities and bonds of financial institutions including the SFCs.

❖ To give priority to firms engaged in infrastructural development as far as allocation of its mobilised fund is concerned.

Performance

LIC's performance with regard to direct assistance to corporate sector has remained significant both in terms of sanctions and disbursements. Since its inception after the end of March 1992, assistance sanctioned to industries by LIC amounted to Rs.5849.3 crore. While disbursements aggregated to Rs.4318.7 crore. The total investible funds available with LIC stood at Rs.35969.3 crore by the end of March 1992.

3. ***Unit Trust of India (UTI):*** UTI is a statutory financial institution in the public sector established on February 1, 1964 under the UTI Act, 1963. The trust started its operation with effect from July 1, 1964 with an initial capital of Rs. 5 crore and with the prime object of mobilising and channelising savings of relatively small investors into industrial securities.

The main objectives of UTI are:

❖ To invest in business and industry directly by subscribing to and underwriting of new securities and indirectly by purchasing securities from the stock exchanges.

❖ To invest in selected portfolio of securities designed to give the unit holders security of capital, besides giving a reasonable return and capital appreciation.

❖ To invest, as a matter of principle, in the securities of more than one companies.

❖ To mobilise savings and channelise them into productive investments servings the best interest of the unit holders.

Performance

Aimed at tapping the savings of small investors through sale of units and channelising them into corporate investments, the UTI from its inception has introduced a number of schemes at a regular intervals keeping in view the varied needs of diverse sections of investors. With an amendment to its Act in 23rd April, 1986 the UTI has also started giving assistance to the corporate firms by way of term loans, bill rediscounting, equipment leasing and hire-purchase financing. The trust has witnessed an encouraging growth in terms of sale of units as well as investible funds and unit holding accounts. The total investible funds, for example, available with the UTI at the end of June, 1992 amounted to Rs.30,550.8 crore and its total investment in the corporate sector as on that date amounted to Rs.22,032.7 crore.

4. ***General Insurance Corporation of India (GIC):*** GIC was established in 1973 on nationalisation of general insurance companies then operating in the country. GIC and its four subsidiaries viz., National Insurance Company Ltd., Oriental Fire and General Insurance Company Ltd., New India Assurance Company Ltd. and United India Insurance Company Ltd. operate a variety of insurance schemes to suit diverse and emerging needs of the society. The investment policies of GIC and its subsidiaries have been evolved within the ambit of the provision 27 (B) of the Insurance Act, 1938 and the guidelines issued by the Government from time to time. According to Government guidelines 70% of annual accretions to the investible funds are required to be invested in socially-oriented sectors of the economy. GIC started the business of term finance from 1976 in participation with other all-India financial institutions by way of term loans and underwriting/direct subscriptions to shares and debentures of industrial projects.

Performance

The aggregate amount of direct assistance sanctioned by GIC and its subsidiaries to the industrial sector amounted to Rs.2278.5 crores at the end of March, 1992. While the disbursements amounted to Rs. 1425.7 crore during the said period. The total amount of investment in all respects, however, stood at Rs.6126.8 crore by the end of March 1992. Of these, investments in shares and debentures of and terms loans to corporate firms in the public sector alone amounted to Rs.2047 crore.

2.2.3 Infrastructure Development Finance Co. Ltd.

Infrastructure Development Finance Co. Ltd. (IDFC) was born out of the need for a specialized financial intermediary to professionalize the process of infrastructure development in the country. Incorporated in 1997 with an initial paid-up capital of Rs.10,000 million, IDFC was conceived as an institution to facilitate the flow of private finance to commercially viable infrastructure projects and help mitigate commercial and structural risks contained therein, by designing innovative products and processes.

Operations

IDFC mainly operates in the areas such as energy, telecommunications and information technology, integrated transportation, urban infrastructure and food and agri-business infrastructure. IDFC has been assigned lead arranger mandates in its area of operations, and in its role as policy advisor, it is actively involved in exercises entailing rationalizing policy and regulatory frameworks that govern infrastructure sectors. It is involved in the identification of best practices, drawing on the expertise of Policy Advisory Boards and promoting policy dialogue among stakeholders, such as central and state governments, regulators and investors.

IDFC offers a variety of services to projects in the infrastrure sector, mezzanine structure and advisory services. Apart from the above, IDFC encourages banks to participate in infrastructure projects through 'take-out' financing for a specific term and at a preferred risk profile, with IDFC taking out the obligation after a specific period. Using risk participation facilities, IDFC also strengthens links between financial institutions and infrastructure projects. Further, IDFC, through guarantees structure, helps promoters raise resources from international markets. Mutual funds and pension funds being potential sources of long-term funds for infrastructure projects, IDFC intends offering advisory services to these funds to facilitate and strengthen their connectivity with infrastructure projects.

During 2000-01, to propel its vision for infrastructure towards reality, IDFC addressed issues, such a conditional lending for the power sector, competitive bidding for infrastructure services and issues in transport pricing and financing. IDFC is also developing its vision for the urban water and sanitation sector. In the power sector, IDFC has been working with progressive state governments to prepare road maps for reforms in the policy framework, with a belief that its multi-pronged and focused approach towards reforming the power sector would ultimately translate into desired investment opportunities. With a view to develop an alternative to escrow based lending that restrict privatisation of distribution, IDFC financed a 210 MW power project set up by Karnataka Power Corporation, based on a reform linked multipartite agreement with various stakeholders in Karnataka. The agreement envisages privatisation of distribution, besides committing the state government to financial discipline and envisaging creation of dedicated power sector fund. Based on the multipartite agreement in Karnataka, lenders are exploring alternatives to escrow based lending in other states as well.

IDFC has developed a Model Concession Agreement for shadow toll projects, which was approved by the High Powered Committee of the Government of India. IDFC also assists private sponsors in structuring projects and negotiating the concession framework for projects being set up in the roads and ports sectors. IDFC assisted the planning commission in the formulation of Integrated Transport Policy and is involved with the Expert Committee on Railways as well as a group constituted to examine the needs of the shipping industry.

During the year, IDFC created a decentralized infrastructure and new technologies group to undertake initiatives, such as indentification of new technologies for application, development of financial models with the help of a local service partner and initiating dialogue with donor agencies, relevant ministries and multilateral agencies to enable and stimulate commercially viable decentralized development.

During 2000-01, IDFC's total sanctions and disbursements amounted to Rs. 24,670 million for 31 projects and Rs.7,620 million for 15 projects, respectively. This compares favourably with previous years's performance of Rs.18,660 million sanctions foe 20 projects and Rs.6,420 million disbursements for 11 projects, indicating an increase of 32.2 percent in sanctions and 18.7 percent in disbursements in 2000-01 as against the growth rates of 10.9 percent and 71.2 percent in 1999-2000. Up to end March 2001, IDFC sanctioned financial assistance to 60 projects aggregating Rs.63,100 million. Of this, disbursement (including non-funded commitments) were made for 27 projects aggregating Rs.17,790 million.

2.2.4 State Industrial Development Corporations

The State Industrial Development Corporations (SIDCs) were established under the Companies Act, 1956, as wholly owned undertakings of the state Governments with the specific objectives of promoting and developing medium and large industries in their

respective states/union territories. These corporations extend financial assistance in the form of rupee loans, underwriting and direct subscriptions to shares/debentures, guarantees, inter-corporate deposits and also open letters of credit on behalf of their borrowers. SIDCs undertake a range of promotional activities including preparation of feasibility reports, conducting industrial potential surveys, entrepreneurship training and development programmes and developing industrial areas/estates. Some SIDCs also offer package of developmental services that include technical guidance, assistance in plant location and coordination with other agencies. With a view to providing infrastructural facilities for the establishment of industrial units, SIDCs are involved in the setting up of industrial growth centres. To keep place with the changing economic environment, SIDCs have initiated various measures to expand the scope of their activities and have entered into various fee-based activities.

Of the 28 SIDCs in the country, those in Andaman & Nicobar, Arunachal Pradesh, Daman & Diu and Dadra and Nagar Haveli, Goa, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Pondicherry and Sikkim also at as SFCs to provide assistance to small and medium enterprise and act as a promotional agencies for this sector.

Operations

During 2000-01, financial assistance sanctioned and disbursed by SIDCs increased by 29.9 percent and 3.1 percent to Rs 20,801 million and Rs 16,644 million, respectively as against a decline in sanctions and disbursements of 29.8 percent and 25.8 percent in 1999-2000, respectively. Up to end March 2001, aggregate sanctions and disbursements amounted to Rs 2,23,309 million and Rs. 176 million respectively.

During 2000-01, direct finance constituting 66.6 percent of overall sanctions, increased by 4.1 percent to Rs.13,849 million as against a decline of 41.6 percent in 1999-2000. Of the direct finance, project finance forming 50.9 percent of total sanctions, grew by 7.8 percent to Rs.10,581 million. Of the project finance, rupee loans declined by 2.3 percent over a decline of 49 percent in the previous year. Underwriting and direct subscriptions, however, registered a growth of 315.4 percent. Non-project finance constituting 15.7 percent of the total sanctions, declined by 6.4 percent during 2000-01. Of the non-project finance, assistance under asset credit scheme/equipment finance/corporate loans increased by 48.3 percent while working capital/short-term loans declined by 41.5 percent. Sanctions under bills finance, accounting for 31.8 percent of the total sanctions, grew by 144.7 percent to Rs.6,604 million during 2000-01.

During 2000-01, disbursements under direct finance were lower by 4 percent constituting 59.6 percent of overall disbursements. Disbursements under project finance grew by 1.3 percent to Rs.7,333 million, accounting for 45.3 percent of the total disbursements. Of the project finance, rupee loans declined by 12.7 percent while underwriting and direct subscriptions increased by 341.1 percent. Non-project finance, accounting for 14.4 percent of total disbursements, declined by 17.4 percent. Disbursements under asset credit scheme/equipment finance/corporate loans and working capital/short term loans were lower by 17.6 percent and 25.9 percent respectively, during 2000-01. Disbursements under bills finance accounting for 38.4 percent of total disbursements, grew by 9.9 percent.

Check Your Progress

State whether the following statements are true or false:

1. The State Industrial Development Corporations (SIDCs) were established under the Companies Act, 1956.

2. A firm's need for finance arises because of fixed capital and working capital requirements.

3. Equity capital is the owned capital of the company.

4. Long-term funds can also be acquired from financial institutions in the form of term loans.

5. Term loans generally include borrowing from financial institutions, banks, government and semi-government agencies.

2.3 LET US SUM UP

A firm's need for finance arises because of fixed capital and working capital requirements. The requirement of finance can be met out of long-term sources and short-term sources. Long-term fund is required for financing fixed assets and permanent portion of working capital while short-term fund is required for financing the working capital.

Equity capital, preference capital, debenture capital and term loans figure prominently among the long-term sources of finance. Equity capital is the owned capital of the company. This capital is provided by the owners of the company. The equity holders enjoy voting rights and also bear the ownership risk. Preference capital on the other hand is a hybrid source of capital consisting some characteristics of equity and some of debenture capital. Suppliers of preference capital enjoy preferential rights over equity holders for payment of dividends. Moreover, they have preferential rights over assets of the firm in case the firm goes into liquidation. Debenture capital is a loan capital provided by the creditors at, a predetermined rate of interest. Interest on debentures is payable irrespective of the financial condition of the firm.

Long-term funds can also be acquired from financial institutions in the form of term loans. Term loans generally include borrowing from financial institutions, banks, government and semi-government agencies, and deposits from general public. The loans thus obtained usually carry a fixed rate of interest and are repayable after one year but before ten years.

Specialised financial institutions in India are mainly divided into development banks and investing institutions. These institutions provide term loans to the corporate firms besides underwriting as well as directly subscribing to their securities. They also undertake merchant banking activities including leasing.

2.4 LESSON END ACTIVITY

Discuss various forms of raising funds for a newly established firm keeping the pros and cons of each of the sources.

2.5 KEYWORDS

Euro Issue: This refers to the issue of securities listed on a European Stock Exchange to which subscription can come from any part of the world except India.

Global Depository Receipt: It is basically a negotiable certificate denominated in US dollars, that represents a non-US company's publicly traded local currency (Indian rupee) equity shares.

Euro Convertible Bond: It is an equity linked debt security with an option on the part of the holder to convert it into a share or Depository Receipt (DR).

2.6 QUESTIONS FOR DISCUSSION

1. Give an overview of the different sources of financing a business enterprise.

2. Why do business enterprises need finance? What are the different sources of such finance?

3. What is working capital of a firm? How are the working capital needs of a firm met with?

4. What is the importance of short-term funds to a firm? How the firm raises such short-term funds?

5. How are the long-term funds raised by a firm?

6. Make a comparative study of the relative merits and demerits of raising different long-term sources of funds by a firm.

7. Give some examples of the latest innovations in the financial markets for raising short-term sources of finance.

8. Explain the role of financial institutions in connection with long term financing for corporate firms.

Check Your Progress: Model Answers

1. T, 2. T, 3. T, 4. T, 5. T

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LESSON
3

INNOVATIVE METHODS OF FINANCING

CONTENTS

3.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

● Familiarise with the new modes of raising capital.

● Understand the pros and cons of various sources of finance.

3.1 INTRODUCTION

The capital markets are undergoing significant changes in modern era. The present lesson discusses various forms of innovative financing method to raise the short-term as well as long-term finances. These changes are taking place due to the rapid changes in investors attitude and their preferences. These preference of investors may be towards the return from investment, tenure of investment, convertibility into cash (liquidity) and risk associated with investment. These methods are discussed below.

3.2 SOME INNOVATIVE METHODS OF FINANCING

3.2.1 Commercial Paper (CP)

Meaning

Commercial Paper (CP) is a form of usance promissory note negotiable by endorsement and delivery. It may be issued even at discount if the issuing company so decides. The form of commercial paper has been prescribed by the Reserve Bank of India.

Requirements

Commercial paper can be issued by a non-banking company desiring to raise funds for a short periods from the market for meeting working capital requirements. Companies governed by *FERA* can also issue *CPs* with approval of the Government of India.

The following conditions are to be satisfied by the company issuing *CPs* as amended up to date:

(1) The issuing company should have a tangible net worth of not less than Rs.4 crores as per the latest balance sheet.

(2) The company should have working capital limit of not less than Rs.4 crores.

(3) The company should have minimum *P2/A2* rating from *CRISIL/ICRA/CARE* or any other Credit Rating Agency for the purpose. The rating should not be more than two months old from the date of issue of commercial paper.

(4) The company should be listed on one of the recognised stock exchanges. However, the Government companies are exempt from its stipulation.

(5) It borrowed account should be classified as "standard" by the financing institution under the head, No.1 status.

Duration

The *CP* can be issued for maturities between 15 days and not more than one year. The *CP* has to be repaid on the maturity date without any delay. No grace period is allowed. If the maturity date happens to be a holiday, it should be on the immediately preceding working day. Renewal of *CP* is not permissible. Such action will be taken as a fresh issue for which the permission of RBI is required.

Denomination and Size

*CP*s may be issued in multiples of Rs.5 lakhs. The minimum amount to be invested by a single investor in primary markets is Rs.25 lakhs (face value). However, for secondary market operations, denomination of *CP*s may be Rs.10 lakhs and multiples thereof.

Maximum Amount

The company can issue the commercial paper for a maximum amount limit to 75 percent of the maximum permissible bank borrowing. The company should carefully determine the size of the *CP*. Although it can go up to 75 percent of maximum bank borrowings, the size should not be for more than the core bank borrowings which should be determined on the basis of past cash flow. If the *CP* size is greater than the minimum borrowing requirement, the company may go in for surplus fund position for few days as a contract to cash credit. The borrowing through *CP* is committed and cannot be repaid before maturity.

Issue Procedure

The following procedure has to be followed for issue of *CP*:

(i)   The *CP* has to be issued in the form of promissory note and in the format prescribed by the *RBI*. The *CP* should be issued at discount. In order words, the interest is always front-ended and maturity value is always equal to face value.

(ii)   The company must get the credit rating from the Credit Rating Agency specified by the *RBI*, as stated earlier.

(iii)   The company should submit the application in the prescribed form along with the rating certificate to its banker.

(iv)   The banker after verification and on being satisfied that the company is eligible to issue *CP*s shall forward the application to *RBI* together with the rating certificate within a application wholly or in part of it. It will indicate it acceptance to the company's banker and also specify other terms and conditions to be complied with.

(v)   The company shall make arrangements to privately place *CP*s and complete the issue within a period of two months from the date of approval of *RBI*.

(vi)   The issue price shall be collected by the company's banker by way of crossed account payee cheque from the investors.

(vii)   The company's banker will reduce the working capital limits of the company by the amount of the size of the *CP*s issued.

(viii) The company shall report to the RBI as to the amount raised by issue of *CP*s within three days from the date of completion of the issue of *CP*s.

(ix)   The expenses of the issue of the *CP*s are to be borne by the company concerned.

Investing Persons

Any individual firm or body corporate in India whether incorporated or not can invest in *CP*s. Financial institutions and banks can also invest funds in companies through *CP*s. Non-resident Indians have also been permitted by the *RBI* to invest in *CP*s subject to the following two conditions:

(i)   The amount invested in the expenses of the issue of the *CP*s are to be borne by the company concerned. and the income earned thereon shall not be allowed to be repatriated out of India; and

(ii)   The *CP*s issued to *NRIs* shall not be transferred.

In conclusion, it can be said that with the present conditions stipulated by the Reserve Bank of India for issue of *CP*s, only very large and financially sound companies will be benefited by issue of *CP*s. In case the experiment is successful, the *RBI* may liberalise regulations governing issue of *CP*s for the benefit of medium and small-size companies.

Illustration 1:

A Co. Ltd. issued commercial paper as per following details:

Date of issue	17th January, 1998
Date of maturity	17th April, 1998
No. of days	90
Interest rate	11.25% p.a.

What was the net amount received by the company on issue of commercial paper ?

(C.A. Final May, 1998)

Solution:

It is being assumed that the amount of commercial paper issued is Rs.1 crore. Hence, on this basis the net amount received by the company on issue of commercial paper is as follows:

Interest: 11.25% p.a.   =   2.774% for 90 days.

The amount of interest will, therefore, be

$$= \quad 0.02,69,913 \times \text{ Rs.1 crore}$$
$$= \quad \text{Rs. } 2,69,913$$

In case of commercial paper the amount of interest is always front added and the maturity value is always equal to its face value. Hence, the net amount received at the time of issue of commercial papers of Rs.1 crore should be

$$= \quad \text{Rs.1 crore - Rs.2,69,913}$$
$$= \quad \text{Rs.97,30,087}$$

3.2.2 Certificate of Deposit (CD)

The Certificate of Deposit (CD) is a document of title similar to a time deposit receipt issued by a bank. However, there is no prescribed interest rate on such funds and the banks have the freedom to issue it at a discount or face value. It is a bearer document, hence readily negotiable. It is beneficial both to the banker and the investor because of the following reasons:

(i) The Banker is not required to encash the deposit(s) before the date of maturity. Hence, it is assured of funds for a minimum period.

(ii) The investor is assured of ready liquidity. In case of need he can sell the *CD* in the secondary market.

The maturity period of *CD*s is between 15 days and one year. The minimum size of the issue to a single investor is Rs.5 lakhs in denomination of Rs.1 lakh and its multiples.

It may be noted that *CD*s can be issued only by scheduled commercial banks excluding Regional Rural Banks.

3.2.3 Securitisation of Debt

Securitisation is a financing technique originated in USA as long back as 1970s when the Government National Mortgage Association started trading in securities backed by pools of mortgage loans. In securitisation, generally a financial institution holds a pool of individual loans and receivables, creates securities against them, get them rated and sell them to investors at large. The most suitable assets for securitisation for the banks and financial institutions are housing loans, car and truck loans, credit card receivable, trade receivable, etc.

The concept of securitisation can be understood with the following example.

Example: A bank has lent Rs.10,000 to Mr. *A* for purchasing a scooter at a rate of interest of 25% per annum. Subsequently one Mr. *B* approaches the bank for another Rs.10,000 for a vehicle loan. The bank has no funds to lend. One option for the bank is to mortgage the asset in a willing lender's favour and raise the resources which can be re-lent. It amounts to settle the old loan to secure a fresh loan. However, it is difficult, in the absence of a secondary market to locate such a lender and mortgage the assets. Now, this difficulty can be overcome by securitising the old debt instead of selling it. This is done by selling old debt in the form of securities of different denominations and varying maturities. These securities are backed by the assets against which earlier loans have been made. Investors buy these securities according to their preferences regarding maturity pattern and return on the securities.

Assets securitisation may, therefore, be defined a process whereby loans and receivables are packaged underwritten and sold in the form of asset-backed securities. It is therefore the process of transforming the assets of a lending institution into negotiable instruments for generation of funds. The assets which can be securitised include receivable from the Government, trade-related receivable, credit card receivable, automobile loans, boat loans, commercial real estate loans, housing loans, student loans, non-performing loans, lease receivables and other financial assets.

Securitisation process starts with segregation of loans into relatively homogeneous pools. The pools are formed according to type of credit, maturity pattern, interest rate risk. These asset pools are then transferred to a trustee or an issuer. The issuer issues securities which are sold to prospective investors. The investor is given legal protection in the form of an undertaking that these securities are being placed in the market without recourse to the seller. Each issue of securities has a service responsible for collecting interest and principal payments on the loans in the underlying pool of assets and for transferring funds to investors. The issues are also rated by rating agencies on grounds of structure of issues, underlying pool of assets, expected cash flows, extent of loans protection provided to investors, degree of credit enhancement, etc. The rating normally improves the saleability of an issue.

Advantages of Securitisation

Securitisation is beneficial both to the issuer and to the investor. It provides the issuer or the originator the advantages of off-balance sheet funding as it converts an otherwise illiquid asset into a ready liquid asset. This enables faster recovery of funds which leads to higher business turnover and profitability. Moreover, the funding cost is comparatively less as compared to traditionally fund raising instruments like bonds, debentures or commercial papers.

It offers multiple new investment instruments to the investors to meet their preferences. But the investors will buy only when they are convinced about the risk involved. The unique advantage is that the securitisation enables the end-investor to look past the issuing entity to the collateral pool that the issue represents. Securitisation also benefits the economy as a whole since it improves the capital utilisation in the economy where there are restrictions on lending and recycling of fund.

The technique of securitisation is of recent development in India and so far it has received low response from the investing public. The first securitisation deal in India was made by *Citibank*, *HDFC* and *ICICI* in February, 1991. The other companies which have adopted securitisation technique in India are Ashok Leyland Finance, Tata Finance, SRF Finance and Esanda Finance.

3.2.4 Secured Premium Notes (SPNs) with Detachable Warrants

SPN, which is issued along with a detachable warrant, is redeemable after a notified period, say, 4 to 7 years. The warrants attached to it ensure the holder the right to apply and get allotted equity shares, provided *SPN* is fully paid.

There is a lock-in-period for *SPN* during which no interest will be paid for the invested amount. The *SPN* holder has an option to sell back the *SPN* to the company at par value after the lock-in-period. If the holder exercises this option, no interest/premium will be paid on redemption. In case, the *SPN* holder holds it further, the holder will be repaid the principal amount along with additional amount of interest/premium on redemption in instalments, as decided by the company. The conversion of detachable warrant into equity shares will have to be done within the time limit notified by the company.

3.2.5 Non-convertible Debentures (NCDs) with Detachable Equity Warrants

The holder of *NCD*s with detachable equity warrants is given an option to buy specific number of shares from the company at a pre-determined price within a definite timeframe.

The warrants attached to *NCD*s will be issued subject to full payment of *NCD*s value. There is a specific lock-in-period after which the detachable warrant holders have to exercise their option to apply for equities. If the option to apply for equities is not exercised, the unapplied portion of shares would be disposed of by the company at its liberty.

3.2.6 Zero Coupon Bonds (ZCBs)

Zero Coupon Bonds refer to bonds which are sold at discount from their eventual maturity values and have zero interest rates. In other words, a zero coupon bond does not carry any interest but it is sold by the issuing company at a discount. The difference between the disconnected value and the maturity or face value represents the interest to be earned by the investor on such bond.

*ZCB*s have their origin in the USA. The basic purpose of introducing such bonds in US security market was to facilitate the interested investors to make investment in securities in a smaller denomination. The initiative for such securities was taken by brokers Merril and Lynch. The purchased such bonds in large lots and sold them to individual investors at a slightly higher price in small lots. The difference between the face value of the certificate and its purchase price was gain to the investors. No other interest was payable to the investors. In India, Mahendra and Mahendera Ltd. were the first to take the initiative to issue such Bonds.

3.2.7 Zero Interest Fully Convertible Debentures (FCDs)

The investors in zero interest fully convertible debentures will not be paid any interest. However, there is a notified period after which fully paid *FCD*s will be automatically and compulsorily converted into shares.

There is a lock-in-period up to which no interest will be paid. Conversion is allowed only for fully paid *FCD*s. In the event of company going for rights issue prior to the allotment of equity resulting from the conversion of equity shares into *FCD*s, *FCD* holders shall be offered securities as may be determined by the company. Recently *DCM* Shri Ram Consolidated Ltd. has issued such bonds.

3.2.8 Deep Discount Bonds

These bonds are of the type of Zero Coupon Bonds, explained above. These bonds were first issued by the Industrial Development Bank of India (*IDBI*).

In case of a Deep Discount Bond issued by *IDBI*, each bond has the face value of Rs.1,00,000 issued at a deep discounted price of Rs.2,700. The bond has the maturity period of 25 years from the date of allotment (i.e. March 31, 1992). The investor has the option to withdraw and *IDBI* has the option to redeem the bond only at the end of every five years from the date of allotment. In that event the deemed face value of the bond would be as under:

In case of withdrawal redemption	Deemed Face Value (Rs.)
At the end of 5 years	5,700
At the end of 10 years	12,000
At the end of 15 years	25,000
At the end of 20 years	50,000

In case the investor/*IDBI* does not exercise the option to withdraw/redeem the bond before the maturity period of 25 years, the investor would be entitled to get Rs.1,00,000 on maturity.

3.2.9 Double Option Bonds

These bonds were also firstly issued by the *IDBI*. The face value of each bond is Rs.5,000. The bond carries interest at 15 percent per annum compounded half-yearly from the date of allotment, i.e. 31st March, 1992. The bond has the maturity period of 10 years. Each bond has two parts in the form of two separate certificates, one for the principal of Rs.5,000 and the other for interest (including redemption premium) of Rs.16,500. Both these certificates are listed on all major stock exchanges. The investor has the facility of selling either one or both the parts anytime he likes.

3.2.10 Stock Invest

Stock-invest instrument has been introduced by the Government on the suggestion made by the Securities and Exchange Board of India. It is an additional facility available to an investor for payment of share application money against the shares applied by him. The instrument is essentially a combination of a letter of authority and a guaranteed cheque and as good as cash. The scheme provides for various denominations of stock-invest in order to enable partial encashment.

The investor who has an account or a deposit with the bank issuing the stock-invest will apply for blank stock-invest. The issuing bank will give the stock-invest duly signed and also marking the date to the investor. Simultaneously, the bank will mark a lien on the investor's account to the extent of the stock-invests issued. The investor, while applying for public issues, will enclose the stock-invest forms filling in his part along with the application forms and send them to the collecting bank as he normally does in case of cash/cheques and drafts under existing system.

Under the stock-invest scheme the company while deciding the basis of allotment would consider along with other application, the applications received from the investor who has opted for payment by the instruments called stock-invest.

Terms of issue and payment

The terms of issue and payment of stock-invest are being summarised below:

1. It is issued to an applicant applying for new issues of shares, debentures or bonds.

2. Stock-invest is generally issued in five denominations of Rs.250, Rs.500, Rs.2,500, Rs.5,000 and Rs.10,000. The denomination is mentioned at the top of the stock-invest form. A ceiling of Rs.50,000 per individual per capital issue has been prescribed for issue of stock-invests by banks. However, this limit is not applicable to Mutual Funds.

3. The applicant authorises the payment of the maximum sum payable towards application money for the shares/debentures or bonds applied on the left side of the stock-invest.

4. The payee fills in the actual amount payable on the right side indicating the number of shares, debentures, bonds, for which payment is appropriated. Such amount should be within the overall ceiling for the stock-invest indicated on its top.

5. The payee should fill in the required particulars in the stock-invest and present for payment at any of the branches of the issuing banker. Payment will be made only by credit to the payee's account with their banker.

6. Stock-invest can be issued only to individual investors and mutual funds.

7. No blank stock-invest forms will, however, be issued even to individual investors and mutual funds.

8. The issuing bank will fill in the name of the company in which funds are being invested by the applications before handing over the stock-invests.

9. The stock-invests will be issued only against term deposits and credit balances available in savings or current bank accounts of the applications.

10. Stock-invest is neither transferable nor negotiable.

11. Stock-invest is valid for six months from the date of its issue mentioned on its face.

12. Stock-invest is valid for payment only when signed by the issuing banker at the specified space on its face.

13. The investor's account will be debited by his banker only on allotment of shares to him as intimated by the company concerned.

14. Stock-invests not utilized by the company are returned to the investor who can approach his banker and get the lien lifted on his account by surrendering the stock-invests.

Advantages of stock-invest

Stock-invest is beneficial to all - the investor, banker and the company.

(a) The investor is benefitted because his account with the bank is debited only when the shares are allotted to him. Thus, he does not lose interest on his deposits unnecessarily.

(b) The company is saved from clerical work etc. involved in refund of surplus application money back to the applicant in case of non-allotment or partial allotment of shares. It has simply to return the stock-invest not utilised by it.

(c) The bank charges a nominal service fee for the stock-invest issued by it. This augments its income.

3.2.11 Equity Shares with Detachable Warrants

In this category, along with fully paid equity shares, detachable warrants are issued which will entitle the warrant holder to apply for a specified number of shares at a determined price.

Detachable warrants are separately registered with the stock exchanges and traded separately. The terms and conditions relating to issue of equities against warrants would be determined by the company.

3.2.12 Fully Convertible Cumulative Preference Share (EQUIPREF)

EQUIPREF is a very recent introduction in the market. It has two parts : A and B. Part A is convertible into equity shares automatically and compulsorily on the date of allotment without any further act or application by the allottee and Part B will be redeemed at par/ converted into equity shares after a lock-in-period at the option of the investors.

Conversion into equity shares after the lock-in-period will take place at a price which would be 30 percent lower than the average market price. The average market price shall be the average of the monthly high and low price of the shares in a stock exchange for a period of six months to the date of conversion including the month in which the conversion would take place.

The dividend on fully convertible cumulative preference shares shall be fixed and shall be given only for the portion that represents part B shares. Upon conversion of each part of the *EQUIPREF* shares, the face value of it will stand reduced proportionately and the *EQUIPREF* shares shall be deemed to have been redeemed to the extent of each part on their respective dates of conversion.

3.2.13 Preference Shares with Warrants Attached

Under this instrument, each preference share should carry certain number of warrants entitling the holder to apply for equity shares for cash at 'premium' at any time in one or more stages between the third and fifth year from the date of allotment. If the warrant holder fails to exercise his option, the unsubscribed portion will lapse. The holder of warrants would be entitled to all rights/bonus shares that may be issued by the company. From the date of allotment, the preference shares with warrants attached would not be transferred/sold for a period of three years.

3.2.14 Secured Zero Interest Partly Convertible Debentures (PCDs) with Detachable and Separately Tradeable Warrants

The instrument has two parts: Part *A* is convertible into equity shares at a fixed amount on the date of allotment and Part *B* non-convertible, to be redeemed at part at the end of

a specific period from the date of allotment. Part *B* will carry a detachable and separately tradeable warrant which will provide an option to the warrant-holder to receive equity share for every warrant held at a price as worked out by the company.

3.2.15 Fully Convertible Debentures (FCDs) with Interest (Optional)

This instrument will not yield any interest for a short period, say 6 months. After this period, option is given to the holders of *FCDs* to apply for equities at 'premium' for which no additional amount needs to be payable. This option needs to be indicated in the application form itself. However, interest on *FCD*s is payable at a determined rate from the date of first conversion to second/final conversion and in lieu of it equity shares will be issued at a fixed price after minimum lock-in period.

3.2.16 American Depository Receipt (ADR)

It is a negotiable instrument denominated in U.S. dollars and issued by a depository bank representing ownership in non-U.S. securities representing the underlying ordinary shares. *ADR* enables an American investor to subscribe for the shares of a foreign company offered in his country or through the international market in the form of depository receipt. *ADR*s are considered as domestic securities and hence it makes it possible for many U.S. banks and pension funds portfolios to invest in securities, investment in which is otherwise prohibited for them.

The advantages of *ADR* are almost similar to those of European Deposit Receipt or Global Depository Receipt.

3.2.17 Euro Issues

Indian companies have recently started raising resources through Euro Issues from foreign investors and *NRIS.* In simple words, the term "euro issue" means an issue listed on an european stock exchange. However, subscription can come from any part of the world.

The following are the various instruments through which finance are raised by Indian Companies from foreign investors:

Foreign Currency Convertible Bonds (FCDBs)

These are bonds issued to and subscribed by non-resident investors in foreign currency and are convertible into ordinary shares of the issuing company at a fixed price. They have definite maturity dates. Euro convertible bonds also fall in this category. Euro convertible bonds are convertible bonds listed on European stock exchange such as London or Luxemburg. Essar Gujarat was the first company to issue such bonds in July, 1993. Later on other companies like Reliance, Jindal Strips, *ICICI* and *TISCO* also issued such bonds.

European Deposit Receipts (EDRs)

They are financial instruments in the form of deposit receipts issued to non-resident investors represented by the equity shares of the issuing company. They are marketed only in European countries including the UK. An *EDR* is similar to *GDR* (as discussed below) except with a Irrigation System was the first Indian company to raise finance through *EDRs*. The total amount of issue by this company in February, 1994 was of US $30 million.

Global Depository Receipts (GDRs)

GDR is a dollar denominated instrument tradeable on stock exchange in Europe or the US or both. The modalities of issue of *GDR* can be put as follows:

(i)   The *GDR* represents a certain number of equity shares. For instance in case of Reliance Industries Limited (RIL) one *GDR* represents two equity shares.

(ii)   The *GDR* is quoted and traded in dollar terms but the equity shares are denominated in rupees.

(iii) The shares issued by the issuing company to intermediary called "depository". The equity shares are registered in the name of depository and he is the person who subsequently issues the *GDR* to the investors.

(iv)   The physical possession of the equity shares is with another intermediary called the "custodian" who is an agent of the depository.

(v)   The *GDR* has a distinct identity through it represents the issuing company's shares. In fact, the *GDR* does not appear in the books of the issuing company.

Advantages of GDR: GDR offers the following advantages:

(i)   The issue has the benefit of collecting the issue proceeds in foreign currency which may be utilised for meeting the foreign exchange component of the project cost, repayment of foreign currency/loans etc.

(ii)   The GDR issue does not involve any foreign exchange risk to the issuing company since the shares represented by GDR are expressed in rupees.

(iii) The GDR holder has an option to convert the GDR and become an equity shareholder instead.

(iv)   Marketing of GDR is done by underwriters.

(v)   The GDR does not entitle the holder to any voting rights so there is no fear of loss of management and control.

The Reliance Industries Limited was the first company to raise money through *GDR* in May, 1992. The company collected an amount of US $ 150 million through *GDRs.*

The total issue of *GDR* including *EDRs* by Indian companies amounted to about US $2,000 million by the end of April, 1994.

3.2.18 Floating Rate Bonds (FRBs)

FRBs are instruments which carry no coupon rates but rather linked to specific bench mark rate decided by the issuer. In India, State Bank of India (SBI) was the first institution to introduce such bonds by linking the interest rate of bonds with the maximum bank term deposit rate. The concept is also being applied by financial institutions in respect of long-term loans. The Industrial Development Bank of India (IDBI) has introduced a variable rate system for loans on the basis of "long-term prime lending rate".

The bench mark rate could be interest rate on treasury bills, interest rate on Government securities, rate for certificate of deposits, prime lending rate, term deposit rate, inter-bank interest rate, etc. The selection of bench mark rate by the issuer depends on the following factors:

(i)   Market interest rate,

(ii)   Yield expected by the investor,

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(iii) Period for which the interest is to be paid,

(iv) Term of instrument,

(v) Credit risk,

(vi) Volatility in market interest rate, and

(vii) Cost of funds, etc.

The following are the advantages of having a floating rate bond over a fixed rate bond:

(i) It ensures that neither the borrower nor the lender suffers because of volatility in the interest rate.

(ii) The interest rate is linked to a bench mark rate which is changing. hence, it evens out wild swings in the market rate thereby stabilising annualised yield for the investors.

(iii) It provides a hedge against the changes in the interest rates particularly in a deregulated interest regime. It ensures that the investor/borrower will be able to earn/pay market related interest rate.

(iv) It reflects true picture of the emerging trend in the interest rates. Thus, it provides the correct signal to the borrower as to whether it is the right time to make investments.

3.2.19 Non-voting Right Shares

There has been demand by the trade and industry to make appropriate amendments in the Companies Act to permit companies having good track record to issue non-voting right shares. The recommendations made in this connection can be summarised as follows:

(i) An average investor in India is hardly interested in the management of companies as long as they maintain a god dividend paying record. Such investors are given compensation for giving up their normal voting rights on shares either through a higher dividend rate or offering discount on the issue price.

(ii) In case a company fails to pay dividend for two consecutive years, the non-voting right shareholders may be given the right to exercise their normal voting rights.

(iii) The non-voting right shares should be listed in India and abroad. This will result in substantial inflow of funds to India from *NRIs* and foreigners without having the right to interfere in the management of the Indian companies.

(iv) In the beginning only such companies which are well managed and having good track record can be allowed to issue such shares with the condition that such issue will be made only once and non-voting shares will not exceed 25% of the issued capital.

The matter is still under consideration of the Government and it is hoped that companies would be permitted to issue non-voting right shares by appropriate amendments in the Companies Act in the near future.

The Companies (Amendment) Act, 2000 (effective from Dec. 13, 2000) has amended Section 86 of the Companies Act by providing issue of equity share capital having differential voting rights. However, there cannot be any equity capital without voting rights.

3.2.20 Derivatives

The continuous liberalisation and globalisation of the Indian economy has brought with it a number of opportunities with a host of difficulties also. Liberalisation means volatility

and volatility means risk. A corporate finance manager has been displaced from a cosy regime of administrative prices into a rapidly changing environment where price, interest rates and exchange rates are constantly changing. The risk management in all these areas has become a challenging task for the finance manager.

In normal circumstances, when demand, supply and spot prices are expected to remain unchanged, still there may be uncertainty in the minds of the traders regarding these expectations. Hence, the future price, say, a month later, is bound to be lower than the spot price. As a result, the inventory holders, to protect themselves from price risk fluctuations, will be willing to sell goods or securities in future to speculators at a price lower than the present spot price. The excess of the present spot price over the future selling price is as a matter of fact the premium which the inventory holder has agreed to pay to the speculator for assuming risk.

Check Your Progress

State whether the following statements are true or false:

1. Pledging is a process of keeping accounts receivable as collateral security with the suppliers of funds.

2. The continuous liberalisation and globalisation of the Indian economy has brought with it a number of opportunities with a host of difficulties also.

3. Liberalisation means volatility and volatility means risk.

4. The concept is also being applied by financial institutions in respect of long-term loans.

5. The bench mark rate could be interest rate on treasury bills.

3.3 LET US SUM UP

In India, State Bank of India (SBI) was the first institution to introduce bonds by linking the interest rate of bonds with the maximum bank term deposit rate. The concept is also being applied by financial institutions in respect of long-term loans. The Industrial Development Bank of India (IDBI) has introduced a variable rate system for loans on the basis of "long-term prime lending rate".

The bench mark rate could be interest rate on treasury bills, interest rate on Government securities, rate for certificate of deposits, prime lending rate, term deposit rate, inter-bank interest rate, etc.

In normal circumstances, when demand, supply and spot prices are expected to remain unchanged, still there may be uncertainty in the minds of the traders regarding these expectations. Hence, the future price, say, a month later, is bound to be lower than the spot price. As a result, the inventory holders, to protect themselves from price risk fluctuations, will be willing to sell goods or securities in future to speculators at a price lower than the present spot price. The risk management in all these areas has become a challenging task for the finance manager.

3.4 LESSON END ACTIVITY

Of the innovative instruments available to raise the required capital for a particular firm, make a note of the instruments suitable for short-term capital requirements. And also for long-term requirements.

3.5 KEYWORDS

Commercial Paper: It is a short-term and unsecured promissory note issued by considerably high credit-rating companies to attract funds at a cheaper rate than the bank rates.

Pledging: It is a process of keeping accounts receivable as collateral security with the suppliers of funds.

Factor: It is a party or person or institution who undertakes the risk of collecting book debts of the client company for consideration of an agreed commission.

3.6 QUESTIONS FOR DISCUSSION

1. Write short notes on:
   a) Commercial Finance
   b) Bridge Finance
   c) Zero Coupon Bond
   d) American Depository Receipt
   e) Global Depository Receipt

2. Differentiate between commercial paper and promissory note.

3. Explain the features of new instruments available for companies for raising finances in India.

4. Discuss the role of commercial paper as a source of working capital.

Check Your Progress: Model Answers

1. T, 2. T, 3 T, 4. T, 5. T

3.7 SUGGESTED READINGS

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Sharma, R.K. and Gupta, S.K., *Financial Management*, Kalyani Publishers, New Delhi.

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UNIT II

LESSON

4

INVESTMENT DECISION

CONTENTS

4.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept and nature of investment decisions with proper estimation and evaluation of cash flows.

- Examine the significance of investment decisions.

- Familiarize with the various methods of appraising capital budgeting projects including their relative merits and demerits.

4.1 INTRODUCTION

Estimation of cash flows is the most important aspect of financial management, especially to take proper decision in respect of investment of funds. Successful operation of any business depends upon the investment of resources in such a way as to bring in benefits or cash flow, i.e., best possible returns from any investment. An efficient allocation of capital is the most important finance function in the modern times. It involves decision to commit the firm's funds to the long-term assets. Investment decisions are of considerable importance to the firm since they tend to determine the growth, profitability and risk.

According to the terminology used in financial management the terms "investment decision", "Investment Projects" and "Investment proposals" are generally associated with application of long term resources. What is a "long term"? There is no hard and fast rule to determine it, but by common practice and in accordance with the financing policies, practices and regulations of the financial institutions and banks a period of ten years and above is generally treated as long term. Thus, all proposals or projects involving investment of funds for a period of five years or more will fall in the category of investment proposals.

4.2 CONCEPT OF INVESTMENT DECISIONS

An investment can be defined as expenditure in cash or its equivalent during one or more time periods in anticipation of series of cash or its equivalent in some future time period or periods. The investment decisions of a firm are generally known as the capital budgeting or capital expenditure decisions. A capital budgeting decision may be defined as the firm's decision to invest its current funds most efficiently in the long-term assets in anticipation of an expected flow of benefits over a series of years.

The term investment decisions refers to long-term planning for proposed capital outlays and their financing. Thus, it includes both raising of long-term funds as well as their utilization. It may thus be defined as "the firm's formal process for the acquisition and investment of capital." It is the decision making process by which the firms evaluate the purchase of major fixed assets. It involves firms decision to invest its current funds for addition, disposition, modification and replacement of long-term or fixed assets. However, it should be noted that investment in current assets necessitated on account of investment in a fixed asset, is also to be taken as a capital budgeting or investment decision.

Investment decision is a many sided activity. It includes searching for new and more profitable investment proposals investigating engineering and marketing considerations to predict the consequences of accepting the investment and making economic analysis to determine the profit potential of each investment proposal. Its basic features can be summarised as follows:

i)   It has the potentiality of making large anticipated profits.

ii)   It involves a high degree of risk.

iii) It involves a relatively long-term period between the initial outlay and the anticipated return.

4.3 NATURE OF INVESTMENT DECISIONS

The firms investment decisions would generally include expansion, acquisition, modernisation and replacement of the long-term assets. Sale of a division or business (divestment) is also as an investment decision. Decisions like the change in the methods of sale distributions, or an advertisement campaign or a research and development programme have long-term implications for the firm's expenditures and benefits and therefore they should also be evaluated as investment decisions. It is important to note that investment in the long-term assets invariably requires large funds to be tied up in the current assets such as inventories and receivables. As such, investment in fixed and current assets is one single activity.

The following three are the basic features of investment decisions:

i)   The exchange of current funds for future benefits.

ii) The funds are invested in long-term assets.

iii) The future benefits will occur to the firm over a series of years.

Check Your Progress 1

Define the term investment decision.

....

....

4.4 SIGNIFICANCE OF INVESTMENT DECISIONS

Investment decisions are among the most crucial and critical business decisions. Special care should be taken in making these decisions on account of the following reasons:

1.   A firm's decision to invest in long-term assets has a decisive influence on the rate and direction of its growth. A wrong decision can prove disastrous for the continued survival of the firm. Unwanted or unprofitable expansion of assets will result in heavy operating costs to the firm. On the other hand, inadequate investment in assets would make it difficult for the firm to compete successfully and maintain its market share.

2.   A long-term commitment of funds may also change the risk complexity of the firm. If the adoption of an investment increases average gain but causes frequent fluctuations in its earnings, the firm will become more risky. Thus, investment decisions shape the basic character of a firm.

3.   Investment decisions generally involve large amount of funds, which make it imperative for the firm to plan its investment programmes very carefully and make an advance arrangements for procuring finances internally or externally.

4.   Most investment decisions are irreversible. It is difficult to find a market for such capital items once they have been acquired. The firm will incur heavy losses if such assets are scrapped.

5. Investment decisions are among the firm's most difficult decisions. They are an assessment of future events, which are difficult to predict. It is really a complex problem to correctly estimate the future cash flows of an investment. Economic, Political, Social and technological forces cause the uncertainty in cash flow estimation.

4.5 TYPES OF INVESTMENT DECISIONS

There are many ways to classify investments. They may grouped in the following two categories:

I. *Change of Business Criteria:*

 1. Expansion and diversification of existing business.

 2. Expansion of new business.

 3. Replacement and modernization.

II. *Nature of Investment Criteria:*

 1. Mutually exclusive investments.

 2. Independent investments.

 3. Contingent investments.

Expansion and Diversification: A company may add capacity to its existing product lines to expand existing operations. For example, the Nagarjuna Fertilizers Company may increase its plant capacity to manufacture more urea. This type of expansion is a related diversification of existing business.

Expansion of new business: A firm may expand its activities in a new business. Expansion of a new business requires investment in new products and a new kind of production activity within the firm. If a packaging manufacturing company invests in a new plant and machinery to produce ball bearings, which the firm has not manufactured before, this represents expansion of new business or unrelated diversification. Sometimes a company acquires existing firms to expand its business.

In either case, the firm makes investment in the expectation of additional revenue. Investments in existing or new products may also be called as revenue expansion investments.

Replacement and Modernization: The main objective of replacement and modernization is to improve operating efficiency and reduce costs. Cost reduction will reflect in the increased profits, but the firms revenue may remain unchanged. Assets become outdated and obsolete with technological changes.

The firm must decide to replace those assets with new assets that operate more economically. Replacement decisions help to introduce more efficient and economical assets and therefore, are also called "cost reduction investments". However, replacement decisions that involve substantial modernization and technological improvements expand revenues as well as reduce costs.

Mutually exclusive investments: Mutually exclusive investments serve the same purpose and compete with each other. If one investment is undertaken, others will have to be excluded. A company may, for example, either use a more labour-intensive, semi-automatic machine, or employ a more capital-intensive, highly automatic machine for production. Choosing the semi-automatic machine precludes the acceptance of the highly automatic machine.

Independent investments: Independent investments serve different purposes and do not compete with each other. For example, a heavy engineering company may be considering expansion of its plant capacity to manufacture additional excavators and addition of new production facilities to manufacture a new product – light commercial vehicles. Depending on their profitability and availability of funds, the company can undertake both investments.

Contingent investments: Contingent investments are dependent projects; the choice of one investment necessitates undertaking one or more other investments. For example, if a company decides to build a factory in a remote and backward area, it may have to invest in houses, roads, hospitals, schools etc. for employees to attract the work forces. Thus building of factory also requires investment in facilities for employees. The total expenditure will be treated as one single investment.

4.6 FACTORS AFFECTING INVESTMENT DECISIONS

The following are the important factors, which are generally taken into account while making a capital investment decision:

1. ***The amount of investment:*** If a firm has unlimited funds for investment it can accept all capital investment proposals which give a rate of return higher than the minimum acceptable or cut-off rate. However, most firms have limited funds and therefore capital rationing has to be imposed. In such an event a firm can take only such project or projects which are within its means.

2. ***Minimum rate of return on investment:*** The management expects a minimum rate of return on the capital investment. The minimum rate of return is usually decided on the basis of the cost of capital. For example, if the cost of capital is 10%, the management will not like to accept a proposal, which yields a rate of return less than 10%. The project giving a yield below the desired rate of return will, therefore, be rejected.

3. ***Return expected from the investment:*** Capital investment decisions are made in anticipation of increased return in the future. Therefore, it is necessary to estimate the future return or benefits accruing from the investment proposals. There are two criteria available for quantifying benefits from capital investments decisions. They are (i) accounting profit and (ii) cash flows. The term accounting profit is identical with income concept used in accounting while in estimating cash flows, depreciation charges and other amortisation charges of fixed assets are not subtracted from gross revenue, because no cash expenditure is involved.

4. ***Ranking of the investment proposals:*** When a number of projects appear to be acceptable on the basis of their profitability the projects will be ranked in order of the profitability with a view to determine the most profitable project. The objective of ranking is to put the capital available to the best possible use. Ranking of capital investment proposals is particularly necessary in the following two circumstances:

    i) Where capital is limited for investment

    ii) Where two or more investment opportunities are mutually exclusively.

5. ***Risk and Uncertainty:*** Different capital investment proposals have different degrees of risk and uncertainty. There is a slight difference between risk and uncertainty. Risk involves situations in which the probabilities of a particular event occurring are known, whereas in uncertainty these probabilities are unknown. Of course in most cases these two terms are used interchangeably. Risk in capital investment decisions may be due to general economic conditions, competitions, technological

developments, consumer preferences, labour condition, etc. On account of these reasons the revenues, costs and economic life a particular investment are not certain. While evaluating capital investment proposals, a proper adjustment should therefore be made far risk and uncertainty.

4.7 EVALUATION TECHNIQUES

An evaluation or appraisal of any investment proposal is necessary to ensure that the investment of resources will bring in desired benefits in future. If the financial resources were in abundance, it would be possible to accept several investment proposals which satisfy the norms of approval or acceptability. Since resources are limited, a choice has to be made among the various investment proposals by evaluating their comparative merit. This would facilitate the identification of relatively superior proposals keeping in mind the limited available resources. In view of the significance of capital budging decisions, it is absolutely necessary that the method adopted for evaluation or appraisal of capital investment proposals is a sound one. It is apparent that the techniques followed to evaluate or appraise the investment proposals must be sound one. It is apparent that some techniques should be followed for making evaluate or appraisal of investment proposals.

The investment proposals will involve large amount of funds, greater amount of risk on account of unforeseen situations and often means irreversibility once the investment decision is made. In view of these the task of appraising investment proposals is very important in financial management.

The investment decision rules may be referred to as capital budgeting techniques, or investment criteria. A sound appraisal technique should be used to measure the economic worth of an investment project. The essential property of a sound technique is that it should maximize the shareholder's wealth. The following other characteristics should also be taken into consideration by a sound investment evaluation criterion.

1. It should consider all cash flows to determine the true profitability of the project.

2. It should provide for an objective and unambiguous way of separating good projects from bad projects.

3. It should help ranking of projects according to their true profitability.

4. It should recognize the fact that bigger cash flows are preferable to smaller ones and early cash flows are preferable to later ones.

5. It should help to choose among mutually exclusive projects that project which maximizes the shareholders' wealth.

6. It should be a criterion which is applicable to any conceivable investment project independent of others.

Therefore, in selecting a particular method, the above factors should be kept in mind. However, in current business world, apart from the analysis in terms of economic benefits and costs, the investment decision is likely to be influenced by many other factors such as legal, political and social pressures. Sometimes it so happens that these decisions are taken, not with standing their economic desirability.

4.7.1 Types of Investment Evaluation or Appraisal Techniques

There are several methods for evaluating and ranking the capital investment proposals. In case of all these methods the main emphasis is on the return which will be derived on the capital invested in the project. In other wards, the basic approach is to compare the investment in the project with the benefits derived therefrom. The main techniques

generally used to evaluate the investment proposals are grouped in the following two categories:

I. **_Traditional or Non-Discounted Cash Flow Techniques:_**
    1. Pay-Back Period (PBP) Method.
    2. Average or Accounting Rate of Return (ARR) Method.

II. **_Modern or Discounted Cash Flow or Time adjusted Techniques:_**
    1. Net Present Value (NPV) Method.
    2. Profitability Index (PI) Method.
    3. Internal Rate of Return (IRR) Method.

The traditional or non-discounted cash flow techniques have been explained in detail in this lesson.

4.8 ESTIMATION OF CASH FLOWS

The methods of payback period and Accounting Rate of Return covered under this category are so called, because these have been widely used for the last several years and these do not recognise the time value of money. These methods depend upon the accounting information available from the books of accounts of the Company.

Now, let us discuss the essence, relative merits and demerits associated with the traditional techniques, and their accept or reject rule.

4.8.1 Pay Back Period Method

The term pay back or pay – out period in which the project will generate the necessary cash to recoup the initial investment. Thus, the pay back period is the number of years it takes a firm to recover its original investment from net cash flows. James C. Van Horne defined the pay back period as "the number of years required to recover initial cash investment. It is the ratio of the initial fixed investment to the annual cash flow.

There are two alternative methods of calculating pay back period:

1. When the cash flow is uniform for each year during the useful life of the project, and

2. When the cash flows are not equal but vary from year to year.

$$\text{Pay Back Period} = \frac{\text{Initial Investment}}{\text{Annual CashInflow}} = \frac{20,000}{5,000} = 4 \text{ years}$$

1. **_When cash flows are uniform,_** the following formula is useful to find out pay back period.

$$\text{Pay Back Period} = \frac{\text{Initial Cash Outlay}}{\text{Constant Annual Cash Flows}} = \frac{C_0}{C_1}$$

2. **_When Cash inflows are not uniform or uneven:_** In the above example, we have presumed that the annual cash inflows are uniform. However, it may not always be so. The cash flows in each year may be different. In such a case cumulative cash inflows will be calculated and by interpolation, the exact pay-back period can be calculated.

$$\text{Pay Back Period} = \frac{\text{Initial Investment}}{\text{Annual CashInflow}}$$

Illustration 1:

If a project requires Rs.20,000 as initial investment and it will generate an annual cash inflows of Rs. 5,000 for ten years, the pay back period will be 4 years, which is calculated as follows:

$$\text{Pay Back Period} = \frac{\text{Initial Investment}}{\text{Annual CashInflow}} = \frac{20,000}{5,000} = 4\,\text{years}$$

Illustration 2:

If the project requires an initial investment of Rs.20,000 and the annual cash inflows for 5 years are Rs.6,000, Rs.8,000, Rs.5,000, Rs.4,000 and Rs.4,000 respectively, the pay back period will be calculated as follows:

Year	Cash in flows (Rs.)	Cumulative cash in flows (Rs.)
1	6,000	6,000
2	8,000	14,000
3	5,000	19,000
4	4,000	23,000
5	4,000	27,000

The above table shows that in three years Rs.19,000 has been recovered. Rs.1,000 is left out of initial investment. In the fourth year the cash inflows is Rs.4,000/- It means the payback period is 3 years and fraction of 4th year, which is calculated as follows;

Pay back period   =   3 years + 1000 / 4000

                       =   3 years + 0.25

                       =   3.25 Years.

Accept or Reject Criterion: The pay back period can be used as a criterion to accept or reject an investment proposal. A project whose actual pay back period is more than what has been pre-determined by the management will be straightaway rejected, otherwise it would be accepted. The pre-determined payback period is generally fixed by taking into account the reciprocal of the cost of capital. In case of mutually exclusive projects, the projects with shorter pay back period will be given top ranks and accordingly selected.

Merits and Demerits of Payback period Method: The pay-back period method has certain merits and demerits.

1. The most important merit of pay-back period is that it is easy to calculate and simple to understand.

2. It costs less than most of the sophisticated techniques in terms of analysts time and use of computers.

3. It is a rough and ready method for dealing with risk. It favours projects which generated substantial cash inflows in earlier years.

4. Since it emphasizes earlier cash inflows, it may be a sensible criterion when the firm is pressed with problems of heredity.

5. It can be computed on the basis of accounting information available from the books.

Demerits: The pay-back period method suffers from the following demerits or limitations;

1. It fails to consider the time value of money. Thus it violates most basic principle of financial analysis.

2. A major short coming of the method is that it completely ignores all cash inflows after pay back period.

3.   It is a measure of projects capital recovery, not profitability.

4.   Though it measures a project's liquidity, it does not indicate the liquidity position of the firm as a whole.

5.   This method is not consistent with the objective of maximising the market value of share.

Despite all the above demerits or limitations, the pay back period method is very popular in practice.

Discounted Pay-Back period Method: One of the serious objections to the payback period method is that not considering the magnitude and timing of cash inflows, it means does not discount the cash flows for calculating the payback period. Hence, the payback period has been modified into discounted payback period. Under the discounted payback period the number of periods taken in recovering the investment outlay on the present value basis. However, the discounted payback period still fails to consider the cash flows occurring after the payback period. The discounted payback period calculated has been explained in the following example;

Illustration 3:

The cost of project is Rs.6,00,000 useful life of the project is 5 years and estimated annual cash inflows during the life period is Rs.2,00,000 and is estimated cut off rate is 10%. The discounted payback period is calculated based on the present value of cash inflows at 10 percent value factor as follows.

Year	Cash inflow Rs.	Present value factor at 10% discount	Present value of cash inflows Rs.	Cumulative present value of cash inflows Rs.
1	2,00,000	0.909	1,81,800	1,81,800
2.	2,00,000	0.826	1,65,200	3,47,000
3.	2,00,000	0.751	1,50,200	4,97,200
4.	2,00,000	0.683	1,36,600	6,33,800
5.	2,00,000	0.621	1,24,200	7,58,000

The above table shows that the cumulative present value of cash inflows at the end of the 3rd year is Rs.4,97,200 and Rs.1,02,800 is left out of initial investment. In the 4 year the cash inflow is Rs.1,36,600. It means the discounted pay back period is between three to four years. The exact discounted pay back period is calculated as follows.

Discounted pay-back period =   3 years + 102800 / 1,36,600

                             =   3 Years + 0.75

                             =   3.75 years

4.8.2 Average or Accounting Rate of Return (ARR) Method

The average or accounting rate of Return method is also known as Return on Investment (ROI) Method. The rate of return is calculated on the basis of average profits of the proposal. Thus, it is called as Average Rate of Return. The rate of return is calculated by using the accounting information as revealed by financial statements so it is called as Accounting Rate of Return. Similarly, the rate of return is calculated on the basis of profitability or return on investment, hence, it is called as Return on Investment. However it is popularly known as Average Rate of Return.

The average rate of return is the ratio of the average after tax profit divided by the average investment. The average investment would be equal to half of the original investment if it were depreciated constantly. Alternatively, it can be found out by dividing

the total of the investment's book values after depreciation by the life of the project. Thus, the average rate of return is calculated as follows;

$$ARR = \frac{\text{Average Annual Profits After Taxes}}{\text{Average Investment}} \times 100$$

Average investments = ½ (Initial investment – Scrap value) +

Scrap value + Additional networking capital.

Illustration 4:

A project will cost Rs. 40,000. Its stream of earnings before depreciation, interest and taxes (EBDIT) during first year through five years is expected to be Rs.10,000, Rs. 12,000, Rs.14,000, Rs.16,000 and Rs.20,000. Assume a 50% tax rate and depreciation on straight-line basis. The Average rate of Return is calculated as follows;

Year	EBDIT Rs.	Depreciation Rs.	EBIT	Taxes 50%	EAT
1	10,000	8,000	2,000	1,000	1,000
2.	12,000	8,000	4,000	2,000	2,000
3.	14,000	8,000	6,000	3,000	3,000
4.	16,000	8,000	8,000	4,000	4,000
5.	20,000	8,000	12,000	6,000	6,000
					16,000

Under straight line method the annual depreciation = 40,000 / 5 Years.

Average annual profits after taxes = 16,000 / 5 years = 3,200

Average investment = ½ (Initial investment-Scrap value) + Scrap value +

Additional net working capital

= ½ (40,000 – 0) + 0 + 0

= 20,000

$$ARR = \frac{\text{Average Annual Profits After Taxes}}{\text{Average Investment}} \times 100$$

$$= \frac{3,200}{20,000} \times 100$$

$$= 16\%$$

Accept or Reject Criterion: As an accept or reject criterion, this method will help to accept all those projects whose ARR is higher than the minimum rate established by the management and reject those projects which have ARR less than the minimum rate. This method would rank a project as number one if it has highest ARR and lowest rank would be assigned to the project with lowest ARR.

Merits and Demerits of ARR: The ARR method has certain merits and demerits, which are to be discussed as follows:

Merits: The ARR method has the following merits.

1) It is very simple to use and calculate.

2) It is based on accounting information, which is really available and familiar to the business.

3) It considers benefits over the entire life of the projects.

Demerits: The ARR method suffers from the following demerits or limitations:

1) It is based upon accounting profit and net cash flows only.

2) It does not take into account the time value of money.

3) It ignores the fact that the profits are reinvested.

4) The ARR measure is somewhat internally inconsistent, while the enumerator of this measure represents profits belonging to equity and preference shareholders, its denominator represents fixed investments which also includes long-term debt.

On account of the above disadvantages, the ARR method is not much in use these days.

4.8.3 Discounted Cash Flow Techniques

The discounted cash flow technique is also known as time adjusted technique. This technique is an improvement on the pay-back period Method. It takes in to account both the interest factor as well as the return. This concept is based on the premise of the 'time value of money'. It explains that the today's value of a rupee is more than that of a rupee to received after a year. It is the time preference for the money. The future income, therefore, has to discounted in order to compare with the current outflow of funds in the investment.

The discounted cash flow technique involves three stages:

i) Calculation of cash flows, i.e., both inflows and outflows after tax over the useful life of the asset.

ii) Discounting the cash flows so calculated by a discounted factor which will be required rate of return or cost of capital rate.

iii) Aggregating discounted cash inflows and comparing the total with the discounted cash out flows.

Discounted cash flow technique thus recognizes that Rupee 1 of today is worth more than Rupee 1 received at a future date.

Types of Discounted Cash flow techniques

Discounted cash flow techniques for evaluating capital investment proposals are of the following three types;

1. Net Present Value (NPV) Method

2. Profitability Index (PI) Method

3. Internal Rate of Return (IRR) Method

Now, let us discuss these techniques with regard to their relative merits and demerits and their accept or reject rule, etc.

1. *Net Present Value (NPV) Method:* The net present value is considered to be the best and classic economic method of evaluating the investment proposals. It is a discounted cash flow technique that explicitly recognises the time value of money. It correctly postulates that cash flows arising at different time periods differ in value and are comparable only when their equivalent present values are found out.

The following steps are involved in the calculation of NPV.

1. Cash flows of the investment project should be forecasted based on realistic assumptions.

2. Appropriate discounted rate should be identified to discount the forecasted cash flows. The appropriate discount factor is the project's opportunity cost of capital, which is equal to the required rate of return expected by investors on investments of equivalent risk.

3. Present value of cash flows should be calculated using the opportunity of capital as the discount rate.

4. Net present value should be found out by subtracting present value of cash outflows from present value of cash inflows. It can be expressed as follows:

NPV = Total of PV Of cash inflows – Initial outlay.

Accept or Reject Criterion: The net present value can be used as an 'accept or reject' criterion. In the case the NPV is positive i.e., present value of cash inflows is more than present value of cash outflows, the project should be accepted. However, if the NPV Is negative i.e., present value of cash inflows is less than the present value of cash outflows, the project should be rejected. Symbolically, the accept or reject criterion can be put as follows;

Where; NPV > Zero accept the proposal

NPV < zero reject the proposal

Or

PV > C Accept the proposal.

PV < C Reject the proposal

C = Present value of cash outflows or initial outlay.

Illustration 5:

A firm is considering two projects A and B. Each project requires an investment of Rs.10,000. The firms cost of capital is 10%. The net cash flows (net operating income after takes plus depreciation) from the projects A and B are as shown below.

Year	Project A	Project B
	Rs.	Rs.
1	5,000	500
2	4,000	1,000
3	3,000	2,000
4	2,000	3,000
5	1,000	4,000
6	500	5,000

Solution: As CFAT is given in the problem, we need not again calculate it. If cash flows before tax (CFBT) is given CFAT of each year is to be worked out as follows:

CFAT = CFBT – Depreciation – Tax + Depreciation.

Calculation Project-A NPV

Year	CFAT Rs.	PV Factor at 10%	Total PV of CFAT
1	5,000	0.909	4,545
2	4,000	0.826	3,304
3	3,000	0.751	2,253
4	2,000	0.683	1,366
5	1,000	0.621	621
6	500	0.564	282
			12,371

NPV = Total of PV of CFAT – Initial outlay

= 12,371 – 10,000

= 2,371

Calculation of Project B NPV:

Year	CFAT Rs.	PV Factor at 10%	Total PV of CFAT
1	500	0.909	454.50
2	1,000	0.826	826.00
3	2,000	0.751	1,502.00
4	3,000	0.683	2,049.00
5	4,000	0.621	2,732.00
6	5,000	0.564	2,820.00
			10,383.50

NPV = Total of PV of CFAT – Initial outlay

= 10,383.50 – 10,000

= 383.50

Interpretation: When the firm takes on a project with a higher NPV, the value of the firm increases, by the amount of the NPV. Therefore, in the above example, if project A and B are mutually exclusive involving the some cash outflows, project A with NPV of Rs.2,371 is preferred to Project B with only Rs.383.50 as its NPV. If these two are independent projects A will be ranked I, followed by B as both of them have the positive NPV. However, it is difficult to decide one between two mutually exclusive projects when they involve different amount of cash flows.

Merits and Demerits of NPV Method: The net present value method has certain merits and demerits;

Merits: The NPV method has the following merits:

1) The most significant merit is that it explicitly recognises the time value of money.

2) It considers the cash flow stream in its entirety.

3) It is consistent with the objective of maximization of wealth.

4) The ranking of projects is independent of the discount rate used for determining the present values.

5) This method is particularly useful for the selection of mutually exclusive projects.

Demerits: The NPV method suffers from the following demerits or limitations:

1) It is difficult to calculate and understand.

2) The NPV is calculated by using the cost of capital as a discount rate, which again is a difficult concept.

3) It does not give satisfactory results when mutually exclusive projects involving different cash out flows are considered.

4) It is not that effective to decide a project, when the firm has limited funds or when projects have different unequal lives.

2. *Profitability Index (PI) Method:* The profitability index method is also known as Excess Present Value Index or Benefit-Cost (B/C) ratio or desirability factor. It is also a time-adjusted method of evaluating the investment proposals. It indicates the relationship between present value of cash inflows and the present value of cash outflows. Thus, it is defined as "the ratio, which is obtained by dividing the present value of future cash inflows, by the present value of cash outflows." It can be calculated as follows:

$$\text{Profitability Index (PI)} = \frac{\text{Total PV of cash in flows}}{\text{Initial cash outlay}}$$

Accept or Reject Criterion: Under this method, all projects with PI exceeding 1 should be accepted. Projects with less than 1 PI should be rejected. When PI equals 1: the firm is indifferent to the project. Mathematically, it can be expressed as follows:

PI > 1	Accept the project
PI < 1	Reject the Project
PI = 0	Indifferent

Ranking of the project can also be done under this method by giving top rank to the projects with highest PI.

Illustration 6:

Assuming everything same as in Illustration 5 calculate Profitability Index. of two projects A and B.

Project A;

$$\text{Profitability Index (PI)} = \frac{\text{Total of PV of CFAT}}{\text{Initial cash outlay}} = \frac{12,371}{10,000} = 1.24$$

Project B;

$$\text{Profitability Index (PI)} = \frac{\text{Total of PV of CFAT}}{\text{Initial cash outlay}} = \frac{10,383.50}{10,000} = 1.04$$

Interpretation: In the above example, if only one project is to be selected, Project-A with highest PI (1.24) will be selected and B with least PI (1.04) will be rejected. If these are independent projects, A will be ranked first followed by B. Thus, PI and NPV give the same results.

Evaluation of PI: Conceptually, the PI method is a sound technique, satisfying almost all the requirements of a sound investment criterion such as considering time value of money, totality of benefits etc. In fact, as already mentioned, the PI is superior to the NPV as this evaluates the worth of the projects in terms of their relative rather than absolute magnitudes. However, PI is more difficult to understand. It involves more calculations than the traditional methods and NPV.

3. *Internal Rate of Return (IRR) Method:* The IRR method is another important method among the discounted cash flow techniques. This is also called as yield on investment, marginal efficiency of capital, marginal productivity of capital, rate of return etc. It is defined as "that rate which equals the aggregate present value of net cash inflows (CFAT) with the aggregate present value of cash outflows of a project." In other words, it is the rate which gives the NPV of the project equivalent to zero. It is called IRR because it depends solely on the cash outflows and cash inflows associated with the investment and not on any rate determined outside the investment.

The internal rate of return can be determined with the help of present value tables. For this purpose the following steps are to be required;

1) Determine the future net cash flows during the entire economic life of the project. The cash inflows are estimated for future profits before depreciation but after taxes.

2) Determine the rate of discount at which the value of cash inflows is equal to the present value of cash outflows. This may be determined as explained after step 4.

3) Accept the proposal if the internal rate of return is higher than or equal to the minimum required rate of return; i.e., the cost of capital or cutoff rate and reject the proposal if the internal rate of return is lower than the cost of cut-off rate.

4) In case of alternative proposals select the proposal with the highest rate of return as long as the rates are higher than the cost of capital or cut off rate.

Determination of IRR: There are two alternative methods of calculating IRR:

1) When the annual net cash flows are equal over the life of the asset.

2) When the annual cash flows are unequal over the life of the asset.

1. *When the annual net cash flows are equal over the life of the asset,* firstly, find out present value factor by dividing initial outlay by annual cash flow, i.e.,

$$\text{Present value Factor} = \frac{\text{Initial outlay}}{\text{Annual constant cash inflow}}$$

Then consult present value annuity tables with the number of years equal to the life of the asset and find out the rate at which the calculated present value factor is equal to the present value given in the table.

Illustration 7:

Initial outlay	Rs. 50,000
Life of the asset	5 years
Estimated Annual cash flow	Rs. 12,500

Solution:

$$\text{Present value Factor} = \frac{\text{Initial outlay}}{\text{Annual constant cash flow}} = \frac{50,000}{12,500} = 4$$

Consulting present value Annuity tables for 5 years periods at present value factor of 4, the IRR = 8% approx.

Note: As we see from the table that at 8% for 5 years period, the present value is 3.9927 which is nearly equal to 4.

2. *In case of annual cash flows are unequal over the life of the asset*, the IRR cannot be determined according to the technique suggested above. In such case, the IRR is calculated by trial and error method. In this process, we may start with any assumed discount rate and find out the total present value of cash outflows. The rate, at which the total present value of all cash inflows equals the initial outlay, is the IRR. Otherwise, several discount rates may have to be tried until the appropriate rate is found. In this process, after applying the first trial rate the second trial rate is determined when the total present value of the cash inflows is greater or less than the total present value of cash inflows is less than the total present value of cash outflows, the second trial rate taken will be lower than the first rate. In case the present total value of cash inflows, exceeds the present value of cash outflows, a trial rate higher than first trial rate will be used. After calculating higher and lower rates, we can say the IRR is between such rates. However, the exact IRR can be calculated as follows:

$$\text{IRR} = \text{LRD} + \frac{\text{NPVL}}{\text{PV}} \times R$$

Where,

IRR	=	Internal Rate of Return
LRD	=	Lower Rate of Discount
NPVL	=	Net present value at Lower rate of discount (i.e., difference between present values of cash inflows at lower discount and present value of cash outflows
PV	=	The difference between the present values at lower and higher discount rates.
R	=	The difference between the two rates of discount.

Accept or Reject Criterion: IRR is the maximum rate of interest which an organization can afford to pay on the capital invested in a project. A project would qualify to be accepted if IRR exceeds the cut-off rate. While evaluating two or more projects, a project giving a higher IRR would be preferred. This is because the higher the rate of return, the more profitable is the investment.

Illustration 8:

A project costs Rs.50,000 and is expected to generate cash inflows (CFAT) of Rs.25,000, Rs. 20,000, 15,000 and Rs.10,000 at the end of each year for next 4 years. Compute IRR of the proposed project:

(a)   When cash inflows are not equal.

(b)   When cash inflows are constant

Solution:

(a)   *When Cash inflows are not equal*

Since we do not know the predetermined rate, let us arbitrarily, take 20% as discount rate. The project's NPV at 20% can be calculated as follows:

Year	Cash inflows Rs.	PV Factor Rs.	Total Present value Rs.
1	25,000	0.833	20,825
2	20,000	0.694	13,880
3	15,000	0.579	8,685
4	10,000	0.482	4,820
		PVCFAT	48,210
		Less: Cash outflow	50,000
			(-) 1,790

A negative NPV of Rs.1,790 at 20% indicates that the projects true rate of return is lower than 20%. Therefore, Let us try with 16% discount rate.

The project's NPV at 16% can be calculated as following:

Year	Cash inflows Rs.	PV Factor Rs.	Total Present value Rs.
1	25,000	0.862	21,550
2	20,000	0.743	14,860
3	15,000	0.641	9,615
4	10,000	0.552	5,520
		PVCFAT	51,545
		Less: Cash outflow	50,000
			+ 1,545

$$\text{IRR} = 16\% + \frac{(51,545 - 50,000)}{51,545 - 48210} \times (20\% - 16\%)$$

$$= 16\% + \frac{1,545}{3,335} \times 4\%$$

NPV = - Rs.50,000 + Rs.20,000 (PV CFAT$_6$)

$$= 16\% + 1.853\%$$

$$= \quad 17.853\%$$

With 16% discount rate the PV of cash flows (NPV) is positive. Therefore, a lower rate should be applied. Once, the lower and upper rates are known, we can say that IRR should be between these two. We work out a close approximation of the rate of return by applying the interpolation formula.

(b) *When cash inflows are constant*

Let us assume that the project will generate an annual cash inflows of Rs.20,000 for 4 years.

$$\text{Pay back period} = \frac{50,000}{20,000} \times 2.5\%$$

The rate which gives a PVCFAT of 2.5 for 4 years is the project's IRR. Referring to present value annuity table across 4 years row, we find 2.500 between 24% and 20% (2.404 and 2.589). By applying interpolation formula we can find out the actual IRR.

$$\text{IRR} = \text{LRD} + \frac{\text{NPVL}}{\text{PV}} \times \text{R}$$

$$= \quad 20\% + \frac{2.589 - 2.500}{2.589 - 2.404} \times 4\%$$

$$= \quad 20\% + \frac{0.089}{0.185} \times 4\%$$

$$= \quad 20\% + 1.92\%$$

$$= \quad 21.92\%$$

Merits and Demerits of IRR:

Merits: As a popular DCF technique, the IRR has several virtues. They include:

1. It takes into account the time value of money.

2. It considers the cashflow stream in its entirety.

3. It always suggest to accept the maximum rate of return on the project.

4. It is conformity with the firm's objective of maximising owner's welfare.

5. It has psychological appeal to the users.

Demerits: The IRR method has the following limitations:

1. It is very difficult to use and understand.

2. It involves a very complicated computational work.

3. It may not be uniquely defined. If the cash flow stream of a project has more than one change sign, there is a possibility that there are multiple rates of return.

4. The IRR figure cannot distinguish between lending and borrowing and hence a high IRR Need necessarily be a desirable feature.

5. The IRR can be misleading one while choosing between mutually exclusives projects that have substantially different outlays.

4.8.4 Differences between NPV and IRR

The two methods-NPV and IRR give consistent results in terms of acceptance or rejection of project in certain situations. If a project is sound, it will be accepted by both the methods and when the project does not qualify for acceptance both the methods will reject it. But it is to be remembered the giving concurrent decision is possible only in case of conventional and independent projects.

But under certain conditions, the NPV and IRR methods can rank projects differently and if mutually exclusive projects are involved or if capital is limited, then rankings can be important. The conditions under which different rankings can occur are as follows:

1.   Size-disparity problem, when the cost of one project is larger than that of the other.

2.   Time-disparity problem when the timing of the prospective cash flows differ.

3.   When the projects have unequal expected lives.

In practice, firms often calculate both the NPV and the IRR, but they rely on the NPV where conflicts arise among mutually exclusive projects. Because, in consonance with the objective of wealth maximization the project with higher NPV will contribute more to the firm's value.

Check Your Progress 2

State whether the following statements are true or false:

1.   Finance manager is not concerned with the financial and investment decisions.

2.   Financing decisions do not relate to determination of the amount of long-term finance.

3.   The investment decisions, also popularly termed as capital budgeting decisions, require comparison of cost against benefits over a long period.

4.   The pay back is not an estimation of how long it will take to recoup the original investment from the flow of cash earning produced by the project.

5.   The pay back provides many measures of profitability.

4.9 CAPITAL RATIONING

According to Weston and Brigham capital rationing is "a situation where constraint is placed on the total size of the funds invested during a particular period". As per the accept or reject criterion, in case of various traditional and DCF methods already discussed, all the projects can be accepted whose contribution to the firm's objective of wealth maximization is positive. But under the situation of capital rationing where the firm suffers from shortage of funds, it may not take up all the projects. It will take up the project selectively ranking all the acceptable projects in the descending order. Thus, firms will occasionally set an absolute hit on the size of its capital budgeting.

4.9.1 Factor Influencing Capital Rationing

The following factors are responsible for capital rationing:

1.   Firms may be reluctant to engage in external financing due to fear of dilution in control or risk.

2.   It may be difficult to raise funds externally.

3.   The firm may not be generating adequate funds for its expansion.

4.   Some firms may resort to capital rationing under the impression that the additional capital may increase the cost of capital.

Selection of Projects under Capital Rationing

Under the conditions of capital rationing, the firm has to rank the proposals on the basis of capital budgeting techniques and finally select the proposals within the available funds. The following are involved in selecting the projects under capital rationing:

1. We should rank the projects according to IRR or profitability index, or NPV in descending order.

2. We should select the project in the same order i.e., projects with highest return first and so on, till the available funds are exhausted.

However, no project with a negative NPV or IRR below the cost of capital should be undertaken.

Comprehensive Illustrations

Problem 1

A project requires an outlay of Rs.50,000 and yields an annual cash inflow of Rs.12,500 for 7 years. Calculate the pay back period.

Solution:

The payback period for the project

$$= \frac{\text{Cash Outlay (Investment)}}{\text{Annual Cash Inflow}} = \frac{C_o}{C_I}$$

$$= \frac{\text{Rs.50,000}}{\text{Rs.12,500}} = 4 \text{ Years}$$

Problem 2

Calculate the pay back period for a project which requires a cash outlay of Rs.20,000 and generates cash inflows of Rs.8,000. Rs.7,000, Rs.4,000 and Rs.3,000

Solution:

When we add up the cash inflows, are find that in the first three years Rs.19,000 of the original outlay is recovered. In the fourth year cash inflow generated is Rs.3,000 and only Rs.1,000 of the original outlay remains to be recovered. Assuming that the cash inflows occur evenly during the year, the time required to recover Rs.1,000 will be (Rs.1,000/Rs.3,000) x 12 months = 4 months.

Thus, the pay back period is 3 years and 4 months.

Problem 3

Management of Kohinoor Textiles Ltd. is contemplating to invest in one of the two mutually exclusive projects. Each requires an outlay of Rs.50,000 Project A has a life of 4 years while project B has a life of 5 years. Both the projects will have no salvage value. The tax-rate applicable is 60% and its required rate of return is 15%. Net cash inflows before tax of both the projects are as under.

Year	Project 'A' (Rs.)	Project 'B' (Rs.)
1	15,000	15,000
2	15,000	15,000
3	20,000	10,000
4	20,000	10,000
5		10,000

The company follows straight line method of depreciation. You are required to calculate the pay back period and suggest the project in which the company should invest.

Solution:

Pay-back period of Project A

Year	Cashflow (Rs.)	Tax (Rs.)	Cashflow after tax (Rs.)	Cashflow+ Depn. (Rs.)	Cumulative CF+Depn. (Rs.
1	15,000	9,000	6,000	18,500	18,500
2	15,000	9,000	6,000	18,500	37,000
3	20,000	12,000	8,000	20,500	57,500
4.	20,000	12,000	8,000	20,500	78,000

Payback Period of Project 'A' = 2 years plus a fraction of 3rd year,

Fraction value will be equal to = $\dfrac{13,000}{20,500} = 0.63$

Hence pay back period is 2.63 years.

Pay-back period of Project B

Year	Cashflow (Rs.)	Tax (Rs.)	Cashflow after tax (Rs.)	Cashflow+ Depn. (Rs.)	Cumulative CF+Depn. (Rs.
1	15,000	9,000	6,000	16,000	16,000
2	15,000	9,000	6,000	16,000	32,000
3	10,000	6,000	4,000	14,000	46,000
4.	10,000	6,000	4,000	14,000	60,000
5.	10,000	6,000	4,000	14,000	74,000

Payback period of Project 'B' = 3 years plus a fraction of 4th year,

Fraction value will be equal to = $\dfrac{4,000}{14,000} = 0.29$

Hence pay back period is 3.29 years.

Since the pay back period of project 'A' is shorter than of project B, company should invest in Project 'A'.

Problem 4

Pallavi Company Limited is contemplating investment in a machine. There are two machines available in the market. The details about the two machines are given below:

	Machine 'A'	Machine 'B'
Life	3 Years	3 Years
Capital cost	Rs.2,00,000	Rs.2,00,000
Income (after tax)		
I year	Rs. 1,60,000	Rs. 40,000
II Year	Rs. 1,20,000	Rs. 1,40,000
III Years	Rs. 80,000	Rs. 2,00,000

Calculate the average rate of return on investment and advise on the choice of the machine.

Solution:

Machine 'A'

Average Income after Tax $= \dfrac{1,60,000 \quad 1,20,000 \quad 80,000}{3} = 1,20,000$

Average Rate of Rerurn $= \dfrac{1,20,000}{2,00,000/2} \times 100 = 120\%$

Machine 'B'

Average income after tax $= \dfrac{40,000 + 1,40,000 + 2,00,000}{3}$

$= $ **Rs. 1,26,667**

Average Rate of Return $= \dfrac{1,26,667}{2,00,000/2} = 126.7\%$

Since ARR of Machine 'B' is higher than that of 'A', Machine 'B', should be bought.

Problem 5

Rama Steel Company is contemplating to invest in one of the two mutually exclusives projects. Each requires an immediate investment of Rs.2,000. Project A has a life span of 4 years and project B has 5 years life. Both the projects will be depreciated on straight line method, assuming no salvage values. The company's tax rate is 50%. Net cash-flows before taxes and depreciation, expected from each project, are as under.

Year	1	2	3	4	5
Project A	Rs.600	600	800	800	-
Project B	Rs.600	600	400	400	400

Which project should the company select and whey? Use average rate of return method.

Solution:

Income after taxes from Project A

Year	Cash inflows (Rs.)	Depreciation (Rs.)	Income before tax (Rs.)	Taxes (Rs.)	Income after taxes (Rs.)
1	600	500	100	50	50
2	600	500	100	50	50
3	800	500	300	150	150
4.	800	500	300	150	150
				Total	400

Average income after tax $= 400/4 = $ Rs.100

Average Rate of Return $= \dfrac{Rs.100}{Rs.2,000/2} = 100$

$= 10\%$

Income after taxes from Project B

Year	Cashflows (Rs.)	Depreciation (Rs.)	Income before tax (Rs.)	Taxes (Rs.)	Income after taxes (Rs.)
1	600	400	200	100	100
2	600	400	200	100	100
3	400	400	-	-	-
4	400	400	-	-	-
5	400	400	-	-	-
				Total	200

Average income after tax = 200 /5 = Rs.40;

Average return $= 2000/2 =$ Rs. 1000

Average Rate of Return $= \dfrac{Rs.40}{Rs.1,000} \times 100 = 4\%$

The company should choose Project A because it would fetch higher average rate of return than Project B.

Problem 6

Management of Raj Electricals is contemplating to buy a machine for manufacturing purpose. At present there are two machines available in the market which could serve the purpose. Details about these two machines are set out below:

Income after taxes from Project A

	Machine-X (Rs.)	Machine-Y (Rs)
Cost	Rs. 30,000	Rs. 30,000
Annual income after depreciation and taxes		
I Year	5,500	6,700
II Year	8,000	7,200
III Year	8,400	8,500
IV Year	8,800	7,000
V year	9,000	8,800
Useful life in years	5	5
Average Income Tax Rate	55%	55%

The company follows the straight line of depreciation on both the machines.

Which machine should the management buy? Assume that the management uses Accounting Rate of Return (ARR) Method for the project evaluation.

Solution:

Average Income $= \dfrac{\text{Total income during the life of the project}}{\text{Life of the project}}$

Average Income of Machine A $= \dfrac{Rs.\,39,000}{5\ Years} = Rs.7,940$

Average Income of Machine B $= \dfrac{Rs.\,38,200}{5\ Years} = Rs.7,640$

Average Investment $=$ Original Investment/2

Average Investment of Machine A $= \dfrac{Rs.\,30,000}{2} = Rs.15,000$

Average Investment of Machine B $= \dfrac{Rs.\,30,000}{2} = Rs.15,000$

ARR of Machine A $= \dfrac{Rs.\,7,940}{15,000} \times 100 = 52.93\%$

ARR of Machine B $= \dfrac{Rs.\,7,640}{15,000} \times 100 = 50.93\%$

Since rate of return on Machine 'A' is higher as compared to Machine 'B', the management should acquire Machine 'A'.

Problem 7

Calculate the net present value of project X which initially costs Rs. 2,500 and generates year-end cash in flows Rs.900, Rs.700, Rs.600 and Rs.500 during the five years of its life. The required rate of return is assumed to be 10 percent.

Solution:

Calculation of Net Present Value of Project 'A'

Year	Cash in flows factor at 10%	Discounting	PV of Cash inflows
1	900	0.909	818
2	800	0.826	661
3	700	0.751	526
4	600	0.683	410
5	500	0.620	310
			2,725
		Less: Investment Outlay	2,500
		Net Present value (NPV)	225

Problem 8

Bharat Bijlee Ltd. is contemplating acquisition of general machine would comes Rs.5,55,000. Besides, the company would have to incur Rs.15,000 to install the machine. Further the company estimates Rs.60,000 as maintenance cost for each year of its operation. The machine will have 5 years life and its salvage value will be Rs.1,20,000. The investment allowance is 20 percent on net purchases of plant and equipment. The estimate cash inflows from the proposed investment projects are as under:

Year	1	2	3	4	5
Cash inflow Rs.	1,50,000	2,10,000	3,00,000	2,40,000	1,80,000

Assuming that the company uses straight line method of depreciation the company's discount rate is 15 per cent and its ordinary tax rate is 50 per cent. Should Bharat Bijlee Ltd. acquire the machine?

Solution:

i)   Investment outlay   Rs.

       Cost of Machine   1,50,000

       (+) Installation costs   -15,000

                             ————

                             5,70,000

       (-) Investment allowance   60,000

                             ————

                           5,10,000

                             ————

ii)   *Computation of Net cash Inflows:*

Year	Cash inflows	Maintenance expenditure	Depre- ciation	Net cash (2-3-4)	Tax	Net cash inflow	Net Cash inflow after tax and before Depn.
1	2	3	4	5	6	7	8
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	1,50,000	60,000	93,000	-3,000	1,500	1,500	94,500
2	2,40,000	60,000	93,000	+87,000	+43,500	43,500	1,36,500
3	3,00,000	60,000	93,000	+1,47,000	+73,500	73,500	1,66,500
4	2,40,000	60,000	93,000	+87,000	+43,500	43,500	1,36,500
5	1,80,000	60,000	93,000	+27,000	+13,500	+13,500	1,26,500

There will be tax savings of Rs. 1500 on the negative income of Rs.3,000. Therefore, net cash flow after tax and before depreciation will be Rs.94,500 (Rs.93,000+1,500).

iii)   *Computation of NPV:*

Year	Net Cashflow Rs.	PV Factor	Total PV (2x3)
1	2	3	4
1	94,500	0.870	82,915.00
2	1,36,500	0.756	1,02,199.00
3	1,66,500	0.658	1,09,557.00
4	1,36,500	0.572	78,078.00
5	1,26,500	0.497	62,8705.50
6	1,20,000	0.497	59,640.00
	(Salvage value)	Total	4,95,254.00

iv)   NPV = Present Value of Cashflows   4,95,254.50

      (-) Investment outlay   5,10,000.00

                                              _____

                            Rs.   44,754.00 (Negative)

                                              _____

Decision: Since   the NPV is negative, the project should not be accepted.

Problem 9

The Glassgo Steel Company is contemplating to invest in a project which will cost Rs.2,50,000 and will require an increase in the level of inventories and receivables of Rs.1,25,000 over its life. The project will generate additional sales of Rs.2,50,000 and will require additional expenses of Rs.75,000 every year. The project has 5 years life. The company is in the tax bracket of 50 per cent and has cost of capital of 10 per cent after tax. Should the project be accepted, assuming straight line method of depreciation?

Solution:

i)   Investment outlay   Rs.

      Cost of the project   2,50,000

      (+) Working capital required   1,25,000

                                                  _____

                                                  3,75,000

                                                  _____

ii)   Net Cash inflow   Rs.
      Additional income   2,50,000
      Less: Expenses   75,000

                                                  _____

Net Profit before depreciation and tax	1,75,000
Less: depreciation	25,000
Net Profit before tax	1,25,000
Less: tax @ 50%	62,500
	62,500
(+) Depreciation	50,000
Net Cash inflow	1,12,000

Annual Net cash inflow of Rs. 1,12,5000 will be available for five years.

iii) Calculation of Present Value of Net Cash inflow

Therefore, 5 year present value factor at 10% rate =   6.105

and the present value of net cash inflows

= Rs.1,12,500 × 6.105 = Rs.6,86,812.50

iv) Net Present Value = Present value of Net cash inflow   6,86,812.50

Less: Investment outlay   3,75,000.00

NPV =   3,11,812.50

Since the present value of the project is positive, the project should be accepted.

Problem 10

Bharat Steel Ltd. is considering investment in one of the two mutually exclusive projects information about which are given below:

	Projects	
	A	**B**
Cost (Rs.)	24,000	24,000
Life	2 Years	2 Years
Cash inflow each year (Rs)	16,000	16,000
Scrap value (Rs.)	0	0

The probabilities of cash inflows each of the projects A and B are as below:

Possible inflow (Rs)	A Probability	Possible inflow (Rs)	B Probability
8,000	0.2	14,000	0.2
16,000	0.6	16,000	0.6
24,000	0.2	18,000	0.2

Assuming cost of capital at 10% on the choice of the project, Calculate NPV and state which project should be accepted.

Solution:

	Project A	Project B
Net Investment outlay	Rs.24,000	Rs.24,000

Present value of cash in flows of both projects.

Year	Adjusted cash inflow (Rs.)	PV Factor at 10%	PV of cash inflows (Rs.)
1	16,000	0.909	14,544
2	16,000	0.826	13,216
		Total	27,760

NPV = Rs.27,760 – 24,000= 3,760

Comments:

1. Since both the projects have the same outlay cash inflow and life period, we have made one computation.

2. Both the projects are acceptable because of their same positive value.

3. However, Project 'B' should be given priority over project 'A' because the former is relatively less risky in terms of low variability in cash inflows.

Problem 11

Naland Manufacturing company is considering to invest Rs.1,00,000. There is a project costing Rs. 1,00,000. the entire amount has to be invested in the year in which the project will be taken up. The company desires that this project must earn 12% after-tax project. This includes depreciation on investment in the project.

The management has decided to invest immediately to earn at least a rate of return of 12% on such inflows. The following are the estimate of yearly cash inflows from the project, including profit after tax and depreciation.

Year end	Cash inflows (Rs.)
1	27,000
2	26,000
3	27,500
4	28,000
5	28,500

The project will be disposed off by the end of 5th year. The salvage value is expected to be of the order of Rs.9,000. Should the company take up the project?

Solution:

Net investment Outlay   =   Rs. 1,00,000

Computation of NPV:

Year end	Cash inflows (Rs.)	Discount Factor at 12%	PV (Rs.)
1	27,000	0.893	24,111
2	26,000	0.797	20,722
3.	27,500	0.712	17,808
4	28,000	0.636	19,580
5	28,500	0.567	16,160
6	9,000	0.567	5,103

NPV = Rs. 1,03,484 – Rs. 1,00,000 = Rs. 3,484
Since the NPV is positive, management should take up the project.

Problem 12

Electrometal Private Ltd. is evaluating two mutually exclusive proposals for new capital investment. The following information about the proposals are available.

	Proposal 'X'	Proposal 'Y'
	(Rs.)	(Rs.)
Net cash outlay:	80,000	1,00,000
Salvage value:	-	-
Estimated life:	4 years	5 years
Depreciation:	Straight line method	Straight line method
Cut-off discount rate:	10 per cent	10 percent
Corporate income tax:	50 percent	50 percent

Earnings before depreciation and taxes:

You are approached to advise the company as to which proposal would be financially viable taking the help of IRR method?

Solution:

	Proposal 'X'	Proposal 'Y'
i) Investment outlay	Rs.80,000	Rs.1,00,000

ii) Proposal 'X' net cash inflows computation:

Year	X (Rs.)	Y (Rs.)
1	24,000	28,000
2	28,000	32,000
3	32,000	36,000
4	44,000	44,000
5	-	40,000

	I year (Rs.)	II Year (Rs.)	III Year (Rs.)	IV Year (Rs.)
Earnings before depreciation and taxes	24,000	28,000	32,000	44,000
Less: depreciation	20,000	20,000	20,000	20,000
Earning after depreciation and before taxes	4,000	8,000	12,000	24,000
Less: Corporate tax @ 50 per cent	2,000	4,000	6,000	12,000
Earning after tax	2,000	4,000	6,000	12,000
Add: Depreciation	20,000	20,000	20,000	20,000
Net Cash inflows	22,000	24,000	26,000	32,000

iii) Calculation of Internal Rate of Return of Proposal 'X':

Let us choose 10% and 11% interest rate to discount future cash inflows of proposal 'X'

Year	Net cash inflow (Rs.)	PV Factor		Total PV	
		10%	11%	10% (Rs.)	11% (Rs.)
1	22,000	0.909	0.901	19,998	19,822
2	24,000	0.826	0.812	19,824	19,488
3	26,000	0.751	0.732	19,524	19,006
4	32,000	0.683	0.659	21,856	21,988
				81,202	**80,304**

Since present value of cash inflows discounted at 11 percent is closer to investment outlay figure Rs.80,000, 11% will be the interest rate of return on project 'X'.

iv) Computation of Net Cash inflows Proposal 'Y':

	I year (Rs.)	II Year (Rs.)	III Year (Rs.)	IV Year (Rs.)	V Yr. Rs.
Earnings before depreciation and taxes	28,000	32,000	36,000	44,000	40,000
Less: depreciation	20,000	20,000	20,000	20,000	20,000
Earning after depreciation and before taxes	8,000	12,000	16,000	24,000	20,000
Less: Corporate tax @ 50 per cent	4,000	6,000	8,000	12,000	10,000
Earning after tax	4,000	6,000	8,000	12,000	10,000
Add: Depreciation	20,000	20,000	20,000	20,000	20,000
Net Cash inflows	24,000	26,000	28,000	32,000	30,000

v) Calculation of IRR: Proposal 'Y'

Year	Net cash inflow (Rs.)	PV Factor 11%	PV Factor 12%	Total PV 11%	Total PV 12% Rs.
1	24,000	0.901	0.893	21,626	21,432
2	26,000	0.812	0.797	21,112	20,722
3	28,000	0.731	0.712	20,468	19,936
4	32,000	0.659	0.636	21,088	20,352
5	30,000	0.593	0.567	17,790	17,010
				1,02,084	**1,99,452**

Since present value of cash inflows discounted at 12% is closer to investment outlay figure of Rs.1,00,000. 12 Percent will be the interest rate of return (IRR) on proposal 'Y'.

As per IRR method Project 'Y' should be accepted as it would earn more than the one to be earned by Project 'X'.

Problem 13

A project costs Rs.16,200 and is expected to generate cash inflows of Rs.8,000, Rs. 7,000 and Rs. 6,000 over its life of three years. You are required to calculate the internal rate of return (IRR) of the project.

Solution:

To start with, we select a rate of 20 per cent and calculate the present value of cash inflows:

Year	Cash inflows	Discount factor at 20%	Present value
1	Rs.8,000	0.833	6,664
2	Rs.7,000	0.694	4,858
3	Rs. 6,000	0.579	4,858
			Rs.14,996
		Less cash outlay	16,200
		NPV (-)	Rs. 1,204

Since the calculated total present value of cash inflow is not equivalent to initial outlay, it is understood that the selected rate of return (IRR) of the project i.e., 20% is a higher rate. Therefore, lower rates should be tried. We try 18 per cent, 16 per cent and 14 per cent and obtain the following results.

Year	Cash inflow	Discount factor 18% (Rs.)	PV	Discount factor 16% (Rs.)	PV	Discount factor 14% (Rs.)	PV
1	8,000	0.847	6,776	0.862	6,896	0.877	7,016
2	7,000	0.718	5,026	0.753	5,201	0.769	5,383
3	6,000	0.609	3,654	0.641	3,846	0.675	4,050
			15,456		15,943		16,449
			16,000		16,200		16,200
	NPV(-)		744		(-)257		(+)249

It can be observed from the above calculations that the true rate of return lies between 14 percent and 16 percent. When we select 15 percent as the trial rate, we find that the net present value is zero. Thus, the true rate of return can be calculated as below:

Year	Cash inflows	Discount factor at 15%	Present
1	Rs.8,000	0.870	6,960
2	Rs.7,000	0.756	5,292
3	Rs. 6,000	0.658	3,948
		Total PVS =Rs.	16,200
		Less cash outlay	16,200
		NPV	0

Problem 14

Indian Textile Company has an investment opportunity involving an outlay of Rs. 80,000. The expected net cash flows after taxes and before depreciation are:

Year	Net Cash inflows (Rs.)
1	14,000
2	14,000
3	14,000
4	14,000
5	14,000
6	14,000
7	20,000
8	30,000
9	20,000
10	8,000

Using 15 percent as rate of discount, you are required to compute Profitability Index.

Solution:

$$\text{Profitability Index} = \frac{\text{PV of cash inflows}}{\text{PV of cash outflows}}$$

Calculation of PV of cash inflows:

Year	Net Cash flow	PV factor at 15%	Total PV (Rs.
1	14,000	0.870	12,180
2	14,000	0.756	10,584
3	14,000	0.658	9,212
4	14,000	0.572	8,008
5	14,000	0.497	6,958
6	16,000	0.432	6,958
7	20,000	0.376	7,520
8	30,000	0.327	9,810
9	20,000	0.284	5,680
10	8,000	0.247	1,976
		Total	78,840

$$\text{Profitability Index} = \frac{\text{Rs.}78,840}{\text{Rs.}80,000} = 0.9855$$

Problem 15

A company is considering two mutually exclusive projects. Both require an initial cash outlay at Rs.10,000 each and have a life of five years. The company's required rate of return is 10 per cent and pay tax at a 50 per cent rate. The projects will be depreciated on a straight line basis. The next cash flow (before taxes) expected to be generated by the projects are as follows:

Year	1	2	3	4	5
Project 1	Rs.4,000	4,000	4,000	4,000	4,000
Project 2	Rs. 6,000	3,000	2,000	5,000	5,000

Calculate:

1. The pay back period of each project
2. The average rate of return for each project
3. The Net Present value and
4. Profitability index for each project

Solution:

	Cash flows	Depreciation	Income before tax	Taxes	Net income After taxes
	Rs.	Rs.	Rs.	Rs.	
Project 1					
4,000	2,000	2,000	1,000	1,000	3,000
4,000	2,000	2,000	1,000	1,000	3,000
4,000	2,000	2,000	1,000	1,000	3,000
4,000	2,000	2,000	1,000	1,000	3,000
4,000	2,000	2,000	1,000	1,000	3,000
4,000	2,000	2,000	1,000	1,000	3,000
Project 2					
6,000	2,000	4,000	2,000	2,000	4,000
3,000	2,000	1,000	500	500	2,500
2,000	2,000	0	0	0	2,000
5,000	2,000	3,000	1,500	1,500	3,500
5,000	2,000	3,000	1,500	1,500	3,500

i) *Payback:*   (Rs.)

Project 1: Rs.10,000/3,000 = 3 1/3 years

Project 2: (Rs.4,000+2,500+2,000) = 8,500 in 3 years. Amount remaining to be recouped in fourth 10,000 minus Rs.8,500 = Rs.1,500. As the total amount realised in fourth year is rs.3,500, needed to recoup rs.1,500 = 1,500/3,500=3/7 years. Thus, the payback period is 3 years + 3/7: 3/7 years.

ii) ***Average Rate of Return (or) Accounting Rate of Return (ARR)***

a)   Average income: Project 1: $\dfrac{Rs.1000+1000+1000+1000+1000}{5}$

$$= \text{Rs. } 1000$$

Project 2: $\dfrac{Rs.2000+500+0+1500+1500}{5}$

$$= Rs.1,100$$

b)   Average investment for each project =Rs.10,000/2= Rs.5000

Thus, ARR   Project 1 = Rs.1,000/5000 = 20%

Project 2 = Rs. 1100/5000= 22%

iii) Net Present value NPV of Project 1:

PV of Net Cashflows:

(annuity of Rs.3,000) Rs.3,000x3.791   = Rs.11,373

Cash outlay   = Rs. 10,000
                                                                    _____
                                                          Rs.   1,373
                                                                    _____

NPV of Project 2:

Net Cashflows	PV factor 10%	PV
Rs.	Rs.	Rs.
4,000	0.909	3,636
2,500	0.826	2,065
2,000	0.751	1,502
3,500	0.683	2,390.50
3,500	0.621	2,173.50
		11,767.00
		10,000.00
	NPV	1,767.00

iv) *Profitability Index*

$$\text{Project 1} = \frac{\text{Rs.11,373}}{\text{Rs.10,000}} = 1,137$$

$$\text{Project 2} = \frac{\text{Rs.11,767}}{\text{Rs.10,000}} = 1.1767$$

Conclusion:

According to ARR, NPV and PI methods Project '2' is more profitable and therefore should be preferred over project 1. According to payback period method, which is not theoretically a sound method, Project 1, having a lesser payback, should be preferred.

Problem 16

A company has an investment opportunity costing Rs.40,000 with the following expected Net cashflow after taxes and before depreciation.

Year	1	2	3	4	5	6	7	8	9	10
Netcash flow(Rs.)	7,000	7,000	7,000	7,000	7,000	8,000	10,000	15,000	10,000	4,000

Using 10% as the cost of capital, determine the following:

a) Payback period

b) Net present value at 10% discount factor

c) Profitability index at 10% discount factor

d) Internal rate of return with the help of 10% and 15% discount factor

Solution:

a) Calculation of Payback period: Rs.

Cash outlay of the project   40,000

Total cash inflow for the first five years   35,000

Balance of cash outlay left to be   5,000
Paid back in the 6th year

Cash inflow for 6th year = $\dfrac{5,000}{8,000}$

So, the payback period is between 5th and 6th year i.e., 5 years+5,000/8,000
= 5 × 5/8 years or 5.625 years.

b) Calculation of Net Present value @ 10% discount rate:

Year	Net Cash flow	PV factor at Discount rate 10% Rs.	Present value Rs.
1	7,000	0.909	6,363
2	7,000	0.826	5,782
3	7,000	0.751	5,257
4	7,000	0.683	4,781
5	7,000	0.621	4,347
6	8,000	0.564	4,512
7	10,000	0.513	5,130
8	15,000	0.467	7,005
9	10,000	0.424	4,240
10	4,000	0.386	1,544
		Total PVs	48,961

NPV   = Present Value of inflow – Cost of the investment
           = Rs. 48,961 – 40,000 = 8,961

c) Calculation of Profitability Index @ 10% discount rate:

Profitability Index = $\dfrac{\text{Present value of cash inflows}}{\text{Cost of cash outflows}} = \dfrac{48,961}{40,000} = 1.22$

d) Calculation of IRR:

As the Net Present Value (calculated in (b) above) is positive, we must calculate
Net Present Value at a higher rate of discount i.e., 15% as given.

Year	Net Cash flow Discount Rs.	PV factor at Discount rate 15% Rs.	Present value Rs.
1	7,000	0.870	6,000
2	7,000	0.756	5,292
3	7,000	0.658	4,606
4	7,000	0.572	4,004
5	7,000	0.497	3,475
6	8,000	0.432	3,456
7	10,000	0.376	3,760
8	15,000	0.327	4,905
9	10,000	0.284	2,840
10	4,000	0.247	988
			39,420

NPV at 15% = 39,330 – 40,000 = Rs. (-) 670

As the Net Present Value @ 15% discount rate is negative, the internal rate of return may fall in between 10% and 15%.

4.10 LET US SUM UP

Finance manager is concerned with the financing as well as investment decisions. Financing decisions relate to determination of the amount of long-term finance required and the sources from which such finance is to be raised. Whereas investment decisions relates to investment in projects whose results would be available only after one year. The investment decisions, also popularly termed as capital budgeting decisions, require comparison of cost against benefits over a long period. Such investment decisions involve a careful consideration of various factors viz., profitability, safety, liquidity and solvency, etc.

Effective deployment of capital over the long term is one of the key means by which management attempts to achieve the objective of wealth maximization. Decisions affecting investment in long-term capital projects or assets have a major impact on the future well-being of the organisation. Apart from being uncertain, such decisions, typically, involve large commitments of funds.

This lesson focused on how investment decision can be made more effective in contributing to the health and growth of the firm. The use of traditional or non-discounted techniques of analysis will enable the management to rank and choose intelligently among proposals competing for essentially scarce long term funds.

The pay back is a rough and ready means of estimating how long it will take to recoup the original investment from the flow of cash earning produced by the project. It suffers from a serious drawback i.e., it provides no measure of profitability. It concerns itself with the liquidity of the investment.

The average or accounting rate of return is readily understood and easily determinable, but it is subject to serious limitations. It average cash flows fails to distinguish between projects with long lives and those with shorter lives and between those with uneven cash flows. More over, it overlooks the all important time value of money. This technique is adequate where the return of a project far exceeds the required rate or in case of projects which are not subject to close competition for funds from other projects.

Investments involve cash flows. Profitability of an investment project is determined by evaluating its cash flows. NPV, PI and IRR are the discounted cash flow criteria for appraising the worth of an investment project. The NPV method is a process of calculating the present value of the project's cash flows, using the opportunity cost of capital as the discount rate, and finding out the NPV by subtracting the initial investment from the PV of cash flows. Under NPV method, the investment project is accepted if its net present value is positive (NPV>0). The market value of the firm's share is expected to increase by the project's positive NPV. Between the mutually exclusive projects, the one with the highest NPV will be chosen.

Profitability index is the ratio of the present value of cash inflows to initial cash outlay. PI specifies that the project should be accepted when it has a profitability index greater than one (PI>1). Since this implies a positive NPV. A conflict of ranking can arise between the NPV and PI rules in case of mutually exclusive projects. Under such a situation, NPV rule should be preferred since it is consistent with the wealth maximization principle.

The IRR is that discount rate at which the project's net present value is zero. Under the IRR rule, the project will be accepted when its internal rate of return is higher than the

opportunity cost of capital (IRR>K). Both IRR and NPV methods account for the time value of money and are generally consistent with the wealth maximization objective. They give same accept-reject results in case of conventional independent projects. Under a number of situations, the IRR rule can give a misleading signal for mutually exclusive projects. The IRR rule also yields multiple rates of return for non-conventional projects and fails to work under varying cost of capital conditions. Since the IRR violates the value addition, it may fail to maximize wealth under certain conditions and it is cumbersome. The use of the NPV rule is recommended.

Capital rationing, refers to a situation where constraint is placed as the size of the capital budgeting decisions. The firm due to different reasons may adopt capital rationing. Under capital rationing project will be ranked and projects with highest return will be selected first in the descending order.

4.11 LESSON END ACTIVITY

Write a study note on the concept of capital rationing.

4.12 KEYWORDS

Cost of capital: The cost of raising capital in the market, which may include interest on borrowed money or the relation of a company's earnings to the market value of its equity shares.

Pay back period: The length of time required to equate cash return with the initial cost of capital investment, which is determined by dividing the original investment by the annual cash inflows.

Present value: The amount of money which, if invested immediately at a stated rate, would yield or more future payments reflecting the increased value of the investment in accordance with the time value of money. Conversely, it may be considered the value of a future stream of payments discounted at a given rate to the present time.

Discounting: A reduction of future cash inflows to a present value at some appropriate of discount rate factor in accordance with the concept of the time value of money.

Discounted Cash Flow: A measure of rate of return for evaluating capital investment proposals based on the concept of the time value of money.

Scrap Value: The residual value of a depreciable asset at the end of its useful life, which is also known as salvage value.

Accounting Rate of Return: A measure of rate of return for evaluating capital investment proposals, derived from accrual accounting methods for income determination.

Net Present Value: It is a technique of discounted cash flow for capital expenditure evaluation, which seeks to determine whether the present value of estimated future cash inflows at management's desired rate of return is greater or less than the cost of the proposal.

Profitability Index: the present value of future cash inflows divided by the present value of the initial outlay, also known as benefit-cost ratio.

Internal Rate of Return: The rate which equates the present value of the future cash inflows with the cost of the investment which produces them.

Capital Rationing: Capital rationing is a situation where a firm has more investment proposals than it can finance. It may be defined as "a situation where a constraint is placed on the total size of capital investment during a particular period."

4.13 QUESTIONS FOR DISCUSSION

A. Short Questions

1.   What do you mean by discounted cash flow technique?

2.   How is NPV calculated?

3.   How is profitability index calculated?

4.   Explain the IRR method.

5.   What do you mean by capital rationing?

B. Essay Type Questions

1.   Explain the superiority of discounted Cash Flow Techniques over Traditional Techniques.

2.   Under what circumstances do the NPV and IRR methods give the same decision and when do they differ? Which method do you prefer and why?

3.   What do you mean by capital rationing? Explain the reasons for its steps involved in selecting a project under capital rationing.

C. Exercises

1.   The Tamil Nadu Fertilizers Ltd. is considering a proposal for the investment of Rs. 5 lakhs on product development which is expected to generate net cash inflows for 6 years as under:

Years	Net Cash Flows (Rs. in Thousnads)
1	Nil
2	100
3	160
4	240
5	300
6	600
The following are the present value factors @ 15% per annum	
1	0.87
2	0.76
3	0.66
4	0.57
5	0.50
6	0.43

The company's cost of capital is 15% advise the company on the desirability or otherwise of accepting the proposal.

Ans. NPV=Rs.226.40 ('000): Proposal is acceptable

2.   A project costing Rs. 10 lakhs has a life of 10 years at the end of which its scrap value is likely to Rs. 1 Lakh. The firm's cut off rate is 12%. The project is expected to yield an annual profit after tax of Rs.1 lakh, depreciation being charged on straight line basis. At 12% p.a. the present value of one rupees received annually for 10 years of Rs.5,650 and the value of one rupee received at the end of 10 years is 0.322.

As certain the net value of the project and state whether we should go for the project.

Ans. NPV Rs.1,05,700, Project is acceptable

3. Following are the pay-offs of three investment projects:

Project	Current Pay-off Rs.	Ist Year Pay-Off Rs.	2nd Year Pay-off Rs.
X	-3,000	6,000	-
Y	-3,000	2,000	4,000
Z	-3,000	3,000	3,000

(i) Calculate the pay-back period of each investment assuming that Rs.3,000 loss in the current year represents the cost of the project.

(ii) With the internal rate of 10%, calculate net present value of each project.

(iii) Which project is best on each criteria?

(The present value of Re.1 received during the 1st and 2nd years is 9516 and 8611 respectively)

Ans. (i) ½, 1 1/4 year (ii) X Rs.2709.60, Y Rs.2347.60 Z Rs.2438.10, (iii) X is the best)

4. The particulars relating to two alternative capital projects are furnished below:

Life of the Project	Project X 4 years	Project Y 6 years
		(Rs. in lakhs)
Estimated Cash Outflow	15	15
Estimated cash Inflow		
1st Year	8	7
2nd Year	10	8
3rd Year	7	8
4th Year	3	6
5th Year	-	5
6th Year	-	4

Computer 'Internal rate of return' of Projects X and Y and state which project would you recommend. You must use the present value tables given as follows:

After Year	20%	25%	30%	35%	40%	45%	50%
1st	.833	.800	.769	.741	.714	.690	.677
2nd	.694	.640	.592	.549	.510	.476	.444
3rd	.579	.512	.455	.406	.364	.328	.296
4th	.482	.410	.350	.301	.260	.226	.198
5th	.402	.328	.269	.233	.186	.156	.132
6th	.335	.262	.207	.165	.133	.108	.088

Ans. IRR X 35.8%; Y - 40.05%, Y is recommended

5. The financial manager of company has to advise the Board of directors on choosing between two competing projects which require an equal investment of Rs. one lakh and are expected to generate cash flows as under:

	Project I (Rs.)	Project II (Rs.)
End of Year 1	48,000	20,000
End of Year 2	32,000	24,000
End of Year 3	20,000	36,000
End of Year 4	Nil	48,000
End of Year 5	24,000	16,000
End of Year 6	12,000	8,000

Which project proposal should be recommended any why? Assume the cost of capital to be 10% p.a. The following are the present value factors at 10% annum.

Year	1	2	3	4	5	6
Factor	0.909	0.826	0.751	0.683	0.621	0.564

Ans. Project I NPV Rs. 6756, Project II Rs. 12272; Project II should be accepted

6. A firm whose cost of capital is 10% is considering two mutually exclusive projects X and Y the details of which are

	Project X	Project Y
	Rs.	Rs.
Investment	70,000	70,000
Cash flow Year 1	10,000	50,000
Cash flow Year 2	20,000	40,000
Cash flow Year 3	30,000	20,000
Cash flow Year 4	45,000	10,000
Cash flow Year 5	60,000	10,000
Total Cash Flows	2,35,000	2,00,000

Compute the net present value at 10%, profitability index and internal rate of return for the two projects.

Year	10%	15%	20%	25%	30%	35%	40%
1	.909	.870	0.833	.800	.769	.741	.714
2	.826	.756	.694	.640	.592	.549	.510
3	.751	.658	.579	.512	.455	.406	.364
4	.683	.572	.482	.410	.350	.301	.260
5	.621	.497	.402	.328	.269	.223	.186

NPV   PI.   I.R.R.

Ans. Project X   = Rs.46,135   1.66   27.33

Project Y   = Rs. 36,550   1.52   37.62%

7. A company manager is considering three projects which are mutually independent and any of them can independently be selected. The company has necessary funds but cannot take up more then one project. The overall cost of the capital of the company is 10. Expected cash flow from the projects are given below:

Project Investment	Year 1	Year 2	Year 3	Year 4	Year 5
A. Rs.10,000	12,000	3,000	—	—	—
B. Rs.14,000	—	—	10,000	5,000	7,000
C. Rs. 9,000	—	4,000	5,000	5,000	2,000

You are required to advise the management as to which project should take up giving the reasons for your advise.

Hint: Calculate Profitability Index

	A	B	C
P. Index	1.139	1.091	1,302

8. A company is considering the purchase of two machines with the following details:

	Machine 1	Machine 2
Life (estimate)	3 Years	3 Years
Capital Cost	Rs.10,000	Rs.10,000
Net earning after tax	Rs.	Rs.
1st Year	8,000	2,000
2nd Year	6,000	7,000
3rd Year	4,000	10,000

You are required to suggest which machine be preferred, using:

(1) Payback period method

(2) Return on Investment method

(3) Discounted cash flow method. (Using 10% Discount Factor)

Note: Ignore depreciation

		Machine 1	Machine 2
Ans. Pay-back period	=	1.33 years	2.1 Years
Return on Investment	=	80%	90%
NPV	=	Rs.5232	Rs.5110

9. Capital and countries Ltd. is considering two projects, only one of which can be accepted. The data in respect of these two are given as below:

	Project 1	Project II
Outlay at t=0	10,000	50,000
Net inflow		
t=1	5,000	10,000
t=2	5,000	15,000
t=3	3,000	25,000
t=4	2,000	25,000
t=5	1,500	21,000

Calculate

(i) the payback period

(ii) the excess present value at 105 and

(iii) the internal rate of return

Also suggest which project should be selected by the firm

Ans. (i) Project I: 2 years, Project II: 3 Years; (ii) Project I: Rs.3225.50, Project Rs. 20,371.00 (iii) Project I: 25.35% Project II: 23% approx.

10. The following statements give quantitative considerations relevant for the ranking of Project A and B

	Project A (Rs.)	Project B (Rs.)
Investment	400	300
Internal Rate of return	Nearly 18%	Nearly 20%
Present value of 6% discount factor	542.7	421.2
Net Present value at 6% D.F.	142.7	121.2
Net Present at 12% D.F.	60.5	60.5

Project A required an investment of Rs.400 and was expected to have cash inflow of Rs.110, Rs.120, Rs.130, Rs. 140 and Rs.150 over its five years economic life. Project B involved an investment of Rs.300 and was expected to have cash inflows of Rs. 100 each over its five-year economic life.

Which of the two projects will you select if cost of capital is (i) 10% (ii) 12% and 15%? Give reasons in support of your decision.

Ans. | | | **Project A** | **Project B** | **Decision** |
|---|---|---|---|---|
| (i) | NPV at 10% | 85.51 | 79.00 | A be selected |
| (ii) | NPV at 12% | 60.50 | 60.50 | B be selected as it requires less cash outlay and gives same NPV |
| (iii) | NPV at 15% | 26.59 | 35.30 | B be selected |

11. X Company Ltd. manufacturing a component which is used in the televisions which they manufacture and sell. The quantity required is 14,000 units. The direct cost of manufacturing this component is Rs.8/- per unit. The company has received a proposal from ABC Ltd. to meet their entire needs at Rs.10 per unit. If X company discontinues making this component it can use its existing facilities for manufacturing a new product for sale at Rs.20/- per unit which would involve the following:

Investment in new machine (which has a life of 80,000 hours) – Rs.1,60,000. Material cost will be Rs. 6 and direct labour cost – Rs.4 per unit. Indirect expenses (other than depreciation) for 16,000 machine hours-Rs.48,000. Estimated sales – 16,000 units. Should the proposal to buy the component at Rs. 10/- per unit be accepted if their current cut off rate is (a) 25% and (b) 40%.

Hint: Calculate Return on Investment

Ans. Rate of Return = 32.5%   (a)   If cut off rate is 25% - Yes, Accept

(b)   If cut off rate is 40% - No, Reject

12. The following two Projects A and B require an investment of Rs.2,00,000 each. The income returns after taxes for these projects are as follows:

years	Project A	Project B
	Rs.	Rs.
1	80,000	20,000
2	80,000	40,000
3	40,000	40,000
4	20,000	40,000
5	—	60,000
6	—	60,000

Using the following criteria, determine which of the projects is preferable

(i) pay – back period

(ii) Average Rate of return

(iii) Present value approach if the company's cost of capital is (a) 10% and (b) 6%

Note: Ignore depreciation.

Ans. (i) Both can be acceptable but A is more preferable, (ii) A; (iii) At 10% none is acceptable, at 65 B is preferable.

	A	B
Pay back period	3 Years	5 Years
Average rate of Return	27.5%	21.5%
NPV at 10%	17,500	20,320
NPV at 6%	3920	+6860

13. Modern Electronics Co. Ltd. are considering the purchase of a machine. Two machines A and B are available each costing Rs.50,000. In comparing the profitability of these machines a discount rate of 10% is to be used. Earnings after taxation are expected to be as follows:

Year	Machine A Cash Inflow Rs.	Machine B Cash Inflow Rs.
1	15,000	5,000
2	20,000	15,000
3	25,000	20,000
4	15,000	30,000
5	10,000	20,000

You are also given the following data:

Year	Present value of Re. 1 @ 10% discount
1	0.909
2	0.826
3	0.751
4	0.683
5	0.621

Evaluate the project using:

(a) the pay-back period

(b) the accounting the rate of return

(c) the net present value and the profitability index

Note: Ignore depreciation.

Ans. (a) (A): 2.6Yrs; B. 3.3 Yrs; (b) A, 34% B, 36%; (c) NPV A Rs.15,385 B-Rs.14,865 P.A. – 1308, B-1297]

14. The Jail company provides a ferry service across the Ganga river. One of its ferry boats is in poor condition. The ferry boats can be renovated at an immediate cost of Rs.20,000 Further repairs and overhaul of the motor will be needed five years from now at a cost of Rs.8,000. In all, the ferry will be usable for 10 years if this work is done. At the end of 10 years, the ferry will have to be scrapped at salvage value of approximately Rs.5,000. The scrap value of ferry right now is Rs. 7,000.

It will cost Rs.16,000 each year to operate the ferry. As an alternative, Jai company can purchase a new ferry boat at a cost of Rs.40,000. It will have a life of 10 years, but will also require some repairs at the end of five years. It is estimated that these repairs will amount to Rs. 2,500. At the end of 10 years, it is estimated that the ferry will have scrap value of Rs.5,000. It will cost rs.12,000 each year to operate the ferry. Company requires a return of at least 18% on all investments. Should the company purchase the new ferry or renovate the old ferry?

Hint: Calculate net present value of cash outflows:

Ans. The company should purchase the new ferry because net present value of cash outflows in that case is Rs.87,065 which is less than the NPV of outflows of renovation amount to Rs. 94,445

15. The Philips Corporation, which has 50 per cent tax rate and a 10 per cent after tax cost of capital, is evaluating a project which will cost rs.1,00,000 and will require an increase in the level of inventories and receivables of Rs.50,000 over its life. The project will generate additional sales of Rs.1,00,000 and will require cash expenses of Rs.30,000 in each year of its five year life; it will be depreciated on a straight – line basis. What is the net present value and internal rate of return for the project.

Ans. Rs.51,645; 21.27%

Check Your Progress: Model Answers

CYP 1

The term investment decisions refers to long-term planning for proposed capital outlays and their financing. Thus, it includes both raising of long-term funds as well as their utilization.

CYP 2

1. F, 2. F, 3. T, 4. T, 5. T

4.14 SUGGESTED READINGS

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LESSON
5

RISK ANALYSIS
IN CAPITAL BUDGETING

CONTENTS

5.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Introduce risk and uncertainty concept in evaluating capital budgeting proposals.

- Familiarize with the probability approach in evaluating investment proposals.

5.1 INTRODUCTION

In the preceding lesson, we have examined the various techniques for evaluating capital investment proposals. Our basic assumption was that these proposals did not involve any kind of risk or irrespective of the proposal selected, there would not be any change in the business-risk complexion of the firm as perceived by the supplier of capital. However, this seldom happens in real world situations. Decisions are made on the basis of forecasts which themselves depend upon future events whose occurrence cannot be anticipated with absolute certainty because of economic, social, fiscal, political and other reasons. Thus risk is linked with business decisions. Of course, it varies from one investment proposal to another. Some proposals may not involve any risk e.g. investment in government securities which assure a return at a fixed rate. Some may be less risky, e.g. expansion of the existing business, while others may be more risky e.g. taking up a new venture etc.

A change in the business-risk complexion of the firm also changes the perception of the investors and creditors about the firm. For example, if the acceptance of a proposal makes a firm more risky, the investors and creditors will not look to it with favour. Such a change in their outlook will adversely affect the total valuation of the firm. It is,

therefore, necessary that while evaluating capital investment proposals, a firm should take into account the effect that their acceptance will have on the firm's business risk as visualised by its investors and creditors. Other things remaining the same, a firm should prefer a less risky investment proposal as compared to a more risky in investment proposal.

5.2 RISK DEFINED

Riskness of an investment proposal can be judged from the variability of its possibility returns. For example, if a person invests Rs.10,000 in government securities carrying 10% interest, he can accurately estimate the return that he will get on his investment year after year. His investment is, therefore, risk free. On the other hand, if he invests this amount in shares of companies, he will not be in a position to correctly estimate his return year after on account of possible variations in dividend rates. His investment in shares is, therefore, relatively risky as compared to his investment in government securities. Thus, the term risk with reference to capital budgeting decisions may be defined as the *variability that is likely to occur in future between the estimated and the actual returns*. The greater is the variability between the two, the more risky is the project and *vice versa.*

The decision situations as to risk may be broken down into three types: (i) certainty (or no risk), (ii) uncertainty, and (iii) risk. A risk situation is one in which the probabilities of particular event occuring are known while an uncertain situation is one where these probabilities are not known. In other words, in case of risk, chance of future loss can be foreseen because of past experience. For example, estimating loss in demand for tractors on account of poor harvest. In such a case the danger has been identified i.e. poor harvest, and one can assign probabilities to this risk say 40% fall in demand due to this factor. On the other hand, in case of uncertainty, the future loss cannot be foreseen, hence the management cannot deal with it in the planning process. For example, a firm investing in a foreign country may not foresee a revolution and takeover by an unfriendly group. This happened in Cuba in the late 1950's.

Incorporation of Risk Factor

From the above discussion, it is clear that a firm must take into consideration the risk factor while determining return/cash flows from a project or capital budgeting decisions. However, incorporation of risk factor in capital budgeting decisions is a difficult task. Some of the popular techniques used for this purpose are as follows:

(i) *General techniques:*

   (a) Risk adjusted discount rate;

   (b) Certainty equivalent coefficient

(ii) *Quantitative technique:*

   (a) Sensitivity analysis;

   (b) Probability assignment;

   (c) Standard deviation;

   (d) Coefficient of variation;

   (e) Decision tree

General Techniques

(a) *Risk adjusted discount rate:* The risk adjusted discount rate is based on the presumption that investors expect a higher rate of return on risky projects as compared to less risky projects. The rate requires determination of (i) risk-free rate and (ii) risk premium rate. Risk-free rate is the rate at which the future cash inflows should be discounted had there been no risk. Risk premium rate is the extra return expected by the investor over the normal rate (i.e. the risk free-rate) on account of the project being risky. Thus, risk adjusted discount rate is a composite discount rate that takes into account both the time and risk factors. A higher discount rate will be used for more risky projects and lower rate for less risky projects.

Illustration 1:

From the following data, state which project is better:

Project	X	Y
Cash flows:	Rs.	Rs.
Year		
0	-20,000	-20,000
1	8,000	10,000
2	8,000	12,000
3	4,000	6,000

Riskless discount rate is 5%. Project *X* is less risky as compared to Project Y. The management considers risk premium rates at 5% and 10% respectively appropriate for discounting the cash inflows.

Solution:

Risk adjusted discount rate

Project X :	5% + 5%	= 10%
Project Y :	5% + 10%	= 15%

Discounted Cash flows

Year	Project X at 10%	Project Y at 15%
0	-20,000	-20,000
1	7,272	8,700
2	6,608	9,072
3	3,004	3.948
NPV	- 3,116	1,720

Project *Y* is superior to Project X. Since NPV is positive, it may be accepted.

Merits

(i) It is simple to calculate and easy to understand.

(ii) It incorporates the risk-averse attitude of investors.

Demerits

(i) The determination of appropriate discount rates keeping in view the different degrees of risk is arbitrary. It may, therefore, not give objective results.

(ii) Conceptually this method is incorrect since it adjusts the wrong element. As a matter of fact, it is the future cash flow which is subject to risk. Hence, it is to be adjusted and not the required rate of return.

(iii) The method results in compounding of risk over time, since the premium is added to the discount rate. This means that the method presumes that the risk necessarily increases with time which may not be correct in all cases.

(iv) The method presumes that the investors are averse to risk. Of course, this is true in most of the cases. However, there are investors who are risk-seekers and are prepared to pay premium for taking risk. In their case the discount rate should be reduced rather than increased with increase in degree of risk.

In spite of these disadvantages the method is most widely used on account of its simplicity.

(b) *Certainty equivalent coefficient:* According to this method the estimated cash flows are reduced to conservative level by applying a correction factor termed as certainty equivalent coefficient. The correction factor is the ratio of riskless (or certain) cash flows to risky cash flows.

$$\text{Certainty equivalent coefficient} = \frac{\text{Riskless Cashflow}}{\text{Risky Cashflow}}$$

Riskless cash flow means the cash flow which the management is prepared to accept in case there is not risk involved. Naturally, this will be lower than the cash flow which will be there in case the project is risky. For example, a project is expected to generate a cash flow of Rs.20,000. The project is risky but the management feels that it will get at least a cash flow of Rs.12,000. It means that certainty equivalent coefficient is .6 (i.e. 12,000/20,000).

Certainty equivalent coefficients can be calculated for estimated cash flows of each year. They are then multiplied with the cash flows to ascertain cash flows which may be used for the purpose of determining *IRR* or *NPV* for capital budgeting decisions.

Illustration 2:

Using the information given in Illustration 1, state which project is better if certainty equivalent coefficients are;

	Project X	Project Y
1st Year	.90	.80
2nd Year	.80	.70
3rd year	.60	.50

Solution:

Discounted Cash Flows At 5%

Year		Project X			Project Y	
		Certain Cash flows	PV Rs.		Certain Cash flows	PV Rs.
0	-20,000	-20,000			-20,000	-20,000
1	8,000x.90	7,200	6,854	10,000x.80	8,000	7,616
2	8,000x.80	6,400	5,804	12,000x.70	8,400	7,618
3	4,000x.60	2,400	2,074	6,000x.5	3,000	2,592
	NPV		-5,268			-2,174

Project *Y* is better than Project *X*. However, in both cases the NPV is in negative and, therefore, none of them can be accepted.

(a) Sensitivity analysis

In the methods explained so far we have considered only one figure of cash flows for each year, However, there are chance of making some estimation errors. The sensitivity analysis approach takes care of this aspect by providing more than one estimate of the future return of a project. It is thus superior to one figure forecast since it gives a more precise idea about the variability of the return.

Usually sensitivity analysis provides information about cash flows under three assumption (i) Pessimistic, (ii) Most likely, and (iii) Optimistic out comes associated with the project. It explains how sensitive the cash flows are under these different situations. The larger is the difference between the pessimistic and optimistic cash flows, the more risky is the project and vice versa.

Illustration 3:

X Limited is attempting to evaluate two mutually exclusive projects 'A' and 'B'. Each project requires a net investment of Rs.10,000 and the annual cash flows from each of the project is estimated at Rs.2,000 p.a. in the next 15 years. The company's cost of capital may be taken as 10%. The management has made the following optimistic, most likely and pessimistic estimates of the annual cash inflows associated with each of these projects.

	Project A (Rs.)	Project B (Rs.)
Initial Investment	10,000	10,000
Estimated cash inflows (per annum)		
Pessimistic	1,500	–
Most likely	2,000	2,000
Optimistic	2,500	4,000

You are required to give your considered opinion for helping the management in arriving at a decision.

Solution:

In order to arrive at a decision about the selection of a project, the following figures have been ascertained regarding the net present value of cash inflows of each of the projects.

Project A (Initial investment Rs.10,000)

	Cash Inflows for each of the 15 years (Rs.)	Discount Factor at 10%	Present Value	Net Present value
Pessimistic	1,500	7,606	11,409	1,409
Most likely	2,000	7,606	15,212	5,212
Optimistic	2,500	7,606	19,015	9,015

Project B (Initial investment Rs.10,000)

Pessimistic	-	7,606	-	(-)10,000
Most likely	2,000	7,606	15,212	5,212
Optimistic	4,000	7,606	30,424	20,424

This data indicates that Project *B* is more risky than project *A*. It will depend upon the management whether they would like to take Project *A* or *B* depending upon the risk they want to undertake. Project *B* has a higher risk together with a higher profitability. In case, the management is venturesome, it can go for Project *B*, and in case, it is orthodox, it may go for Project *A*.

Illustration 4:

AB Ltd. is considering a project with the following cash flows:

Year	Purchase of Plant/Rs	Running Costs/Rs.	Savings Rs.
0	(7,000)		
1		2,000	6,000
2		2,500	7,000

The cost of capital is 8%. Measure the sensitivity of the project to changes in the levels of plant value, running costs and savings (considering each factor at a time) such that net present value becomes zero. Which factor is most sensitive to affect the acceptability of the project. The present value factors at 8% are as follows :

Year	Factor
0	1.00
1	0.93
2	0.86

Solution:

Computation of the Present Value of Cash Flows

Year	Discount factor at 8%	PV of Plant Cost (Rs)	PV of Running (Rs)	PV of savings Cost (Rs.)	PV of Net Cash flow (Rs.)
0	1.00	(7,000)			(7,000)
1	0.93		(1,860)	5,580	3,720
2	0.86		(2,150)	6,020	3,870
		(7,000)	(4,010)	11,600	*NPV* = 590

The project has a positive *NPV* and hence it may be accepted. The changes in cash flows which would be necessary before the project only, just breaks even (*i.e.* where *NPV* =0) are as follows:

Sensitivity Analysis:

(i) Plant costs would need to increase by a *PV* of Rs.590

$$\text{i.e., by } \frac{590}{7,000} = 8.4\%$$

(ii) Running costs would need to increase by a *PV* of Rs.590

$$\text{i.e., by } \frac{590}{4,010} = 14.7\%$$

(iii) Savings would need to fall short by a *PV* of Rs.590

i.e., by $\dfrac{590}{11,600}$ = 8.4%

The above analysis shows that savings is the most sensitive factor to affect the acceptability of the project.

(b) Probability assignment

Sensitivity analysis approach, as explained above, suffers from a limitation. No doubt it provides different cash flow estimates under three assumptions, it however does not provide chances of occurence of each of these estimates. For example, in the illustration given above three possible cash inflows have been given, Rs.1,500 Rs.2,000 and Rs.2,500 in respect of Project *A*. The question is - are these equally likely ? *A* better decision can be made if one can assign appropriate probabilities to each of these estimates. Suppose the probabilities assigned are .20, .60 and .20 respectively, the cash flows as adjusted by probabilities will be as follows:

	Cash Inflows (Rs.)	Probabilities (Rs.)	Expected Monetary values (Rs.)
Pessimistic	1,500	Rs..20	300
Most likely	2,000	.60	1,200
Optimistic	2,500	.20	500

The above monetary values give a more precise estimate about the likely cash flows as compared to those estimated without assigning probabilities.

Probabilities means the likelihood of happening an event. When it is said that an event has 1 probability, it means it is bound to happen. In case it has 0 probability it means it is not going to happen. In the above example the chances of having cash flow as Rs.2,000 has a probability of .6 or 60%. In other words, chances of not having cash flow of Rs.2,000 are .4 or 40%.

Probability may be objective or subjective. An objective probability is based on a large number of observations under independent and identical conditions repeated over a period of time. A subjective probability is based on personal judgement since there are no large number of independent and identical observations. In capital budgeting decisions, the probabilities are of a subjective type since they are based on a single event.

The mechanism of assigning probabilities to cash flows for capital budgeting decisions will be clear withe the following illustration.

Illustration 5:

The Hypothetical Company Ltd. has given the following possible cash inflows for two of their projects *'X'* and *'Y'* out of which one they wish to undertake together with their associated probabilities. Both the projects will require an equal investment of Rs.5,000.

You are requested to give your considered opinion regarding the selection of the project.

	Project 'X'		Project 'Y'	
Possible event	Cash Inflow	Probability	Cash in flow	Probability
A	Rs.4,000	.10	Rs.12,000	.10
B	5,000	.20	10,000	.15
C	6,000	.40	8,000	.50
D	7,000	.20	6,000	.15
E	8,000	.10	4,000	.10

Solution:

Computation of Expected Monetary Values For Project 'X' And Project 'Y'

	Project 'X'			Project 'Y'		
	Cash Inflows (Rs.)	Probability	Expected value	Cash Inflows (Rs.)	Probability	Expected Value
A	4,000	.10	400	12,000	.10	.1,200
B	5,000	.20	1,000	10,000	.15	1,500
C	6,000	.40	2,400	8,000	.50	4,000
D	7,000	.20	1,400	6,000	.15	900
E	8,000	.10	800	4,000	.10	400
	Total		6,000			8,000

The workings given above show that Project '*Y*' has higher expected monetary value as compared to Project '*X*'. the monetary value in case of Project *'Y'* is Rs,8,000 while the expected monetary value in case of Project *'X'* is Rs.6,000. Thus Project '*Y*' is preferable to Project *'X'*. Moreover, if monetary values in each of the two cases are discounted at 10%, the net present value for Project *'X'* will be only Rs.454 (i.e. Rs.6,000 × .909 - 5,000) while in case of Project *'Y',* the present value will be Rs. 2,272 (i.e. Rs.8,000 × .909 – 5,000)

(c) Standard Deviation

The probability assignment approach for risk analysis in capital budgeting does not provide the decision maker with a precise value indicating about the variability of cash flows and therefore the risk. This limitation is overcome by adoption of standard deviation approach. Standard deviation is a measure of dispersion. It may be defined as the square root of squared deviations calculated from the mean. In case of capital budgeting this measure is used to compare the variability of possible cash flows of different projects from their respective mean or expected values. *A* project having a larger standard deviation will be more risky as compared to a project having smaller standard deviation.

The following steps are taken for calculating the standard deviation of the possible cash flows associated with a project:

(i)   Mean value of possible cash flows is computed;

(ii)   Deviations between the mean value and the possible cash flows are found out;

(iii) Deviations are squared;

(iv)   Squared deviations are multiplied by the assigned probabilities which give weighted squared deviations;

(v)   The weightage squared deviations are totalled and their square root is found out. The resulting figure is the standard deviation;

Illustration 6:

On the basis of data given in Illustration 5, find out which project is more risky by adopting standard deviation approach.

Solution:

	Project X		Computation of Standard Deviation		
Possible Events	Cash Inflows	Deviation Mean *(Rs.6,000)*	Deviations Squared	Probability	
	cf	dcf	dcf²	p	pdcf²
(i)	(ii)	(iii)	(iv)	(v)	(iv) × (v) = (vi)
A	4,000	-2,000	40,00,000	.10	4,00,000
B	5,000	1,000	10,00,000	.20	2,00,000
C	6,000	0	0	.40	0
D	7,000	1,000	10,00,000	.20	2,00,000
E	8,000	2,000	40,00,000	.10	4,00,000
				Σpdcf²	12,00,000

$$\sigma = \sqrt{\Sigma pdcf^2} = \sqrt{12,00,000}$$
$$= 1.095$$

	Project Y		Computation of Standard Deviation		
Possible Events	Cash Inflows	Deviation Mean *(Rs.8,000)*	Deviations Squared	Probability	
	cf	dcf	dcf²	p	pdcf²
(i)	(ii)	(iii)	(iv)	(v)	(iv) × (v) = (vi)
A	12,000	4,000	1,60,00,000	.10	16,00,000
B	10,000	2,000	40,00,000	.20	8,00,000
C	8,000	0	0	.40	0
D	6,000	-2,000	40,00,000	.20	8,00,000
E	4,000	-4,000	1,60,00,000	.10	16,00,000
				Σpdcf²	48,00,000

$$\sigma = \sqrt{\Sigma pdcf^2} = \sqrt{48,00,000}$$
$$= 6.928$$

The standard deviation for project *X* is 1.095 while that for project *Y* is 6.928. Thus, the variability of cash flows is more in case of project Y as compared to project *X*. Hence, Project *Y* is more risky. However, the decision maker will be in a dilemma because Project Y has a higher monetary value of expected cash flows as compared to project *X*. This problem can be solved by calculating coefficient of variation as discussed below.

(d) Coefficient of variation

Standard deviation is an absolute measure. It is unfit for comparison particularly where projects involve different cash outlays or different expected (or mean) values. In such a case relative measure of dispersion should be calculated. Coefficient of variation is one of such measures. It is calculated as follows :

$$\text{Coefficient of Variation} = \frac{\text{Standard Deviation}}{\text{Expected (or Mean) Cash flow}} = \frac{\sigma}{\Sigma cf}$$

The co-efficient of variation in case of Project X and Project Y will be calculated as follows :

$$\text{Project X} = \frac{1.095}{6,000} = 0.1825 \text{ or } 18.25\%$$

$$\text{Project Y} = \frac{6.928}{8,000} = 0.866 \text{ or } 86.6\%$$

The coefficient of variation of Project Y is more as compared to Project X. Hence, Project Y is more risky. The choice would depend upon the capacity of the investor to bear the risk. Project Y has a higher expected monetary value as compared to Project X. Thus, with higher risk the profitability is also higher. In case the investor is not averse to risk, he may accept Project Y. However, if he is averse to risk, he will accept Project X.

Illustration 7:

(a) A firm faces two choices. First choice is to build a big plant by investing initially Rs.4 crores and the other alternative is to invest initially only Rs.1 crore for a small plant and subsequently to enlarge it, on the basis of its initial experience of small plant and the future prospects. The other relevant information is as follows :

	Demand conditions	Probability	Present value of expected cash flows discounted at the firm's cost of capital
	(1)	(2)	(3)
1st Choice			
Big Plant	High	.3	Rs.10 crores
Initial investment	Medium	.5	Rs. 4 crores
Rs.4 crores	Low	.2	Rs. 1 crore
2nd Alternative			
Small Plant	High	.3	Rs.3 crore
Initial investment	Medium	.5	Rs.1 crore
Rs.1 crore	Low	.2	Rs. 1 crore

From the above data, which alternative is preferable and why? Will it make a difference if you are supplied with additional information regarding coefficient of variation of net present values?

(b) What other factors would you like to take into account while deciding in favour of big plant?

Solution:

(a)   Statement showing profitability of plants

(Rs. in crores)

Demand	Big Plant		Certain cash flows	Small plant		Certain cash flows
	Present value of cash flows	Proba-bility		Present value of	Proba-bility	
High	10	.3	3.0	3	.3	0.9
Medium	4	.5	2.0	2	.5	1.0
Low	1	.2	0.2	1	.2	0.2
			5.2			2.1
Initial investment			4.0			1.0
Net present value			1.2			1.1

Big plant has a higher *NPV* as compared to small plant. Hence, on this basis the former seems to be profitable. However, since the initial investment widely differs, it will be appropriate to calculate profitability or present value index.

$$Present\ Value\ Index = \frac{Present\ Value\ of\ future\ Cash\ Inflows}{Present\ value\ of\ future\ Cash\ Outflows} \times 100$$

Big plant   **Small plant**

$$= \frac{5.2}{4} \times 100 \qquad = \frac{2.1}{1} \times 100$$

$$= 130\% \qquad\qquad = 210\%$$

Present Value index of small plant is substantially higher than that of the Big Plant. Thus, the Small Plant is more profitable than the Big Plant and, hence, it should be preferred.

The answer may be different in case information regarding coefficient of variation of net present value is also supplied. Higher is the coefficient of variation, higher is the risk. For example, if the Small Plant has a higher coefficient of variation of *NPV* as compared to the Big Plant, and the investor is averse to risk, he may accept the Big Plant though it has a lower profitability.

(b)   The following are the other important factors, which should be taken into account while taking the decision in favour of the big plant.

(i)   The extent to which the company would be in a position to use the extra capacity.

(ii)   How much of the overheads are fixed and variable?

(iii)   Would the costs of possible idle capacity losses as a result of high fixed costs, be balanced by the ability of the large plant to produce more goods when needed. This is necessary to estimate since the big plant will have sizable reserve capacity. It will be vulnerable to decrease in production since certain costs will continue whether the plant produces or not.

(iv) Requirement of funds at the entire range of operations. This can be done by multiplying the present value of cash flows for different operating levels by the probability of the flows occurring.

(e) Decision Tree Analysis

Decision tree analysis is another technique which is helpful in tackling risky capital investment proposals. Decision tree is a graphic display of relationship between a present decision and possible future events, future decisions and their consequences. The sequence of event is mapped out over time in a format resembling branches of a tree. In other words, it is pictorial representation in tree form which indicates the magnitude, probability and interrelationship of all possible outcomes.

An outstanding feature of decision tree analysis technique is that it links events chronologically with forecasted probabilities and thus gives systematic appearance of decisions and their forecasted results.

(f) Constructing a decision tree

The following steps are taken for constructing a decision tree :

(i) **Definition of the proposal:** The proposal is defined i.e. what is exactly required under the proposal e.g. entering a new market, introducing a new product line, etc.

(ii) **Identification of alternatives:** Every proposal will have at least two alternatives accept or reject. However, there may be more than two alternatives also. For examples, a firm may be considering the purchase of new plant for manufacturing a new product. It may have four alternatives: (i) not to purchase the plant, (ii) purchase a large plant, (iii) purchase a small plant, or (iv) purchase a medium size plant.

(iii) **Graphing the decision tree:** The decision tree is then laid down showing decision point (i.e. the cash outlay), decision branches (i.e. alternatives available and other data).

(iv) **Forecasting cash flows:** The forecasted cash flows regarding each decision branch are also shown along with the branch. Probabilities are also assigned to each cash flow. Expected values of future returns are calculated and the total expected value for the decision is determined.

(v) **Evaluating results:** Having determined the expected value for each decision, the results are analysed. Some alternatives may look to be acceptable while others may be weak or unacceptable. The firm may proceed with the profitable alternative or alternatives or may decide to reconsider them because of incomplete data or other reasons.

Illustration 8:

X Ltd. is considering the purchase of a new plant requiring a cash outlay of Rs.20,000. The plant is expected to have a useful life of 2 years without any salvage value. The cash flows and their associated probabilities for the two years are as follows:

1st year	Cash flows (Rs.)	Probability
(i)	8,000	0.3
(ii)	11,000	0.4
(iii)	15,000	0.3

2nd year, if cash flows in 1st year are:

	Rs.8,000		Rs.11,000		Rs.15,000	
	Cash flows	**Probability**	**Cash flows**	**Probability**	**Cash flows**	**Probability**
(i)	4,000	0.2	13,000	0.3	16,000	0.1
(ii)	10,000	0.6	15,000	0.4	20,000	0.8
(iii)	15,000	0.2	16,000	0.3	24,000	0.1

Presuming that 10% is the cost of capital, you plot the above data in the form of a decision tree and suggest whether the project should be taken up or not.

Solution:

Decision Tree

Year 0	Year 1 Prob.	Cash flows	Year 2 Prob.	Cash flows	Net present value of cash flows (see note)	Joint	Expected
		Rs.		Rs.			
			0.2	4,000	-9.424	0.06	-565.4
	0.3	8,000	0.6	10,000	-4.468	0.18	-804.2
			0.2	15,000	-388	0.06	-20.3
Decision Point			0.3	13,000	737	0.12	88.4
Cash Outlay Rs.20,000	0.4	11,000	0.4	15,000	2,389	0.16	382.2
			0.3	16,000	3,215	0.12	385.8
			0.1	16,000	6,851	0.03	205.5
	0.3	15,000	0.8	20,000	10,155	0.24	2,437.2
			0.1	24,000	13,459	0.03	403.8
						1.00	NPV 2,513

The project gives a positive net present value of Rs.2,513 at 10% discount factor, hence it may be accepted.

Working note

Computation of Net Present Values

		Cash flow		Present values at 10%			NPV
Alternatives		1st year	2nd year	1st year	2nd year	Total	
(a)	(i)	8,000	4,000	7,272	3,304	10,576	-9,424
	(ii)	8,000	10,000	7,272	8,260	15,532	-4,468
	(iii)	8,000	15,000	7,272	12,390	19,662	-388
(b)	(i)	11,000	13,000	9,999	10,735	20,737	737
	(ii)	11,000	15,000	9,999	12,390	22,389	2,389
	(iii)	11,000	16,000	9,999	13,216	23,215	3,215
(c)	(i)	15,000	16,000	13,635	13,216	26,851	6,851
	(ii)	15,000	20,000	13,635	16,520	30,155	10,155
	(iii)	15,000	24,000	13,635	19,824	33,459	13,459

The technique of decision tree analysis has the advantages of giving an overall view of all the possibilities associated with a project. The management can take a decision keeping the entire picture in mind. However, it has one big disadvantage. Its format may become unwieldy and complex if the project has a long life with different probabilities of cash flows. For example, if a project has life of 3 years with three possible outcomes, the number of decision paths/branches may be as large as 27. In such a situation it becomes almost impossible to understand and derive a proper conclusion from the decision tree analysis.

Check Your Progress

State whether the following statements are true or false:

1. Decision tree analysis is another technique which is helpful in tackling risky capital investment proposals.

2. The decision tree is then laid down showing decision point (i.e. the cash outlay), decision branches (i.e. alternatives available and other data).

3. The forecasted cash flows regarding each decision branch are also shown along with the branch. Expected values of future returns are calculated and the total expected value for the decision is determined.

4. Having determined the expected value for each decision, the results are analysed.

5.3 LET US SUM UP

The expected cash flows that are generated from a project are the base for evaluating the project under consideration. But the expected cash flows pertaining to future period and uncertainties are bound to exist, and they are to be adjusted to evaluate the investment proposals. In evaluating the projects the certainty equivalent method adjusted risk free rate of return method, probability approach and decision tree approaches are more useful in real life situations.

5.4 LESSON END ACTIVITY

How can you deal with the varying cash flows associated with an investment proposal ?

5.5 KEYWORDS

Decision Tree Analysis: Decision tree analysis is another technique which is helpful in tackling risky capital investment proposals.

Graphing the Decision Tree: The decision tree is then laid down showing decision point (i.e. the cash outlay), decision branches (i.e. alternatives available and other data).

Forecasting Cash Flows: The forecasted cash flows regarding each decision branch are also shown along with the branch. Probabilities are also assigned to each cash flow.

Evaluating Results: Having determined the expected value for each decision, the results are analysed.

5.6 QUESTIONS FOR DISCUSSION

1. How are the certainty equivalent factor are calculated ?

2. What is decision tree approach and how it helps in evaluating the investment proposals ?

Practical Problems

1. A Project requires an investment of Rs.50,000. It is expected to generate cash flows at the end of each year as follows :

Year	Cash flows (Rs.)
1	25,000
2	20,000
3	10,000
4	10,000

Ascertain by *NPV* method whether the project will be accepted in each of the following situations :

(i) The project is risk-free and expected return is 10%.

(ii) The project is risky and the expected return is 15%

(*Ans:* (i) NPV Rs.3,585; (ii) Rs. (-) 830. The project is acceptable if it is risk free. It is not acceptable if it is risky.)

2. *S* Ltd. is considering to select one of the two projects *X* and *Y*, each requiring investment of Rs.40,000. Cash flow estimates for 15 years are as follows:

Situation	Project X (Rs.0	Project Y (Rs.)
Worst	6,000	Nil
Most likely	8,000	8,000
Best	10,000	16,000

The required rate of return is 10%. The present value of an annuity of Re.1 for 15 years at 10% is 7,606. State which project is more risky.

(*Ans:* Project *Y* is more risky than Project *X*)

3. M/s Light Home Ltd. have estimated the following probabilities for net cash flows generated by a project. You are required to calculate the present value of the expected monetary cash flows at 10% discount rates. The following information has been made available to you:

1st year		2nd year		3rd year	
Cash Inflow	Probability	Cash Inflow	Probability	Cash Inflow	Probability
Rs.		Rs.		Rs.	
100	.10	100	.20	100	.30
200	.20	200	.30	200	.40
300	.30	300	.40	300	.20
400	.40	400	.10	400	.10

(*Ans:* Rs 628.65)

4. A firm is considering a proposal to buy a machine for Rs.30,000. The expected cash flows after taxes from the machine for a period of three consecutive years are Rs.20,000 each. After the expiry of the useful life of the machine, the seller has guaranteed its repurchase at Rs.2,000. The firm's cost of capital is 10% and the risk-adjusted discount rate is 18%. Should the company accept the proposal of purchasing the machine ?

(*Ans: NPV* Rs.14,982. The firm should accept the proposal)

Check Your Progress: Model Answers

1. T , 2. T, 3. T, 4. T.

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UNIT III

LESSON
6

CAPITAL STRUCTURE DECISIONS

CONTENTS

6.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept and meaning of capital structure and optimum capital structure.

- Identify various factors determining the capital structure of companies.

- Present various approaches for capital structure in determining the value of the firm.

6.1 INTRODUCTION

The basic task of a Finance Manager is the procurement of funds and the basic objective of financial management is wealth maximization. The finance manager is required to select such a finance mix or capital structure, which maximizes shareholders wealth in procurement of funds. For designing the optimum capital structure, he is required to select such a mix of sources of finance so that overall cost of capital is minimum. The funds required by a business enterprise can be raised either through the ownership securities i.e. equity shares and preference shares or creditorship securities i.e. debentures/bonds. A business enterprise has to maintain a proper mix of both these types of securities in a manner that both the cost and the risk are minimum. If the value of the firm can be affected by capital structure or financing decision, a firm would like to have a capital structure, which maximizes the market value of the firm. In order to achieve the goal of identifying an optimum debt-equity mix, it is necessary for the finance manager to be conversant with the basic theories underlying the capital structure of corporate enterprises.

6.2 MEANING OF CAPITAL STRUCTURE

Capital Structure refers to the mix of various sources from where the long term funds required in a business may be raised. According to Gerstenberg, capital structure means "the make up of a firm's capitalization". In other words, it represents the proportional mix of equity share capital, preference share capital, internal sources, debentures, and other sources of funds in the total amount of capital which an undertaking may raise for establishing its business.

While designing the capital structure, the following points must be kept in mind:

(1)   There is no single definite model, which can be suggested/used as an ideal for all business undertakings. This is because of the varying circumstances of various business undertakings. The capital structure depends primarily on a number of factors like the nature of industry, gestation period; certainty with which the profits will accrue after the undertakings goes into commercial production and the likely quantum of return on investment. It is, therefore, important to understand that different types of capital structure would be required for different types of business undertakings.

(2)   Government policy is also a major factor in planning capital structure. For example, a change in the lending policy of financial institutions may mean a complete change in the financial pattern. Similarly, the Rules and Regulations for capital market formulated by the Securities Exchange Board of India (SEBI) affect the capital structure decision. Similarly, monetary and fiscal policies of the Government may also affect the capital structure decisions. The finance managers of business concerns are therefore required to plan capital structure within these constraints.

6.3 CAPITAL STRUCTURE AND FINANCIAL STRUCTURE

The term capital structure differs from financial structure. Financial structure refers to the way the firm's assets are being financed. In other words, it includes both the long-term as well as short-term sources of funds. Capital structure is the permanent financing

of the company represented primarily by long-term debt and shareholders' funds but excluding all short-term credit. Thus, a company's capital structure is only a part of its financial structure.

6.3.1 Optimum Capital Structure

A firm should try to achieve an optimum capital structure with a view to maintain financial stability.

The optimum capital structure is attained when the market value of equity share is the maximum and overall cost of capital is the minimum. It may, therefore, be defined as that relationship of debt and equity securities which maximizes the value of a company's share in the stock market. In case a company borrows and this borrowing helps in increasing the value of the company's shares in the stock market, it can be said that the borrowing has helped the company in moving towards its optimum capital structure. If the borrowing results in fall in the market value of the company's equity shares, it can be said that the borrowing has moved the company away from its optimum capital structure.

The objective of the firm should be to select a financing or debt equity mix, which will lead to maximum value of the firm. Hence, the capital structure is said to be optimum capital structure when the firm has selected such a combination of equity and debt so that the wealth of firm is maximum. At this level, the cost of capital is minimum and market price per share is maximum.

Features of an optimal capital structure:

1. *Profitability:* The capital structure of the company should be most profitable i.e. is one that tends to minimize cost of financing and maximize earning per equity share.

2. *Solvency:* The pattern of a capital structure should be so devised as to ensure that the firm does not run the risk of becoming insolvent. Excess use of debt threatens the solvency of the company. The debt content should not be such that it increases risk beyond manageable limits.

3. *Flexibility:* The capital structure should be such that it can be easily maneuvered to meet the requirements of changing conditions. Moreover, it should also be possible for the company to provide funds whenever needed to finance its profitable activities.

4. *Conservatism:* The capital structure should be conservative in the sense that the debt content in the total capital structure does not exceed the limit that the company can bear. In other words, it should be such as is commensurate with the company's ability to generate future cash flows.

5. *Control:* The capital structure should be so devised that it involves minimum risk of loss of control of the company.

The above principles regarding an appropriate capital structure are as a matter of fact related to each other. For example, raising of funds through debt is cheaper and, therefore, in accordance with the principle of profitability it is desirable to the company to use the debt, but it is risky and, goes against the principle of solvency and conservatism. The prudent financial manager should try to have the optimal capital structure out of the circumstances within which the company is operating. The relative importance of each of the above features will also vary from company to company. However, the fact remains that each finance manager has to make a satisfactory compromise between the management's desire for funds and the trends in the supply of funds.

6.4 MAJOR CONSIDERATIONS IN CAPITAL STRUCTURE PLANNING

The following considerations will be helpful to a finance manager in achieving optimum capital structure:

(i)   The finance manager should take advantage of favourable financial leverage. In other words, if the Return on Investment (ROI) is higher than the fixed cost of funds, the may prefer raising funds having a fixed cost to increase the return of equity shareholders.

(ii)   He should take advantage of the leverage offered by the corporate taxes. A high corporate income tax also provides some form of leverage with respect to capital structure management. The higher cost of equity financing can be avoided by use of debt which in effect provides a form of income tax leverage to the equity shareholders.

(iii) He should avoid a high risk capital structure. This is because if the equity shareholders perceive an excessive amount of debt in the capital structure of the company, the price of the equity shares will drop. The finance manager should not therefore issue debentures or bonds with which risky. If the investors perceive an excessive risk, which will likely to depress the market prices of equity shares.

6.4.1 Patterns of Capital Structure

The capital structure may be of any of the following four patterns:

(i)   Capital structure with Equity Shares only.

(ii)   Capital structure with both Equity and Preference Shares.

(iii) Capital structure with Equity Shares and Debentures.

(iv)   Capital structure with Equity Shares, Preference Shares and Debentures.

The choice of an appropriate capital structure depends on a number of factors such as the nature of the company's business, regularity of earnings, conditions of the money market, attitude of the investor, etc. However, the main emphasis will be regarding the basic difference between debt and equity. Debt is a liability on which interest has to be paid irrespective of the company's profits. While equity consists of shareholders or owners funds, on which payment of dividend depends upon the company's profits. A high proportion of the debt content in the capital structure increases the risk and may lead to financial insolvency of the company in adverse times. However, raising funds through debt is cheaper as compared to raising funds through shares. This is because interest on debt is allowed as an expense for tax purposes. Dividend is considered to be an appropriation of profits hence payment of dividend does not result in any tax benefit to the company. This means if a company, which is in 50% tax bracket, pays interest at 14% on its debentures; the effective cost to it comes only to 7%. While if the amount is raised by issue of 14% preference shares, the cost of raising the amount would be 14%. Thus, raising of funds by borrowing is cheaper resulting in higher availability of profits for shareholders. This increases the earnings per equity share of the company, which is the basic objective of a financial manager.

Check Your Progress 1

1.   Define capital structure.

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2.   Define optimum capital structure.

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6.5 FACTORS DETERMINING CAPITAL STRUCTURE

There are three major considerations, i.e. risk, cost of capital and control, which help the finance manager in determining the proportion in which he can raise funds from various sources.

Although, three factors, i.e., risk, cost and control determine the capital structure of a particular business undertaking at a given point of time, the finance manager attempts to design the capital structure in such a manner that his risk and costs are the least and the control of the existing management is diluted to the least extent. However, there are also subsidiary factors like marketability of the issue, maneuverability and flexibility of the capital structure and timing of raising the funds. Determining an ideal capital structure is a shrewd financial management decision and is something that makes the fortunes of the company. These factors are discussed here under:

1.   *Risk:* Risk is of two kinds, i.e., Financial risk and Business risk. Here we are concerned primarily with the financial risk. Financial risk also is of two types:

(a)   *Risk of cash insolvency:* As a firm raises more debt, its risk of cash insolvency increases. This is due to two reasons. Firstly, higher proportion of debt in the capital structure increases the commitments of the company with regard to fixed charges. This means that a company stands committed to pay a higher amount of interest irrespective of the fact whether it has cash or not. Secondly, the possibility is that the supplier of funds may withdraw the funds at any given point of time. Thus, the long-term creditors may have to be paid back in installments, even if sufficient cash to do so does not exist. This risk is not there in the case of equity shares.

(b)   *Risk of variation in the expected earnings available to equity shareholders:* In case a firm has higher debt content in capital structure, the risk of variations in expected earnings available to equity shareholders will be higher. This is because of trading on equity. Financial leverage works both ways, i.e., it enhances the shareholders' return by a high magnitude or brings it down sharply depending upon whether the return on investment is higher or lower than the rate of interest. Thus, there will be lower probability that equity shareholders will enjoy a stable dividend if the debt content is high in the capital structure. In other words, the relative dispersion of expected earnings available to equity shareholders will be greater if the capital structure of a firm has a higher debt content.

The financial risk involved in various sources of finance can be understood by taking the example of debentures. A company has to pay interest charges on debentures even when it does not make any profit. Also the principal sum has to be repaid under the stipulated agreement. The debenture holders also have a charge against the assets of the company. Thus, they can enforce a sale of the assets in

case the company fails to meet its contractual obligations. Debentures also increase the risk of variation in the expected earnings available to equity shareholders through leverage effect, i.e., if the return on investment remains higher than the interest rate, shareholders will get a high return; but if reverse is the case, shareholders may get no return at all.

As compared to debentures, preference shares entail slightly lower risk for the company, since the payment of dividends on such shares is contingent upon the earning of profits by the company. Even in the case of cumulative preference shares, dividends have to be paid only in the year in which a company makes profits. Again, the repayment of preference shares has to be made only if they are redeemable and that too after a stipulated period. However, preference shares also increase the variations in the expected earnings available to equity shareholders. From the point of view of the company, equity shares are the least risky. This is because a company does not repay equity share capital except on its liquidation. Also, it may not declare a dividend for years together.

In short, financial risk encompasses the volatility of earnings available to equity shareholders as well as the probability of cash insolvency.

2. *Cost of Capital:* Cost is an important consideration in capital structure decisions. It is obvious that a business should be at least capable of earning enough revenue to meet its cost of capital and finance its growth. Hence, along with a risk as a factor, the finance manager has to consider the cost aspect carefully while determining the capital structure.

3. *Control:* Along with cost and risk factors, the control aspect is also an important consideration in planning the capital structure. When a company issues further equity shares, it automatically dilutes the controlling interest of the present owners. Similarly, preference shareholders can have voting rights and thereby affect the composition of the Board of Directors in case dividends on such shares are not paid for two consecutive years. Financial institutions normally stipulate that they shall have one or more directors on the Board. Hence, when the management agrees to raise loans from financial institutions, by implication it agrees to forego a part of its control over the company. It is obvious, therefore, that decisions concerning capital structure are taken after keeping the control factor in mind.

4. *Trading on Equity:* A company may raise funds either by the issue of shares or by borrowings. Borrowings carry a fixed rate of interest and this interest is payable irrespective of fact whether there is profit or not. Of course, preference shareholders are also entitled to a fixed rate of dividend but payment of dividend, is subject to the profitability of the company. In case the rate of return (ROI) on the total capital employed i.e., shareholder's funds plus long term borrowings is more than the rate of interest on borrowed funds or rate of dividend on preference shares, it is said that the company is trading on equity. For example, the total capital employed in a company is a sum of Rs.2 lakh. The capital employed consists of equity shares of Rs.10 each. The company makes a profit of Rs.30,000 every year. In such a case, the company cannot pay a dividend of more than 15% on the equity share capital. However, if the funds are raised in the following manner, and other things remain the same, the company may be in a position to pay a higher rate of return on equity shareholders' funds:

(a) Rs.1 lakh is raised by issue of debentures carrying interest at 10% p.a.;

(b) Rs.50,000 is raised by issue of preference shares, carrying dividend at 12%; and

(c) Rs.50,000 is raised by issue of equity shares.

In the above case, out of the total profit of Rs.30,000, Rs.10,000 will be used for paying interest while Rs.6,000 will be used for paying preference dividends. A sum of Rs.14,000 will be left for paying dividends to the equity shareholders. Since the amount of equity capital is Rs.50,000, the company can give a dividend of 28%. Thus, the company can pay a higher rate of dividend than the general rate of earning on the total capital employed. This is benefit of trading on equity.

Limitations: The trading on equity is subject to the following limitations:

(i) A company can have trading on equity only when the rate of return on total capital employed is more than the rate of interest on debentures as well as dividend on preference shares.

(ii) Trading on equity is beneficial only for companies which have stability in their earnings. This is because both interest and preference dividend imposes a recurring burden on the company. In the absence of stability in profits, the company will run into serious financial difficulties in periods of trade depression.

(iii) Every rupee of extra borrowings increases the risk and hence the rate of interest expected to the subsequent lenders goes on increasing. Thus, borrowings become costlier which ultimately result in reducing the amount of profits available for equity shareholders.

5. *Corporate Taxation:* Under the Income Tax laws, dividend on shares is not deductible while interest paid on borrowed capital is allowed as deduction. Cost of raising finance through borrowing is deductible in the year in which it is incurred. If it is incurred during the pre-commencement period, it is to be capitalized. Cost of issue of shares is allowed as deduction. Owing to these provisions, corporate taxation plays an important role in determining the choice between different sources of financing.

6. *Government Policies:* Government policies are major factor in determining capital structure. For example, a change in the lending policies of financial institutions may mean a complete change in the financial pattern to be followed in the companies. Similarly, the Rules and Regulations framed by SEBI considerably affect the capital issue policy of various companies. Monetary and fiscal policies of the Government also affect the capital structure decisions.

7. *Legal Requirements:* The promoters of the company have also to keep in view the legal requirements while deciding about the capital structure of the company. This is particularly true in case of banking companies which are not allowed to issue any other type of security for raising funds except equity share capital on account of the banking Regulation Act.

8. *Marketability:* The market sentiment also decide the capital structure of the company. There are periods when people want to have absolute safety. In such cases, it will be appropriate to raise funds by issue of debentures. At other periods, people may be interested in earning high speculative incomes; at such times, it will be appropriate to raise funds by issue of equity shares. Thus, if a company wants to raise sufficient funds, if must take into account market sentiments, otherwise its issue may not be successful.

9. *Maneuverability:* Maneuverability is required to have as many alternatives as possible at the time of expanding or contracting the requirement of funds. It enables use of proper type of funds available at a given time and also enhances the bargaining power when dealing with the prospective suppliers of funds.

10. *Flexibility:* Flexibility refers to the capacity of the business and its management to adjust to expected and unexpected changes in circumstances. In other words, management would like to have a capital structure, which provides maximum freedom to changes at all times.

11. *Timing:* Closely related to flexibility is the timing for issue of securities. Proper timing of a security issue often brings substantial savings because of the dynamic nature of the capital market. Intelligent management tries to anticipate the climate in capital market with a view to minimize the cost of raising funds and also to minimize the dilution resulting from an issue of new ordinary shares.

12. *Size of the Company:* Companies, which are of small size, have to rely considerably upon the owners' funds for financing. Such companies find it difficult to obtain long-term debt. Large companies are generally considered to be less risky by the investors and, therefore, they can issue different types of securities and collect their funds from different sources. They are in a better bargaining position and can raise funds from the sources of their choice.

13. *Purpose of financing:* The purpose of financing also to some extent affects the capital structure of the company. In case funds are required for productive purposes like manufacturing etc., the company may raise funds through long term sources. On the other hand, if the funds are required for non-productive purposes, like welfare facilities to employees such as schools, hospitals, etc., the company may rely only on internal resources.

14. *Period of finance:* The period for which finance is required also affects the determination of capital structure. In case funds are required for long term requirements say 8 to 10 years, it will be appropriate to raise borrowed funds. However, if the funds are required more or less permanently, it will be appropriate to raise them by the issue of equity shares.

15. *Nature of Enterprise:* The nature of enterprise also to a great extent affects the capital structure of the company. Business enterprises which have stability in their earnings or which enjoy monopoly regarding their products may go for borrowings or preference shares, since they are having adequate profits to pay interest/fixed charges. On the contrary, companies which do not have assured income should preferably rely on internal resources to a large extent.

16. *Requirement of Investors:* Different types of securities are to be issued for different classes of investors. Equity shares are best suited for bold or venture some investors. Debentures are suited for investors who are very cautious while preference shares are suitable for investors who are not very cautious. In order to collect funds from different categories of investors, it will be appropriate for the companies to issue different categories of securities. This is particularly true when a company needs heavy funds.

17. *Provision for future:* While planning capital structure the provision for future should also be kept in view. It will always be safe to keep the best security to be issued in the last instead of issuing all types of securities in one instalment. In the words of Gerestenberg, "Manager of corporate financing operations must always think of rainy days or the emergencies. The general rule is to keep your best security or some of your best securities till the last".

Thus, there are many factors which are to be considered while designing an appropriate capital structure of a company. As a matter of fact, some of them are conflicting in nature. The relative weightage assigned to each of these factors will vary widely from

company to company depending upon the characteristics of the company, the general economic conditions, and the circumstances under which the company is operating. Companies issue debentures and preference shares to enlarge the earnings on equity shares, while equity shares are issued to serve as a cushion to absorb the shocks of business cycles and to afford flexibility. Of course, greater the operating risk, the less debt the firm can use, hence in spite of the fact that the debt is cheaper the company should use it with caution. Moreover, it should be remembered that "Financial theory has not developed to the point where data related to these considerations are fed at one end of a computer and an ideal financial structure pops out of the other. Consequently, human judgement must be used to resolve the many conflicting forces in laying plans for the types of funds to be sought".

6.6 APPROACHES FOR CAPITAL STRUCTURE THEORIES

There are four major theories/approaches explaining the relationship between capital structure, cost of capital and value of the firm:

1. Net Income Approach (N.I. Approach)

2. Net Operating Income Approach (N.O.I. Approach)

3. Traditional Approach

4. Modigliani and Miller Approach (MM Hypothesis)

These approaches analyses relationship between the leverage, cost of capital, and the value of the firm in different ways. However, the following assumptions are made to understand this relationship:

(i)   The firm employs only two types of capital viz., debt and equity. There are also no preference shares.

(ii)   There are no corporate taxes. This assumption has been removed later.

(iii) There are no retained earnings. It implies that entire profits are distributed among shareholders as dividends.

(iv)   The firm's total assets are given and they do not change. In other words, the investment decisions are assumed to be constant.

(v)   The firm's total financing remains constant. The firm can change its capital structure either by redeeming the debentures by issue of shares or by raising more debt and reduce the equity share capital.

(vi)   The Operating Earnings (EBIT) are not expected to grow.

(vii) The business risk remains constant and is independent of capital structure and financial risks.

(viii) All investors have the same subjective probability distribution of the future expected operating earnings (EBIT) for a given firm.

(ix)   The firm has a perpetual life.

6.6.1 Net Income Approach (NI-Approach)

This approach was suggested by Durand David. According to this approach, a firm can increase its value or lower the overall cost of capital by increasing the proportion of debt in the capital structure. In other words, if the degree of financial leverage increases, the

weighted average cost of capital will decline with every increase in the debt content in total funds employed, while the value of firm will increase. Reverse will happen in a converse situation.

Net Income approach is based on the following assumptions:

(i)   The cost of debt is less than cost of equity or equity capitalization rate; and

(ii)   The use of debt content does not change the risk perception of investors as a result both the K_d (debt capitalization rate) and k_e (equity capitalization rate) remains constant.

(iii) There are no corporate taxes;

The value of the firm on the basis of Net Income Approach can be ascertained as follows:

$$V = S + B$$

Where,

V   = Value of the firm

S   = Market value of equity or stock

B/D   = Market value of debt

However, Market value of equity (S) can be ascertained as below:

$$\text{Market value of equity (S)} = \frac{NI}{K_e}$$

Where,

NI   = Net Income (Earnings available for two equity shareholders)

K_e = Equity Capitalisation rate

Under NI approach, the value of the firm will be maximum at a point where weighted average cost of capital is minimum. Thus, the theory suggests that use of maximum possible debt financing will minimize the overall cost of capital.

The overall cost of capital under this approach can be calculated as below:

$$\text{Overall cost of capital} = \frac{EBIT}{\text{Value of firm}}$$

Illustration 1:

ABC Ltd. is expecting annual earnings before the payment of interest and tax of Rs.2 lakhs. The company in its capital structure has Rs.8 lakhs in 10% debentures. The cost of equity or capitalisation rate is 12.5%. You are required to calculate the value of firm according to Net Income Approach. Also, compute the overall cost of capital.

Solution: Statement showing the Value of firm and overall Cost of Capital

Earnings before interest and tax (EBIT)	2,00,000
Less: Interest on debentures (10% of Rs.8,00,000)	80,000
Earnings available for equity shareholders (NI)	1,20,000
Equity capitalisation rate (K_e)	12.5%
Market value of equity (S) = [NI/K_e]	
$= \dfrac{Rs.1,20,000}{12.5} \times 100$	9,60,000
Market value of debt (D)	8,00,000
Total value of the firm (V)	**17,60,000**
Therefore, Overall cost of capital $= \dfrac{EBIT}{\text{Value of the firm}}$	
$= \dfrac{Rs.2,00,000}{Rs.17,60,000} \times 100$	
= 11.36%	

Illustration 2:

Assume in the illustration given above that firm decides to raise further Rs.2,00,000 by issue of debentures and to use the proceeds thereof to redeem equity shares. You are required to calculate the value of the firm according to NI Approach. Also, compute the overall cost of capital.

Solution: Statement showing the Value of firm and overall Cost of Capital

Earnings before interest and tax (EBIT)	2,00,000
Less: Interest on debentures (10% of Rs.10,00,000)	1,00,000
Earnings available for equity shareholders (NI)	1,00,000
Equity capitalisation rate (K_e)	12.5%
Market value of equity (S) = [NI/K_e]	
$= \dfrac{Rs.1,00,000}{12.5} \times 100$	8,00,000
Market value of debt (D)	10,00,000
Total value of the firm (V)	**18,00,000**
Therefore, Overall cost of capital $= \dfrac{EBIT}{\text{Value of the firm}}$	
$= \dfrac{Rs.2,00,000}{Rs.18,00,000} \times 100$	
= 11.12%	

From the above two illustrations, it can be observed that the cost of equity, i.e., 12.5% remains constant at different levels of debt-equity mix and the cost of debt also remains same at 10% for every mix. However, the cost of debt is always cheaper to cost of equity and overall cost of capital goes on decreasing with increased use of debt.

Illustration 3:

A Ltd. is expecting an annual Operating Profit of (EBIT) of Rs.1,00,000. The cost of equity capital or capitalisation rate is 12.5%. You are required to calculate the total value of the firm and also state the overall cost of capital when

(a) company has Rs.4,00,000 in 10% debentures?

(b) the company raises another Rs.5,00,000/- debt capital and use the proceeds to redeem equity.

(c) when the company reduces the debt capital to Rs.3,00,000/- by raising Rs.1,00,000/- equity capital.

Solution:

(a) Statement showing the Value of Firm and Overall Cost of Capital when Debt Capital is Rs.4,00,000/-

Earnings before interest and tax (EBIT)	1,00,000
Less: Interest on debentures (10% of Rs.4,00,000)	40,000
Earnings available for equity shareholders (NI)	60,000
Equity capitalisation rate (K$_e$)	12.5%
Market value of equity (S) = [NI/K$_e$]	
$= \dfrac{Rs.60,000}{12.5} \times 100$	4,80,000
Market value of debt (D)	4,00,000
Total value of the firm (V)	**8,80,000**
Therefore, Overall cost of capital $= \dfrac{EBIT}{Value\ of\ the\ firm}$	
$= \dfrac{Rs.1,00,000}{Rs.8,80,000} \times 100$	
= 11.36%	

(b) Statement showing the Value of the Firm and Overall Cost of Capital when the Debt Capital is Rs.5,00,000/-

Earnings before interest and tax (EBIT)	1,00,000
Less: Interest on debentures (10% of Rs.5,00,000)	50,000
Earnings available for equity shareholders (NI)	50,000
Equity capitalisation rate (K$_e$)	12.5%
Market value of equity (S) = [NI/K$_e$]	
$= \dfrac{Rs.50,000}{12.5} \times 100$	4,00,000
Market value of debt (D)	5,00,000
Total value of the firm (V)	**9,00,000**
Therefore, Overall cost of capital $= \dfrac{EBIT}{Value\ of\ the\ firm}$	

$$= \frac{\text{Rs.}1,00,000}{\text{Rs.}9,00,000} \times 100$$

$$= 11.10\%$$

The above calculation shows that raising of additional debt has increased the total value of the firm and reduced the overall cost of capital structure.

(c) Statement showing the Value of firm and Overall cost of capital when the Debt Capital is Rs.3,00,000/-

Earnings before interest and tax (EBIT)	1,00,000
Less: Interest on debentures (10% of Rs.3,00,000)	30,000
Earnings available for equity shareholders (NI)	70,000
Equity capitalisation rate (K_e)	12.5%
Market value of equity (S) = [NI/K_e]	
$\qquad = \dfrac{\text{Rs.}70,000}{12.5} \times 100$	5,60,000
Market value of debt (D)	3,00,000
Total value of the firm (V)	**8,60,000**
Therefore, Overall cost of capital = $\dfrac{\text{EBIT}}{\text{Value of the firm}}$	
$\qquad = \dfrac{\text{Rs.}1,00,000}{\text{Rs.}8,60,000} \times 100$	
$\qquad = 11.60\%$	

The above table shows that decrease in debt has reduced the overall value of the firm and increased the overall cost of capital.

Thus, according to Net Income (NI) approach, a firm can increase or decrease its total value (V) and its overall cost of capital by increasing or decreasing the debt content or the degree of leverage in its capital structure. An increase in the value of the firm would result in increase in the market value of its shares and *vice-versa*.

6.6.2 Net Operating Income Approach (NOI-Approach)

This approach was suggested by Durand David. According to this approach, the market value of the firm is not affected by the capital structure changes. The market value of the firm is ascertained by capitalising the net operating income at the overall cost of capital that is constant. The market value of the firm is determined as follows:

$$\text{Market value of the firm (V)} = \frac{\text{Earnings before Interest and Tax (EBIT)}}{\text{Overall cost of capital}} = \frac{\text{EBIT}}{K_0}$$

The value of equity can be determined by the following equation:

Value of equity (S) = V (Market value of firm) – B (Book value of debt)

Therefore, the cost of equity can be calculated by the following formula:

$$\text{Cost of equity} = \frac{\text{Net Income available to Equity Share holders}}{\text{Market value of Equity}}$$

$$K_e = K_o + (K_o - K_d)B/S$$

The Net Operating Income Approach is based on the following assumptions:

(i)   The overall cost of capital remains constant for all degree of debt-equity mix.

(ii) The market capitalizes the value of firm as a whole. Thus, the split between debt and equity is not important.

(iii) The use of debt funds increases the risk of shareholders. This causes the equity capitalisation rate to increase. Thus, the advantage of debt is set off exactly by increase in equity capitalisation rate.

(iv) There are no corporate taxes.

(v)   The cost of debt remains constant.

Under NOI Approach, the overall cost of capital is constant, therefore, there is no optimal capital structure, rather every capital structure is as good as any other and so every capital structure is optimal one.

Illustration 4:

XYZ Ltd. is expecting an Earning before interest and tax of Rs.4,00,000 and belongs to risk class of 10%. You are required to find out the value of firm & cost of equity capital if it employs 8% debt to the extent of 20%, 35% or 50% of the total financial requirement of Rs.20,00,000. Also, verify the overall cost of capital.

Solution:

Statement showing Value of firm and Cost of Equity Capital

	20% Debt	35% Debt	50% Debt
Earnings before interest & tax (EBIT)	Rs. 4,00,000	Rs. 4,00,000	Rs. 4,00,000
Overall Cost of capital	10%	10%	10%
Value of firm (V) = $\dfrac{\text{EBIT}}{\text{Cost of Capital}}$	Rs. 40,00,000	Rs.40,00,000	Rs.40,00,000
Value of 8% Debt (D)	Rs.4,00,000	Rs.7,00,000	Rs.10,00,000
Value of Equity (S) = V – D	Rs.36,00,000	Rs.33,00,000	Rs.30,00,000
Net profit (EBIT – Interest)	Rs.3,68,000	Rs.3,44,000	Rs.3,20,000
Cost of equity (K_e) = (Net profit/Value of equity) x 100	10.22%	10.42%	10.66%

It is apparent from the above computation that the overall cost of capital and value of the firm are constant at different levels of debt, i.e., at 20%, 35%, and 50% respectively. The benefit of use of debt content is offset by increase in the cost of equity. The overall cost of capital remains constant and can be calculated as follows:

Overall Cost of Capital (K_o) $= K_d[D/D+S] + K_e[S/D+S]$

At 20% Debt $= [4,00,000/40,00,000] \times 8\% + [36,00,000/40,00,000] \times 10.22\%$

$= 0.008 + 0.092$

$= 0.10 \text{ or } 10\%$

At 35% Debt $= [7,00,000/40,00,000] \times 8\% + [33,00,000/40,00,000] \times 10.42\%$

$= 0.014 + 0.0859$

$= 0.0999 \text{ or } 10\%$

At 50% Debt $= [10,00,000/40,00,000] \times 8\% + [30,00,000/40,00,000] \times 10.66\%$

$= 0.02 + 0.07995$

$= 0.09995$ or 10%

Illustration 5:

XY Ltd. has an EBIT of Rs.1,00,000. The cost of debt is 10% and the outstanding debt amount to Rs.4,00,000. Presuming the overall capitalisation rate as 12.5%, calculate the total value of the firm and the equity capitalisation rate.

Solution:

Earnings before interest & tax (EBIT)	Rs. 1,00,000
Overall Cost of capital	12.5%
Value of firm (V) = $\dfrac{EBIT}{Cost\ of\ Capital}$ = $\dfrac{1,00,000}{12.5}$ x 100	Rs. 8,00,000
Value of 8% Debt (D)	Rs.4,00,000
Value of Equity (S) = V – D	Rs.4,00,000
Net profit (EBIT – Interest) = 1,00,000 – 40,000	Rs.60,000
Cost of equity (K_e) = (Net profit/Value of equity) x 100 = [60,000/4,00,000] x 100	15%

6.6.3 Traditional Approach

The traditional approach is also called an intermediate approach as it takes a midway between NI approach (that the value of the firm can be increased by increasing financial leverage) and NOI approach (that the value of firm is constant irrespective of the degree of financial leverage). According to this approach, the firm should strive to reach the optimal capital structure and its total value through a judicious use of the both debt and equity in capital structure.

At the optimal capital structure, the overall cost of capital will be minimum and the value of the firm is maximum. It further states that the value of the firm increases with financial leverage up to a certain point. Beyond this point, the increase in financial leverage will increase its overall cost of capital and hence the value of firm will decline.

This approach partly contains features of both the NI and NOI approaches as given below:

(i) The traditional approach is similar to NI Approach to the extent that it accepts that the capital structure or leverage of the firm affects the cost of capital and its valuation. However, it does not subscribe to the NI approach that the value of the firm will necessarily increase with all degree of leverages.

(ii) It subscribes to the NOI approach that beyond a certain degree of leverage, the overall cost of capital increases resulting in decrease in the total value of the firm. However, it differs from NOI approach in the sense that the overall cost of capital will not remain constant for all degrees of leverage.

Thus, as per the traditional approach, the cost of capital is a function of financial leverage and the value of firm can be affected by the judicious mix of debt and equity in capital structure. The increase of financial leverage up to a point favourably affects the value of

the firm. At this point, the capital structure is optimal and the overall cost of capital will be the least.

Illustration 6:

Ambica Ltd. is expecting an EBIT of Rs.3,00,000. The company presently raised its entire fund requirement of Rs.20,00,000 by issue of equity with capitalisation rate of 16%. The firm is now contemplating to redeem a part of capital by introducing debt financing. The firm has two options – to raise debt to the extent of 30% or 50% of total funds. It is expected that for debt financing up to 30% the rate of interest will be 10% and equity capitalisation rate is expected to increases to 17%. However, if the firm opts for 50% debt then interest rate will be 12% and equity capitalisation rate will be 20%. You are required to compute value of firm and its overall cost of capital under different options.

Solution:

	0% Debt	30% Debt	50% Debt
Total Debt	--	Rs.6,00,000	Rs.10,00,000
Rate of interest	--	10%	12%
Earning before interest and tax (Rs.)	3,00,000	3,00,000	3,00,000
Less: Interest	--	60,000	1,20,000
Profit after interest before tax	3,00,000	2,40,000	1,80,000
Equity capitalisation rate (K_e)	16%	17%	20%
Value of equity (E)	18,75,000	14,11,176	9,00,000
Value of debt (D)	--	6,00,000	10,00,000
Total value of firm (V) = E + D	**18,75,000**	**20,11,176**	**19,00,000**
Overall cost of capital = (EBIT/V)	**16%**	**14.91%**	**15.78%**

It is apparent from above, that the value of firm increases from Rs.18,75,000 to Rs.20,11,176, if firm increases its debt content from 0% to 30%, the overall cost of capital fall from 16% to 14.91% accordingly. However, if the debt content increased from 30% to 50%, the value of the firm reduces from Rs.20,11,176 to Rs.19,00,000 and its overall cost of capital increases from 14.91% to 15.78%.

6.6.4 Modigliani and Miller Approach

The Modigliani-Miller (MM) approach is similar to the Net Operating Income (NOI) approach. In other words, according to this approach, "the value of a firm is independent of its capital structure". However, there is a basic difference between the two. The NOI approach is purely definitional or conceptual. It does not provide operational justification for irrelevance of the capital structure in the valuation of the firm. While MM approach supports the NOI approach providing behavioural justification for the independence of the total value and the cost of capital of the firm from its capital structure. In other words, MM approach maintains that the weighted average cost of capital does not change with change in the debt equity mix or capital structure of the firm. It also gives operational justification for this and not merely states only a proposition.

Modigliani-Miller makes the following propositions:

(i)   The overall cost of capital (K) and the value of the firm (V) are independent of the capital structure. In other words, K and V are constant for all levels of debt-equity mix. The total market value of the firm is given by capitalizing the expected net operating income (NOI) by the rate appropriate for the risk class.

(ii)   The cost of equity (K_e) is equal to capitalisation rate of a pure equity stream plus a premium for the financial risk. The financial risk increases with the use of more

debt content in the capital structure. As a result, K_e increases in a manner to offset exactly the use of less expensive source of funds represented by debt.

(iii) The cut-off rate for investment purposes is completely independent of the way in which an investment is being financed.

Assumptions

The MM approach is subject to the following assumptions:

(i) The capital markets are assumed to be perfect. This means that investors are free to buy and sell securities. They are well informed about the risk-return on all type of securities. There are no transaction costs. The investors behave rationally. They can borrow without restrictions on the same terms as the firms do.

(ii) The firms can be classified into 'homogenous risk class'. They belong to this class if their expected earnings is having identical risk characteristics.

(iii) All investors have the same expectations from a firm's net operating income (EBIT) which are necessary to evaluate the value of a firm.

(iv) The dividend pay-out ratio is 100%. In other words, there are no retained earnings.

(v) There are no corporate taxes. However, this assumption has been removed later.

Thus, the MM hypothesis can be put in the following words: "MM hypothesis based on the idea that no matter how you divide the capital structure of a firm among debt, equity and other claims, there is a conservation of investment value. That is, because the total investment value of a corporation depends upon its underlying profitability and risk. It is invariant with respect to relative changes in the firm's financial capitalisation. Hence, the total pie does not change as it is divided into debt, equity, and other securities. The sum of the parts must equal the whole; so regardless of financing mix, the total value of the firm stays the same".

Arbitrage Process

The 'arbitrage process' is the operational justification of MM hypothesis. The term 'Arbitrage' refers to an act of buying an asset or security in one market having lower price and selling it in another market at a higher price. The consequence of such action is that the market price of the securities of the two firms exactly similar in all respects except in their capital structures can not for long remain different in different markets. Thus, arbitrage process restores equilibrium in value of securities. This is because in case the market value of the two firms which are equal in all respects except their capital structure, are not equal, investors of the overvalued firm would sell their shares, borrow additional funds on personal account and invest in the under-valued firm in order to obtain the same return on smaller investment outlay. The use of debt by the investor for arbitrage is termed as 'home made' or 'personal leverage'. This will be clear with the following illustration:

Illustration 7:

Two firms A and B are identical in all respects except that the firm A has 10% Rs.50,000 debentures. Both the firms have the same amount of earnings before interest and taxes Rs.10,000. The equity capitalisation rate of firm A is 16% while that of firm B is 12.5%.

You are required to calculate the total market value of each of the firms and explain with an example the working of the 'arbitrage process'.

Solution:

Statement Showing the Total Value of the Firms

Particulars	Firm A Rs.	Firm B Rs.
Earnings before Interest & Tax (EBIT)	10,000	10,000
Less: Interest	5,000	......
Earnings available for equity shareholders	5,000	10,000
Equity capitalisation rate (K_e)	16%	12.5%
Market value of Equity (S):		
Firm A : [5,000/16] × 100	31,250	......
Firm B : [10,000/12.5] × 100	......	80,000
Market value of Debt (D)	50,000	......
Value of firm (V)	**81,250**	**80,000**
Overall cost of capital (k) = EBIT/V:		
Firm A : [10,000/81,250] × 100	12.3%	....
Firm B : [10,000/80,000] × 100	....	12.5%
Debt-Equity Ratio: (D/S):		
Firm A : [50,000/81,250]	0.6	....

Working of the Arbitrage Process: The above table shows that market value of the firm A having debt content in its capital structure is higher than the market value of the firm B, which does not have any debt content in its capital structure. According to MM Hypothesis this situation can not continue for longer period on account of working of the arbitrage process. The investors in company B can earn a higher return on their investment with a lower financial risk. Hence, the investors in company A will start selling their shares and start buying shares in company B. These arbitrate transactions will continue till company A's shares decline in price and B's shares increase in price enough to make the total value of the two firms identical.

According to MM hypothesis, the total value of a levered firm (i.e. a firm having debt content in its capital structure) can not be more than that of an unlevered firm. The reverse is also true i.e., the value of an unlevered firm can not be greater than the value of a levered firm. This is again because of the setting in of the arbitrage process, which will decrease the market value of the unlevered firm and increase that of the levered firm.

Limitations of MM Hypothesis

The Arbitrage process is the behavioural foundation for the MM hypothesis. However, the arbitrage process fails to bring the desired equilibrium in the capital markets on account of the following reasons:

(i) ***Rates of Interest are not the same for the individuals and the firms:*** The assumption made under the MM hypothesis that the firms and individuals can borrow and lend at the same rate of interest does not hold good in real practice. This is because firms have the higher credit standing as compared to the individuals on account of firm's holding substantial fixed assets.

(ii) ***Home made leverage is not perfect substitute for corporate leverage:*** The risk to which an investor is exposed is not identical when the investor himself borrows proportionate to his share in the firm's debt and when the firm itself borrows. As a matter of fact, the risk exposure to the investor is greater in the former case as compared to the latter. When the firm borrows, the liability of the investor is limited only to the extent of his proportionate share holding, in case the company is forced to go for its liquidation. However, when an individual borrows, he has an ultimate liability and even his personal property can be used for payment to his creditors.

(iii) ***Transaction costs involved:*** Buying and selling of securities involves transaction costs. It would therefore become necessary for investor to invest a larger amount in the shares of the unlevered/levered firms than his present investment to earn the same return.

(iv) ***Institutional restrictions:*** The switching option from unlevered to levered firm and vice-versa is not available to all investors, particularly, institutional investors, *viz.*, Life Insurance Corporation of India, Unit Trust of India, Commercial Banks, etc. Thus, the institutional restrictions stand in the way of smooth operation of the arbitrage process.

(v) ***Corporate Taxes frustrate MM Hypothesis:*** On account of corporate taxes, it is a known fact that the cost of borrowing funds to the firm is less than the contractual rate of interest. As a result, the total return to the shareholders of an unlevered firm is always less than that of the levered firm. Thus, the total market value of a levered firm tends to exceed that of the unlevered firm on account of this reason.

Check Your Progress 2

State whether the following statements are true or false:

1. Capital structure refers to the resourcing and financing of funds.

2. The finance manager has to keep in view various factors such as risk, cost of capital, control, trading on equity, etc.

3. The traditional approach shows that the value of firm increases with financial leverage up to a certain point.

4. Modigliani-Miller approach maintains that the weighted average cost of capital does not change with change in the debt-equity mix.

5. Net Income approach concludes that the value of firm shall be increased and the overall cost of capital will be declined with every addition of debt in the capital structure of a company.

6.7 TAXATION AND CAPITAL STRUCTURE

The irrelevance theorem of capital structure of MM is valid if the perfect market assumptions underlying their analysis are satisfied. However, in the face of imperfections characterizing the real world capital market, the capital structure of a firm may affect its valuation. Presence of taxes is a major imperfection in the real world. Hence, this section examines the implications of corporate taxes for the capital structure.

When taxes are applicable to corporate income, debt financing is advantageous. This is because dividends and retained earnings are not deductible for tax purposes; whereas, interest on debt is a tax-deductible expense. As a result, the total income available for

both stockholders and debt-holders is greater when debt capital is used. Therefore, a levered firm should have a greater market value as compared to an unlevered firm. The value of the levered firm would exceed that of the unlevered firm by an amount equal to the levered firm's debt multiplied by the tax rate. This can be put in the form of the following formula:

$$Vu = \frac{\text{Profits available for equity shareholders}}{\text{Equity capitalisation Rate}}$$

(or)

Symbolically, $Vu = \dfrac{EBIT\,(1-t)}{Ke}$

Where,

Vu   =   Market value of an unlevered firm

EBIT =   Earnings before interest and taxes. Since there is no debt content in case of unlevered firm, EBIT shall be equal to EBT.

t   =   Tax rate

Ke   = Equity capitalisation rate.

Value of levered firm can be symbolically as below:

Vl   =   Vu + Dt

Where,

Vl   =   Value of levered firm

Vu   =   Value of an unlevered firm

D   =   Amount of debt

t   =   Tax rate

Illustration 8:

Two firms A and B are identical in all respects except the degree of leverage. Firm A has 6% debt of Rs.3,00,000, while firm B has no debt. Both the firms earn an EBT of Rs.1,20,000 each. The equity capitalisation rate is 10% and the corporate tax is 60%. Calculate the market value of the two firms.

Solution:

Value of unlevered firm B:

$$Vu = \frac{\text{Profits available for equity shareholders}}{\text{Equity capitalisation Rate}}$$

$$= \frac{1,20,000 - 72,000}{10\%}$$

$$= \frac{48,000 \times 100}{10}$$

$$= \text{Rs.4,80,000}$$

or

$$Vu = \frac{EBIT\ (1-t)}{Ke}$$

$$= \frac{1,20,000\ (1-0.6)}{10\%}$$

$$= \frac{1,20,000 \times 0.4}{10\%}$$

$$= Rs.4,80,000$$

Thus, the value of firm B (unlevered) is Rs.4,80,000. The value of the firm A (levered) can now be ascertained as below:

Value of levered firm A:

$$Vl = Vu + Dt$$
$$= 4,80,000 + 3,00,000 \times 0.6$$
$$= 4,80,000 + 1,80,000$$
$$= Rs.6,60,000.$$

6.8 LET US SUM UP

Capital structure refers to a proportionate mix of various sources of financing of funds, namely debentures/bonds, preference shares and equity shares. Every business enterprise has to design and maintain an appropriate capital structure so that the overall cost of capital must be low and the value of the firm should be high. The capital structure decision is a continuous one and has to be taken whenever a firm needs additional finances. The finance manager has to keep in view various factors such as risk, cost of capital, control, trading on equity, corporate taxation, government policies, legal requirements, marketability, flexibility, size of the company purpose of financing, period of financing, nature of enterprise, requirement of investors, provision for future, etc. while determining the capital structure of a company. Net Income approach concludes that the value of firm shall be increased and the overall cost of capital will be declined with every addition of debt in the capital structure of a company. However, Net Operating Income approach strongly believes that the overall cost of capital remains constant, as such every capital structure is optimal one. The traditional approach shows that the value of firm increases with financial leverage up to a certain point and beyond this point, every increase in financial leverage will result in increasing the overall cost of capital and hence the value of firm will decline. Modigliani-Miller approach maintains that the weighted average cost of capital does not change with change in the debt-equity mix. It also gives operational justification for this. This aspect has been explained with Arbitrage process.

6.9 LESSON END ACTIVITY

Compare and contrast MM and traditional approaches to capital structure.

6.10 KEYWORDS

Capital Structure: The composition of a firms financing consisting of equity, preference and debt.

Trading on equity: Raising debt capital, by keeping equity as the base, to improve the earnings per share of the equity share holders.

6.11 QUESTIONS FOR DISCUSSION

1. What is Capital Structure?

2. How do you determine 'Optimum Capital Structure'?

3. Explain various patterns of capital structure.

4. Explain the characteristics of an optimum capital structure.

5. What is 'trading on equity'?

6. Distinguish between NI and NOI approaches.

7. What are the assumptions of MM hypothesis?

8. What is "Arbitrage Process"?

9. What are the limitations of MM hypothesis?

Essay Type Questions

1. Discuss various factors to be considered by a financial manager while determining the capital structure of a company.

2. Discuss the factors that effect the capital structure of a firm.

3. What is "Trading on Equity"? Explain with an example how a company avail the benefit of trading on equity. State its limitations also.

4. What do you understand by capital structure of a corporation? Discuss the qualities which a sound capital structure should possess.

5. Critically examine the Net Income and Net Operating Income approaches to capital structure.

6. Explain 'Arbitrage Process' under Modigliani-Miller theorem.

7. Discuss the Traditional theory of capital structure.

Practical Problems

1. From the following selected data determine the value of the firms P and Q belonging to the homogeneous risk class under (a) the NI approach and (b) the NOI approach:

	Levered firm	Unlevered firm
EBIT	Rs.2,00,000	Rs.2,00,000
Interest rate 10%	Rs.50,000	
Equity capitalisation rate	15%	
Corporate tax rate	50%	

    Which of the two firms has an optimal capital structure under the (i) NI approach, and (ii) NOI approach?

Ans. Firm P has optimal capital structure both under NI and NOI approaches

2. Company X and Company Y are in the same risk class and are identical in every fashion except that company X uses debt while company Y does not. The levered firm has Rs.9,00,000 debentures, carrying 10% rate of interest. Both the firms earn 20% before interest and taxes on their total assets of Rs.15 lakhs. Assume perfect capital markets, rational investors and so on; a tax rate of 15% for an all-equity company.

    (i)   Compute the value of firm X and Y using the Net Income (NI) approach.

    (ii) Compute the value of each firm using the Net Operating Income (NOI) approach.

    (iii) Using the NOI approach, calculate the overall cost of capital for firms X and Y.

Ans. (i)   firm X Rs.16,00,000; firm Y Rs.10,00,000

     (ii) firm X Rs.14,50,000; firm Y Rs.10,00,000

     (iii) firm X 10.34%; firm Y 15%]

Check Your Progress: Model Answers

CYP 1

1. Capital Structure refers to the mix of various sources from where the long term funds required in a business may be raised.

2. The optimum capital structure is attained when the market value of equity share is the maximum and overall cost of capital is the minimum.

CYP 2

1.   T,   2.   T,   3.   T,   4.   T,   5.   T

6.12 SUGGESTED READINGS

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LESSON

7

COST OF CAPITAL

7.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

● Understand the concept of cost of capital and its components.

● Study the importance and relevance of cost of capital.

● Discuss the procedure of measurement of specific costs and the overall cost of capital.

7.1 INTRODUCTION

The cost of capital is a significant factor in designing the capital structure of an undertaking. The basic reason behind running a business undertaking is to earn a return at least equal to its cost of capital. Commercial undertaking has no relevance if it does not expect to earn its cost of capital. Therefore, cost of capital constitutes an important factor in various business decisions. In analyzing financial implications of capital expenditure proposals, the cost of capital will be taken as the discounting rate. Obviously, if a particular project gives an internal rate of return higher than its cost of capital, it should be an attractive opportunity. In this lesson , the focus will be on the measurement of cost of capital of each source of finance, individually and overall costs of capital.

7.2 CONCEPT OF THE COST OF CAPITAL

The term 'cost of capital' refers to the minimum rate of return a firm must earn on its investments so that the market value of the company's equity shares does not fall. This is consonance with the overall firm's objective of wealth maximization. This is possible only when the firm earns a return on the projects financed by equity shareholders' funds at a rate, which is at least equal to the rate of return expected by them. If a firm fails to earn return at the expected rate, the market value of the shares would fall and thus result in reduction in overall wealth of the shareholders.

A firm's cost of capital may be defined as "the rate of return expected by the investors from their investment.

There are three basic aspects of concept of cost:

a) *It is not a cost as such:* A firm's cost of capital is really the rate of return that it requires on the projects available. It is merely a 'hurdle rate'. Of course, such rate may be calculated on the basis of actual cost of different components of capital.

b) *It is the minimum rate of return:* A firm's cost of capital represents the minimum rate of return that will result in at least maintaining (if not increasing) the value of its equity shares.

c) *It comprises three components:* A firm's cost of capital comprises of the following three components:

   (i) *Return at Zero risk level:* This refers to the expected rate of return when a project involves no risk whether business or financial.

   (ii) *Premium for business risk:* The term business risk refers to the variability in operating profit (EBIT) due to change in sales. In case a firm selects a project having more than the normal or average risk, the suppliers of funds for the project will expect a higher rate of return than the normal rate. The cost of capital will thus go up. The business risk is generally determined by the capital budgeting decisions.

   (iii) *Premium for financial risk:* The term financial risk refers to the risk on account of pattern of capital structure (or debt-equity mix). In general, it may be said that a firm having a higher debt content in its capital structure is more risky as compared to a firm, which has comparatively low debt content. This is because in the former case, the firm requires higher operating profit to cover periodic interest payment and repayment of principal at the time of maturity as compared to the latter. Thus, the chances of cash insolvency are greater in case of such firms. The suppliers of funds would therefore expect a higher rate of return from such firms as compensation for higher risk.

These three components of cost of capital may be put in the form of the following equation:

$$K = r_o + b + f$$

Where, K = Cost of capital; ro = return at zero risk level; b = Premium for business risk; and f = Premium for financial risk.

7.3 IMPORTANCE OF THE COST OF CAPITAL

The determination of the firm's cost of capital is important from the point of view of both capital budgeting as well as capital structure planning decisions. These aspects have been discussed below:

(i) *Capital budgeting decisions:* In capital budgeting decisions, the cost of capital is often used as a discount rate on the basis of which the firm's future cash flows are discounted to find out their present values. Thus, the cost of capital is the very basis for financial appraisal of new capital expenditure proposals. The decision of the finance manager will be irrational and wrong in case the cost of capital is not correctly determined. This is because of the business must earn at least at a rate which equals to its cost of capital in order to make at least a break-even.

(ii) *Capital structure decisions:* The cost of capital is also an important consideration in capital structure decisions. The finance manager must raise capital from different sources in a way that it optimizes the risk and cost factors. The sources of funds which have less cost involve high risk. Raising of loans may, therefore, be cheaper on account of income tax benefits, but it involves heavy risk because a slight fall in the earning capacity of the company may bring the firm near to cash insolvency. It is, therefore, absolutely necessary that cost of each source of funds is carefully considered and compared with the risk involved with it.

Check Your Progress 1

1. Define cost of capital.

    ....

    ....

2. What do you mean by return at zero risk level?

    ....

    ....

7.4 CLASSIFICATION OF THE COST OF CAPITAL

Cost of capital can be classified as follows:

1. *Explicit cost and Implicit cost:* The explicit cost of any source of finance may be defined as "the discount rate that equates the present value of the funds received by the firm net of underwriting costs, with the present value of expected cash outflows". These outflows may be interest payment, repayment of principal or dividend. This may be calculated by computing value according to the following equation:

$$I_o = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \text{.........} + \frac{C_n}{(1+K)^n}$$

Where,

    I_o = Net amounts of cash received by the firm at time zero

    C   = Cash Outflow in the period concerned

    n   = Duration for which the funds are provided

    K   = Explicit cost of capital.

Thus, the explicit cost of capital may be taken as "the rate of return of the cash flows of financing opportunity". It is, in other words the internal rate of return the firm pays for financing. For example, if a company raised a sum of Rs.1 lakh by way of debentures carrying interest at 9% and payable after 20 years, the cash inflow will be a sum of Rs. 1 lakh. However, annual cash outflow will be Rs.9,000 for 20 years. The explicit cost will, therefore, be that rate of internal return which equates Rs.1 lakh, the initial cash inflow with Rs.9,000 payable every year for 20 years and Rs.1 lakh at the end of 20 years.

The implicit cost may be defined as "the rate of return associated with the best investment opportunity for the firm and its shareholders that will be forgone if the project presently under consideration by the firm were accepted". When the earnings are retained by a company, the implicit cost is the income, which the shareholders could have earned if such earnings would have been distributed and invested by them. As a matter of fact, explicit costs arise when the funds are raised, while the implicit costs arise whenever they are used. Viewed from this angle, funds raised from any source have implicit costs once they are invested.

2. *Future cost and historical cost:* Future cost refers to the expected cost of funds to finance the project, while historical cost is the cost which has already been incurred for financing a particular project. In financial decision making, the relevant costs are future costs and not the historical costs. However, historical costs are useful in projecting the future costs and providing an appraisal of the past performance when compared with standard or predetermined cost.

3. *Specific cost and combined cost:* The cost of each component of capital (i.e., equity shares, preference shares, debentures, loans, etc.) is known as specific cost of capital. In order to determine the average cost of capital of the firm, it becomes necessary first to consider the costs of specific methods of financing. This concept of cost is useful in those cases where the profitability of a project is judged on the basis of the cost of the specific sources from where the project will be financed. For example, if a company's estimated cost of equity share capital is 11%, a project which will be financed out of equity shareholders' funds would be accepted only when it gives a rate of return of at least 11%.

The composite or combined cost of capital is inclusive of all cost of capital from all sources, i.e., equity shares, preference shares, debentures and other loans. In capital investment decisions, the composite cost of capital will be used as a basis for accepting or rejecting the proposal, even though the company may finance one proposal from one source of financing while another proposal from another source of financing. This is because it is overall mix of financing over time, which is important in valuing the firm as an ongoing overall entity.

4. *Average cost and marginal cost:* The average cost of capital is the weighted average of the costs of each component of funds employed by the firm. The weights are in proportion of the share of each component of capital in the total capital structure.

The computation of average cost involves the following steps:

(i)   It requires measurement of costs of each specific source of capital.

(ii)   It requires assigning of appropriate weights to each component of capital.

(iii)   It raises a question whether the average cost of capital is ought to be affected by changes in the composition of the capital. The financial experts differ in their approaches. According to the traditional approach, the firm's cost of capital depends upon the method and level of financing, while according to the modern approach as propounded by Modigliani and Miller, the firm's total cost of capital is independent of the method and level of financing.

Marginal cost of capital, on the other hand, is the weighted average cost of new funds raised by the firm. For capital budgeting and financing decisions, the marginal cost of capital is the most important factor to be considered.

7.5 APPROACHES TO COST OF CAPITAL

The concept of cost of capital has considerable practical utility. However, it should be noted that cost of capital is not only the most important but also the most disputed topic in financial management. There are two important approaches in this regard.

7.5.1 Traditional Approach

According to this approach, a firm's cost of capital depends upon the method and level of financing or its capital structure. A firm can, therefore, change its overall cost of capital by increasing or decreasing the debt-equity mix. For example, if a company has 9% debentures (issued and payable at par) the cost of funds raised from this sources comes to only 4.5% (assuming 50% tax rate). Funds from other sources, such as equity shares and preference shares, also involve cost. But the raising of funds through debentures is cheaper because of the following reasons:

(i)   Interest rates are usually lower than dividend rates.

(ii)   Interest is allowed as an expense resulting in a tax benefit while dividend is not allowed as an expense while computing taxable profits of the company.

The traditional theorists (Ezra Soloman, Alexander Barges and others), therefore, argue that the weighted average cost of capital will decrease with every increase in the debt content in the total capital employed. However, the debt content in the total capital employed should be maintained at a proper level because cost of debt is a fixed burden on the profits of the company. It may have adverse consequences in periods when company has low profitability. Moreover, if the debt content is raised beyond a particular point, the investors will start considering the company too risky and their expectations from equity shares will go up.

7. 5. 2 Modigliani and Miller Approach

According to this approach, the firm's total cost of capital is constant and it is independent of the method and level of financing. In other words, according to this approach a change in the debt-equity ratio does not affect the total cost of capital. According to traditional approach, as explained above, the cost of capital is the weighted average cost of the debt and the cost of equity. Each change in the debt-equity ratio automatically offsets change in one with the change in the other on account of change in the expectation of equity shareholders. For example, the capital structure of a company is as follows:

9% Debentures	Rs.1,00,000
Equity Share Capital	Rs.1,00,000

The company has at present even debt-equity ratio. It has been paying dividend at the rate of 12% on equity shares. In case, the debt-equity ratio changes to say 60% debt and 40% equity, the following consequences will follow:

(i) The debt being cheaper, the overall cost of capital will come down.

(ii) The expectation of the equity shareholders from present dividend of 12% will go up because they will find the company now more risky.

Thus, the overall cost of capital of the company will not be affected by change in the debt-equity ratio. Modigliani and Miller, therefore, argue that within the same risk class, mere change of debt-equity ratio does not affect the cost of capital. They observed the following considerations:

(i) The total market value of the firm and its cost of capital are independent of its capital structure. The total market value of the firm can be computed by capitalizing the expected stream of operating earnings at discount rate considered appropriate for its risk class.

(ii) The cut-off rate for investment purposes is completely independent of the way in which investment is financed.

Assumptions under Modigliani-Miller Approach: The Modigliani-Miller Approach is subject to the following assumptions:

(a) *Perfect capital market:* The securities are traded in perfect capital markets. This implies that:

    (i) The investors are free to buy or sell securities.

    (ii) The investors are completely knowledgeable and rational persons. All information and changes in conditions are known to them immediately.

    (iii) The purchase and sale of securities involve no costs such as broker's commission, transfer, fees, etc.

    (iv) The investors can borrow against securities without restrictions on the same terms and conditions as the firms can.

(b) *Firms can be grouped in homogeneous risk classes:* Firms should be considered to belong to a homogeneous class if their expected earnings have identical risk characteristics. In other words, all firms can be categorized according to the return that they give and a firm in each class is having the same degree of business and financial risk.

(c) *Same expectation:* All investors have the same expectation of firm's net operating income (EBIT) which is used for evaluation of a firm. There is 100% dividend pay out, i.e., firm distribute all of their net earnings to the shareholders.

(d) *No corporate taxes:* In the original formulation, Modigliani and Miller hypothesis assumes that there are no corporate taxes. This assumption has been removed later.

In conclusion, it may be said that in spite of the correctness of the basic reasoning of Modigliani and Miller, the traditional approach is more realistic on account of the following reasons:

(i) The corporation are subject to income tax and, therefore, due to tax effect, the cost of debt is lower than cost of equity capital.

(ii)   The basic assumption of Modigliani and Miller hypothesis that capital markets are
        perfect, is seldom true.

7.6 MEASUREMENT OF THE COST OF CAPITAL

Measurement of cost of capital involves: (i) Computation of cost of each specific source
of finance-termed as computation of specific costs; and (ii) Computation of composite
cost of capital termed as Weighted Average Cost of Capital.

Computation of Specific Costs: Cost of each specific source of finance viz., debt,
preference capital and equity capital, can be determined as follows:

1. Cost of Debt

The explicit cost of debt is the interest rate as per contract adjusted for tax and the cost
of raising the debt. Debt may be issued at par, at premium or discount. It may be perpetual
or redeemable. The technique of computation of cost in each case has been explained as
under:

Cost of irredeemable debentures: Cost of debentures not redeemable during the life
time of the company can be calculated as below:

$$K_d = \frac{I}{NP}(I - T)$$

Where,

K_d = Cost of debt after tax

I = Annual interest rate

NP = Net proceeds of debentures

T = Tax rate.

The tax is deducted out of the interest payable, because interest is treated as an expense
while computing the firm's income for tax purposes. However, the tax adjusted rate of
interest should be used only in those cases where the 'earning of the firm before interest
and tax' (EBIT) is equal to or exceed the interest. In case, EBIT is in negative, the cost
of debt should be calculated before adjusting the interest rate for tax.

Illustration 1:

X Ltd. issues Rs.10,00,000, 16% irredeemable debentures of Rs.100 each. The company
is in 35% tax bracket. You are required to calculate the cost of debt after tax. If debentures
are issued at (i) par, (ii) 10% discount, and (iii) 10% premium. If brokerage is paid at 2%
what will be cost of debentures if issue is at par.

Solution:
Cost of debentures after tax when debentures are:
(i)   ***Issued at Par:***

K_d $= \frac{I}{NP}(I - T)$

$$= \frac{Rs.1,60,000}{Rs.10,00,000} \times (1 - 0.35)$$

$$= 10.4\%$$

(ii) *Issued at discount of 10%:*

$$K_d = \frac{I}{NP} (I - T)$$

$$= \frac{Rs.1,60,000}{Rs.9,00,000} \times (1 - 0.35)$$

$$= 11.55\%$$

(iii) *Issued at 10% Premium:*

$$K_d = \frac{I}{NP} (I - T)$$

$$= \frac{Rs.1,60,000}{Rs.11,00,000} \times (1 - 0.35)$$

$$= 9.45\%$$

If brokerage is paid at 2% and debentures are issued at par:

$$K_d = \frac{I}{NP} (I - T)$$

$$= \frac{Rs.1,60,000}{Rs.9,80,000 \ (\ i.e. \ Rs.10,00,000 - Rs.20,000)} \times (1 - 0.35)$$

$$= 10.61\%$$

Cost of redeemable debentures: If the debentures are redeemable after the expiry of a fixed period the cost of debentures would be as calculated below:

$$K_d = \frac{I(1 - t) + (RV - NP)/N}{[RV + NP]/2}$$

Where,

I	= Annual interest payment
NP	= Net proceeds of debentures
RV	= Redemption value of debentures
t	= Tax rate
N	= Life of debentures.

Illustration 2:

A company issues debentures of Rs.1,00,000 and realizes Rs.98,000 after allowing 2% commission to brokers. The debentures carry an interest rate of 10%. The debentures are due for maturity at the end of the 10th year. You are required to calculate the effective cost of debt considering tax rate of 55%.

Solution:

$$K_d = \frac{I(1-t) + (RV - NP)/N}{[RV + NP]/2}$$

$$= \frac{10,000\,(1 - 0.55) + (1,00,000 - 98,000)/10}{[1,00,000 + 98,000]/2}$$

$$= 4.64\%$$

2. Cost of Preference Shares

In the case of preference shares, the dividend rate can be taken as its cost since it is this amount which the company intends to pay against preference shares. As in the case of debt, the issue expenses or the discount/premium on issue/redemption has also to be taken into consideration.

Cost of Irredeemable Preference Share:

Cost of irredeemable preference shares $(K_p) = \dfrac{Pd}{NP} \times 100$

Where,

Pd   = Annual Preference Dividend

NP   = Net proceeds in issue of preference shares.

Illustration 3:

X Ltd. raised preference share capital of Rs.1,00,000 by issue of 10% preference shares of Rs.10 each. Calculate the cost of preference capital when they are issued (i) par (ii) 10% premium and (iii) 10% discount.

Solution:

(i) When Preference Shares are issued at par:

$$K_p = \frac{10,000}{1,00,000} \times 100$$

$$= 10\%$$

(ii) When Preference Shares are issued at 10% premium:

$$K_p = \frac{10,000}{1,10,000} \times 100$$

$$= 9.09\%$$

(iii) When Preference Shares are issued at 10% discount:

$$K_p = \frac{10,000}{90,000} \times 100$$

$$= 11.11\%$$

Cost of redeemable Preference Shares: In case of redeemable preference shares, the cost of capital is the discount rate that equates the net proceeds of sale of preference shares with the present value of future dividends and principal repayments. Such cost can be calculated as below:

$$Kp = \frac{Pd + (RV - NP)/N}{[RV + NP]/2}$$

Where,

Pd	=	Annual preference dividend
RV	=	Redemption value of preference shares
NP	=	Net proceeds an issue of preference share
N	=	Life of preference shares.

Illustration 4:

A Company has Rs.1,00,000, 10% redeemable preference shares redeemable at the end of the 10th year from the year of their issue. The underwriting costs came to 2%. Calculate the effective cost of preference share capital.

Solution:

$$Kp = \frac{Pd + (RV \quad NP)/N}{[RV + NP]/2}$$

$$\frac{10,000 + (1,00,000 \quad 98,000)/10}{(1,00,000 + 98,000)/10}$$

$$= 10.30\%$$

3. Cost of Equity Shares

Calculation of the cost of equity shares involves a complex procedure. This is because unlike debt and preference shares, there is no fixed rate of interest or dividend against ordinary shares. Hence, to assign a certain cost to equity share capital is not a question of mere calculation. It requires an understanding of many factors basically concerning the behaviour of investors and their expectations. Since there can be difference interpretations of investor's behaviour, there are many approaches regarding calculation of cost of equity shares. The four main approaches are:

(i)   D/P (Dividend/Price) approach;

(ii)   D/P + g (Dividend/Price + growth rate of earnings) approach; and

(iii)   E/P (Earning/Price) ratio;

(iv)   Realized yield approach.

(i)   ***D/P – ratio approach:*** This emphasizes that dividend expected by an investor from a particular share determines its cost. An investor who invests in the ordinary shares of a particular company does so in the expectation of a certain return. In other words, when an investor buys ordinary shares of a certain risk, he expects a certain return. The expected rate of return is the cost of ordinary share capital. Under this approach, therefore, the cost of ordinary share capital is calculated on the basis of the present value of the expected future stream of dividends.

The cost of new equity can be determined according to the following formula:

$$Ke = \frac{D}{NP}$$

Where,

Ke   = Cost of equity capital

D   = Dividend per equity share

NP   = Net proceeds of an equity share.

However, in case of existing equity shares, it will be appropriate to calculate the cost of equity on the basis of market price of the company's equity shares. In the present case, it can be calculated according to the following formula:

$$Ke = \frac{D}{MP}$$

Where,

Ke   = Cost of equity capital

D   = Dividend per equity share

MP   = Market Price of an equity share.

(ii) **D/P + growth approach:** The Dividend/Price + growth approach emphasizes that an investor actually expects to receive from his investment in a particular ordinary share in terms of dividend plus the rate of growth in dividend/earnings. This growth rate in dividend (g) is taken to be equal to the compound growth rate in earnings per share. According to this approach, the cost of equity capital is determined on the basis of the expected dividend rate plus the rate of growth in dividend. The rate of growth in dividend is determined on the basis of the amount of dividends paid by the company for the last few years. The computation of cost of capital can be done by using the following formula:

$$Ke = \frac{D}{NP} + g$$

Where,

Ke   = Cost of equity capital

D   = Expected dividend per share

NP   = Net proceeds per share

g   = Growth rate of expected dividend.

It may be noted that in case of existing equity shares, the cost of equity share capital can also be determined by using the above formula. However, the market price (MP) should be used in place of net proceeds (NP) of the share. Symbolically,

$$Ke = \frac{D}{MP} + g$$

Illustration 5:

The current market price of an equity share of a company is Rs.90. The current dividend per share is Rs.4.50. In case the dividends are expected to grow at the rate of 7%, calculate the cost of equity capital.

Solution:

$$Ke = \frac{D}{MP} + g$$

$$= \frac{Rs.4.50}{Rs.90} + 0.07$$

$$= 0.05 + 0.07$$

$$= 0.12 \text{ or } 12\%$$

(iii) *E/P (Earnings/Price) ratio approach:* The advocates of this approach co-relate the earnings of the company with the market price of its share. Accordingly, the cost of ordinary share capital would be based upon the expected rate of earnings of a company. The argument is that each investor expects a certain amount of earnings, whether distributed or not from the company in which he has invested. According to this approach, it is the earning per share (EPS) which determines the market price of the shares. This is based on the assumption that the shareholders capitalize a stream of future earnings (as distinguished from dividends) in order to evaluate their shareholdings. Hence, the cost of capital should be related to that earning percentage which could keep the market price of the equity shares constant. This approach, therefore, takes into account both dividends as well as retained earnings.

The formula for calculating the cost of equity capital according to this approach is as follows:

$$Ke = \frac{E}{NP} = Ke = \frac{E}{MP}$$

Where,

Ke = Cost of equity capital

E = Earnings per share

NP = Net proceeds per equity share

MP = Market Price per share

However, in case of existing equity shares, it will be appropriate to use Market Price (MP) instead of Net Proceeds (NP) for determining the cost of equity capital.

7.7 COST OF RETAINED EARNINGS

The companies do not generally distribute the entire profits earned by them by way of dividend among their shareholders. Some profits are retained by them for future expansion of the business. Many people feel that such retained earnings are absolutely cost free. This is not the correct approach because the amount retained by company, if it had been distributed among the shareholders by way of dividend, would have given them some earnings. The company has deprived the shareholders of this earnings by retaining a part of profit with it. Thus, the cost of retained earnings is the earnings forgone by the shareholders. In other words, the opportunity cost of retained earnings may be taken as the cost of the retained earnings. It is equal to the income that the shareholders could have otherwise earned by placing these funds in alternative investments. For example, if

the shareholders could have invested the funds in alternative channels, they could have got a return of 10%. This return of 10% has been forgone by them because of the company not distributing the full profits to them. The cost of retained earnings may, therefore, be taken at 10%.

The above analysis can also be understood in the following manner. Suppose, the earnings are not retained by the company and passed on to the shareholders, are invested by the shareholders in the new equity shares of the same company, the expectation of the shareholders from the new equity shares would be taken as the opportunity cost of the retained earnings. In other words, if earnings were paid as dividends and simultaneously an offer for the right shares was made, the shareholders would have subscribed to the right shares on the expectation of certain return. This expected return can be taken as the cost of retained earnings of the company.

The following adjustments are made for ascertaining the cost of retained earnings:

(i)   *Income Tax adjustment:* The dividends receivable by the shareholders are subject to income tax. Hence, the dividends actually received by them are not the amount of gross dividends but the amount of net dividend, i.e., gross dividends less income tax.

(ii)   *Brokerage cost adjustment*: Usually the shareholders have to incur some brokerage cost for investing the dividends received. Thus, the funds available with them for reinvestment will be reduced by this amount.

The opportunity cost of retained earnings to the shareholders is, therefore, the rate of return that they can obtain by investing the net dividends (i.e., after tax and brokerage) in alternative opportunity of equal quality.

Illustration 6:

X Ltd. is earning a net profit of Rs.50,000 per annum. The shareholders' required rate of return is 10%. It is expected that retained earnings, if distributed among the shareholders, can be invested by them in securities of similar type carrying return of 10% p.a. It is further expected that the shareholders will have to incur 2% of the net dividends received by them as brokerage cost for making new investments. The shareholders of the company are in 30% tax bracket.

You are required to calculate the cost of retained earnings to the company.

Solution:

In order to calculate the cost of retained earnings to the company, it is necessary to calculate the net amount available to the shareholders for investment and the likely return earned by them. This has been done as follows:

		Rs.
	Dividends payable to the shareholders	50,000
Less:	Income tax @ 30%	15,000
	After tax dividends	35,000
Less:	Brokerage cost @ 2%	700
	Net amount available for investment	34,300

Since the shareholders have the investment opportunity of earning 10%, the amount of earning received by them on their investment will amount to Rs.3,430 (i.e., 10% of Rs.34,300).

In case the earnings had not been distributed by the company among its shareholders, the company could have full Rs.50,000 for investment, since no personal income tax and

brokerage cost, as above, would have been payable. The company could have paid a sum of Rs.3,430 to the shareholders if it could earn a return of 6.86% calculated as follows:

$$\frac{Rs.3,430}{Rs.50,000} \times 100 = 6.86\%$$

The rate of return expected by the shareholders from the company on their retained earnings come to 6.86%. It may, therefore, be taken as the cost of the retained earnings.

The cost of retained earnings after making adjustment for income tax and brokerage cost payable by the shareholders can be determined according to the following formula:

$$Kr = Ke (1 - T) (1 - B)$$

Where,

Kr   = Required rate of return on retained earnings

Ke   = Shareholder's required rate of return

T   = Shareholders' marginal tax rate

B   = Brokerage cost.

The cost of retained earnings using the data given in the above illustration can be calculated according to the above formula, as follows:

Kr   = Ke (1 - T) (1 - B)

         = 10% (1 - 0.3) (1 - 0.02)

         = 10% x 0.7 x 0.98

         = 6.86%

Check Your Progress 2

State whether the following statements are true or false:

1. Cost of capital does not refer to minimum rate of return required to be earned by a firm.

2. The composite or overall cost of capital of a firm is the weighted average costs of various sources of funds.

3. Weights are taken to be the proportion of each source of funds in the capital structure.

4. While making financial decisions this overall or weighted cost is used.

5. Each investment is financed from a pool of funds which represents the various sources from which funds have been raised.

7.8 WEIGHTED AVERAGE COST OF CAPITAL

The composite or overall cost of capital of a firm is the weighted average costs of various sources of funds. Weights are taken to be the proportion of each source of funds in the capital structure. While making financial decisions this overall or weighted cost is used. Each investment is financed from a pool of funds which represents the various sources from which funds have been raised. Any decision of investment, therefore, has to be made with reference to the overall cost of capital and not with reference to cost of

a specific source of fund used in the investment decision. The weights to be used can be either book value weights or market value weights. Book value weights are easier to calculate and can be applied consistently. Market value weights are supposed to be superior to book value weights as component costs are opportunity costs and market values reflect economic values. However, these weights fluctuate frequently and fluctuations are wide in nature.

The Weighted Average Cost of Capital (WACC) can be computed based on the following procedure:

(i)   Calculating the cost of specific sources of funds, i.e., cost of debt, preference, and equity shares.

(ii) Multiplying the cost of each source by its proportion of weights in capital structure.

(iii) Adding the weighted component costs to get the firm's WACC.

Thus, the WACC is $K_0 = K_1 W_1 + K_2 W_2 + \ldots$ where K_1, K_2 are component costs and W_1, W_2 are weights.

Illustration 7:

A company has the following capital structure:

	Rs.
Equity Share capital	5,00,000
Reserves	2,00,000
Debt	3,00,000
	10,00,000

The component costs (before tax) are: Equity capital 18%, Debt 10%

Assume tax rate @ 35%.

You are required to calculate the weighted average cost of capital of the company.

Solution:

The after tax cost of debt (Kd) = Kd (1 – T)   = 10% (1 – 0.35) = 6.5%

Cost of retained earnings is taken to be the same as cost of equity.

Computation of WACC

Source	Proportion	After Tax Cost	Weighted Cost
Equity capital	0.50	0.18	0.09
Retained earnings	0.20	0.18	0.036
Debt	0.30	0.065	0.0195
			0.1455

Therefore, the Weighted Average Cost of Capital = 14.5%

Illustration 8:

From the following capital structure of X Ltd., calculate the overall cost of capital, using (i) Book Value Weights; and (ii) Market Value Weights.

Source	Book value (Rs.)	Market value (Rs.)
Equity share capital (Rs.10 shares)	45,000	90,000
Retained earnings	15,000	------
Preference share capital	10,000	10,000
Debentures	30,000	30,000

The after-tax cost of different sources of finance is as follows:

Equity share capital: 14%; Retained earnings: 13%; Preference share capital: 10%; and Debentures: 5%.

Solution:

(i) **Computation of Weighted Average Cost of Capital**
(Book Value Weights)

Source	Amount (Rs.)	Proportion	After tax cost	Weighted cost
1	2	3	4	5 = (3 x 4)
Equity Share Capital	45,000	0.45	14%	6.3%
Retained Earnings	15,000	0.15	13%	1.95%
Preference Share Capital	10,000	0.10	10%	1.00%
Debentures	30,000	0.30	5%	1.50%
Weighted average cost of capital (Ko)				10.75%

Alternatively, the weighted average cost of capital can also be found as follows:

Computation of Weighted Average Cost of Capital
(Book Value Weights)

Source	Amount (Rs.)	After tax cost	Total after tax cost (Rs.)
1	2	3	4 = (2 x 3)
Equity Share Capital	45,000	14%	6,300
Retained Earnings	15,000	13%	1,950
Preference Share Capital	10,000	10%	1,000
Debentures	30,000	5%	1,500
Total	1,00,000		10,750

$$\text{Weighted Average Cost of Capital} = \frac{Rs.10,750}{Rs.1,00,000} \times 100$$

$$= 10.75\%$$

(ii) **Computation of Weighted Average Cost of Capital**
(Market Value Weights)

Source	Amount (Rs.)	Proportion	After tax cost	Weighted cost
1	2	3	4	5 = (3 x 4)
Equity Share Capital	90,000	0.692	14%	9.688%
Preference Share Capital	10,000	0.077	10%	0.770%
Debentures	30,000	0.231	5%	1.155%
Weighted average cost of capital (Ko)				11.613%

Illustration 9:

X Ltd. has the following capital structure: Rs.

Equity Share Capital (2,00,000 shares)	40,00,000
6% Preference Shares	10,00,000
8% Debentures	30,00,000
	_____
	Rs.80,00,000
	_____

The market price of the company's equity share is Rs.20. It is expected that the company will pay a current dividend of Rs.2 per share which will grow at 7% forever. The tax rate may be presumed at 50%. You are required to calculate the following:

(i)   A weighted average cost of capital based on existing capital structure.

(ii)   The new weighted average cost of capital if the company raises an additional Rs.20,00,000 debt by issuing 10% debentures. This would result in increasing the expected dividend to Rs.3 and leave the growth rate unchanged but the price of share will fall to Rs.15 per share.

(iii) The cost of capital if in (ii) above, growth rate increases to 10%.

Solution :

(i)   **Computation of Weighted Average Cost of Capital**

Source	Amount (Rs.)	Weights	After tax cost	Weighted cost
1	2	3	4	5 = (3 x 4)
Equity Share Capital*	40,00,000	0.500	0.17	0.0850
Preference Share Capital	10,00,000	0.125	0.06	0.0075
Debentures	30,00,000	0.375	0.04	0.0150
				0.1075
Weighted average cost of capital (Ko) = 10.75%				

*The Cost of Equity Shares has been calculated as below:

$$Ke = \frac{D}{MP} + g$$

$$= \frac{Rs.2}{Rs.20} + 0.07$$

$$= 0.1 + 0.07 \qquad = 0.17 \text{ or } 17\%$$

(ii)   **Computation of Weighted Average Cost of Capital**

Source	Amount (Rs.)	Weights	After tax cost	Weighted cost
1	2	3	4	5 = (3 x 4)
Equity Share Capital*	40,00,000	0.40	0.27	0.108
6% Preference Share Capital	10,00,000	0.10	0.06	0.006
8% Debentures	30,00,000	0.30	0.04	0.012
10% Debentures	20,00,000	0.20	0.05	0.010
				0.136

Weighted average cost of capital (K_s)   = 13.60%

*The Cost of Equity Shares has been calculated as below:

$$Ke \quad = \frac{D}{MP} + g$$

$$= \frac{Rs.3}{Rs.15} + 0.07$$

$$= 0.20 + 0.07 \quad = 0.27 \text{ or } 27\%$$

(iii)   **Computation of Weighted Average Cost of Capital**

Source	Amount (Rs.)	Weights	After tax cost	Weighted cost
1	2	3	4	5 = (3 x 4)
Equity Share Capital*	40,00,000	0.40	0.30	0.120
6% Preference Share Capital	10,00,000	0.10	0.06	0.006
8% Debentures	30,00,000	0.30	0.04	0.012
10% Debentures	20,00,000	0.20	0.05	0.010
				0.148

Weighted average cost of capital (K_o)   = 14.80%

*The Cost of Equity Shares has been calculated as below:

$$Ke \quad = \frac{D}{MP} + g$$

$$= \frac{Rs.3}{Rs.15} + 0.10$$

$$= 0.20 + 0.10 \quad = 0.30 \text{ or } 30\%$$

Illustration 10:

Avon Electricals Ltd. wishes to determine the weighted average cost of capital for evaluating capital budgeting projects. You have been supplied with the following information to calculate the value of K_o for the company.

Balance Sheet as on March 31

Liabilities		Assets	
Current Liabilities	Rs. 9,00,000	Sundry Assets	Rs.39,00,000
Debentures	9,00,000		
Preference shares	4,50,000		
Equity Shares	12,00,000		
Retained earnings	4,50,000		

Anticipated external financing informaiton:

i)   20 years, 8% Debentures of Rs.2,500 face value, redeemable at 5 percent premium, sold at par, 2 percent flotation costs.

ii)   10% Preference shares: Sale price Rs.100 per share, 2 percent flotation costs.

iii)   Equity shares: Sale price Rs.115 per share; flotation costs would be Rs.5 per share.

iv)   The corporate tax rate is 35 percent and expected equity dividend growth is 5 percent per year. The expected dividend at the end of the current financial year is

Rs.11 per share. Assume that the company is satisfied with its present capital structure and intends to maintain it.

Solution:

K_d = Rs.200(1-0.35)+(Rs.2,625 - Rs.2,450)/20 ÷ (Rs.2,625 + Rs.2,450)/2 = 5.47 per cent.

K_p = Rs.10 ÷ (Rs.100 + Rs.98)/2 = 10.1 per cent

K_e = (Rs.11 ÷ Rs.110) + 0.05 = 15 per cent

K_r = (Rs.11 ÷ Rs.115) + 0.05 = 14.57 per cent

Determination of Weighted Average Cost of Capital

Sources of funds	Amount	Cost	Total costs
Debentures	Rs.9,00,000	0.0547	Rs.49,230
Preference shares	4,50,000	0.1010	45,450
Equity shares	12,00,000	0.15	1,80,000
Retained earnings	4,50,000	-.1457	65,565

K_0 = (Rs.3,40,245/30,00,000) x 100 = 11.34 per cent

Illustration 11:

From the following information, determine the appropriate weighted average cost of capital, relevant for evaluating long-term investment projects of the company.

Cost of equity	0.18
After tax cost of long-term debt	0.08
After tax cost of short-term debt	0.09

Sources of capital	Book value (BV)	Market value (MV)
Equity	Rs.5,00,000	Rs.7,50,000
Long-term debt	4,00,000	3,75,000
Short-term debt	1,00,000	1,00,000

Solution:

Determine of weighted average cost of capital

Sources of Capital	Market value	Specific cost (K)	Total costs (MV x K)
Equity	Rs.7,50,000	0.18	1,35,000
Long term debt	3,75,000	0.08	30,000
	11,25,000		1,65,000

K_0 = (Rs.1,65,000/11,25,000) × 100 = 14.7 per cent.

Illustration 12:

Avon Transport Ltd. is interested in measuring its cost of specific types of capital, as well as its overall cost. The finance department of the company indicates that the following costs would be associated with the sale of debentures, preference shares and equity shares. The corporate tax rate is 35 per cent.

Debentures: The company can sell 15 year 14% Debentures of the face value of Rs.1,000 for Rs.970. In addition, an underwriting fee of 1.5 percent of the face value would be incurred in the process.

Preference Shares: 15% Preference shares, having a face value of Rs.100, can be sold at a premium of 10 percent. An underwriting fee of Rs.2 per share is to be paid to the underwriters.

Equity Shares: The company's equity shares are currently selling for Rs.125 per share. It has to pay Rs.15 per share at the end of the coming year. Its dividend payments over the past 6 years per share are given below :

Year	Dividend
1	Rs. 10.60
2	11.24
3	11.91
4.	12.62
5	13.38
6	14.19

It is expected that the new equity shares can be sold at Rs.123 per share. The company must also pay Rs.3 per share as underwriting fee.

Market Value (MV) and Book Value (BV) for each type of capital are as follows:

Sources of capital	Book value (BV)	Market value (MV)
Long-term debt	Rs.18,00,000	Rs.19,30,000
Preference share	4,50,000	5,20,000
Equity shares	60,00,000	100,00,000
Retained earnings	15,00,000	…..

i) Calculate the specific cost of each source of financing.

ii) Determine the weighted average cost of capital using (a) BV weights, and (b) MV weights.

Solution:

(i) *Determination of specific costs*

K_d = Rs.140(0.65) + (Rs.1,000 - Rs.955)/15 ÷ (Rs.1,000 + Rs.955)/2

= 9.62 per cent

K_p = Rs.15/108 * 100 = 13.89 per cent

$K_e = D_1/P_o (1 - f) + g$ = Rs.10.6$(1 + r)^5$ = 14.19 = $(1 + r)^5$ = Rs.14.19/10.60 = 1.3386

Compound Value table suggests that Re1 compounds to Rs.1.3386 in 5 years at 6 per cent rate of interest, that is, growth rate is 6 per cent.

K_e = (Rs.15/120) + 0.06 = 18.5 per cent

K_r = (Rs.15/123) + 0.06 = 18.2 per cent

(ii)

Source of capital	Weights		Specific Cost (K)	Total costs	
	Book value	Market value		(BV xK)	(MV x K)
Long-term debt	18,00,000	19,30,000	0.0962	1,73,160	1,85,666
Preference share	4,50,000	5,20,000	0.1389	62,505	72,228
Equity shares	60,00,000	80,00,000	0.185	11,10,000	14,80,000
Retained earnings	15,00,000	20,00,000	0.182	2,73,000	3,64,000
	97,50,000	1,24,50,000		16,18,665	21,01,894

K_o based on BV weights = (Rs.16,18,665/97,50,000) x 100 = 16.6 percent

K_o based on MV weights = (Rs.21,01,894/1,24,50,000) x 100 = 16.9 percent.

7.9 LET US SUM UP

Cost of capital refers to minimum rate of return required to be earned by a firm. Cost of capital technique is to be measured before taking financial decision for raising funds from different sources, namely, equity, preference, and debt finances. For computation of overall cost of capital/weighted average cost of capital, it is necessary to estimate the component-wise cost, viz., cost of debt, cost of preference shares, and cost of equity shares. The firm has to concentrate that the overall cost of capital must be lower so that the equity shareholder's wealth may be maximized.

7.10 LESSON END ACTIVITIES

1. List out various methods of computing specific costs.

2. Mention the various methods of computing weighted average cost of capital.

7.11 KEYWORDS

Cost of Capital: The minimum rate of return, the firm must earn on its investments in order to satisfy the expectation of investors who provide the funds to the firm.

Face Value: The amount that the firm promises to pay the bond holder, preference share holders at the time of maturity. It is also referred to as the par value or principal value.

Salvage Value: The value realized from the sale of an asset.

7.12 QUESTIONS FOR DISCUSSION

1. Define 'Cost of Capital'.

2. What is 'explicit cost' and 'implicit cost' of capital?

3. What is weighted average cost of capital?

4. Explain how do you compute the cost of debt under various situations?

5. What is the cost of retained earnings?

Essay Type Questions

1. What is meant by Cost of Capital? What are the components of Cost of Capital?

2. Discuss briefly the different approaches to the computation of the cost of equity capital.

3. Define Cost of Capital. State how you would determine the weighted average cost of capital of a firm.

4. Explain how the cost of retained earnings is determined where such retained earnings are proposed to be distributed as bonus shares or right shares to the existing shareholders?

Practical Problems

1. A Ltd issues 10% irredeemable debentures of Rs.1,00,000. The company is in 55% tax bracket. Calculate the cost of debt if the debentures are issued at (i) Par; (ii) 10% discount; and (iii) 10% premium.

2. X Ltd. issued 10% irredeemable preference shares. The nominal value of each share is Rs.100. You are required to calculate the cost of preference share capital in each of the following cases: (a) When issued at 5% discount, (b) When issued at 5% premium.

3. The current market price of the shares of P Ltd. is Rs.95. The flotation costs are Rs.5 per share. Dividend per share amounts to Rs.4.50 and is expected to grow at a rate of 7%. You are required to calculate the cost of equity share capital.

4. XYZ Ltd. has the following capital structure:

Equity Share capital (expected dividend 12%)	Rs.10,00,000
10% Preference share capital	Rs.5,00,000
8% Debentures	Rs.15,00,000

    You are required to calculate the weighted average cost of capital, assuming 50% as the rate of income tax.

Check Your Progress: Model Answers

CYP 1

1. The term 'cost of capital' refers to the minimum rate of return a firm must earn on its investments so that the market value of the company's equity shares does not fall.

2. *Return at Zero risk level:* This refers to the expected rate of return when a project involves no risk whether business or financial.

CYP 2

1. F, 2. T, 3. T, 4. T, 5. T.

7.13 SUGGESTED READINGS

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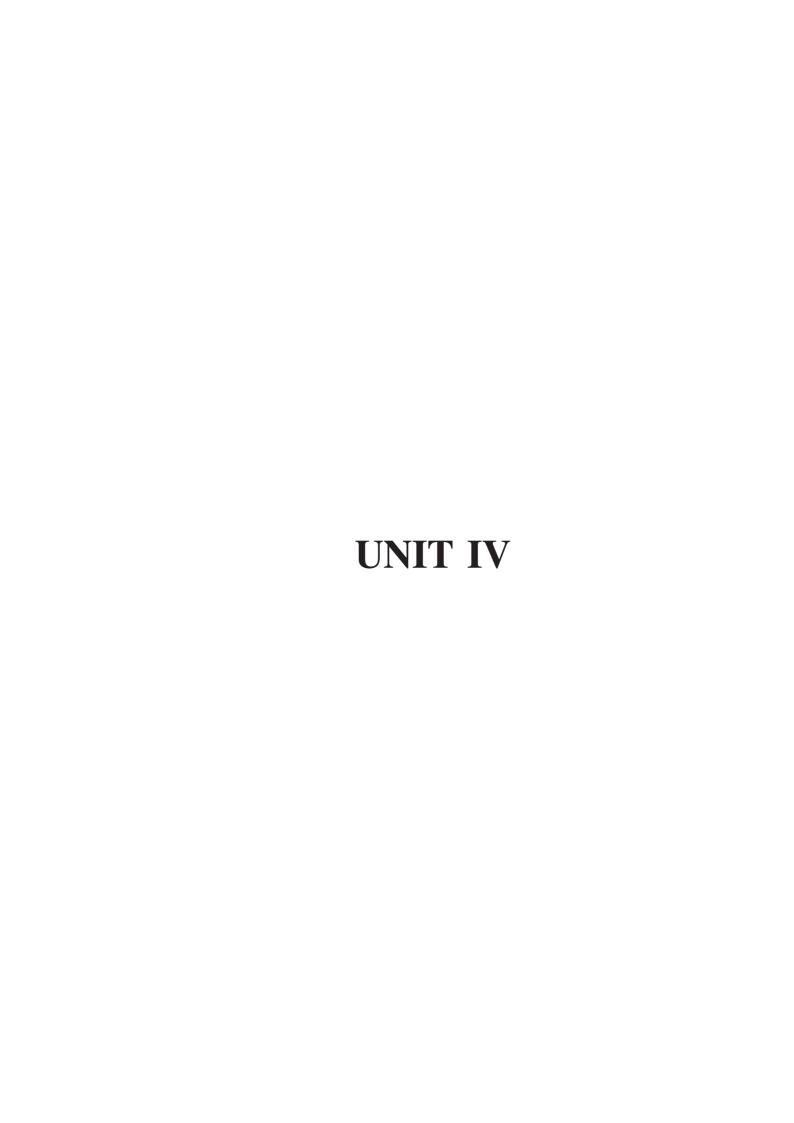
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UNIT IV

LESSON

8

LEVERAGE ANALYSIS

8.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept of leverage and types of leverages.

- Present the procedure for calculation of leverages.

- Examine the significance of leverages.

8.1 INTRODUCTION

The financial or capital structure decision is of tremendous significance for the management, since it influences the debt-equity mix of the company, which ultimately affects shareholders' return and risk. In case the borrowed funds are more when compared to the owners' funds, it results in increase in shareholders' earnings. This is because the cost of borrowed funds is less than that of the shareholders' funds on account of cost of borrowed funds being allowable as a deduction for income tax purposes. But at the same time, the borrowed funds carry a fixed rate of return, which has to be paid whether the company is earning profits or not. Thus, the risk of the shareholders increases in case there is a high proportion of borrowed funds in the total capital structure of the company. In a situation where the proportion of the shareholders' funds is more than the proportion of the borrowed funds, the return as well as the risk of the shareholders will be much less.

Therefore, the finance manager has to estimate the total requirement of fund for meeting the needs of the firm and make arrangement to raise the necessary funds. The desired structure of funds influences the shareholder's return and risk. Leverage analysis is a technique used by business firms to quantify risk-return relationship of different alternative capital structure.

8.2 CONCEPT OF LEVERAGE

The term Leverage generally refers to a relationship between two interrelated variables. In financial analysis, it represents the influence of one financial variable over some other related financial variable. These financial variables may be costs, output, sales revenue, Earnings Before Interest and Tax (EBIT), Earning per share (EPS), etc.

James C. Van Horne has defined the leverage as "the employment of an asset or funds for which the firm pays a fixed cost or fixed return". Thus, according to him, leverage results as a result of the firm employing an asset or source of funds, which has a fixed cost. The former may be termed as "fixed operating cost", while the latter may be termed as "fixed financial cost". It should be noted that fixed costs or return is the fulcrum of a leverage. If a firm is not required to pay fixed cost or fixed return, there will be no leverage.

Since fixed cost has to be paid or incurred irrespective of the volume of output or sales, the size of such cost has considerable influence over the amount of profits available for the shareholders. When the volume of sales changes, leverage helps in quantifying such influence. It may therefore, be defined as relative change in profits due to a change in sales. A high degree of leverage implies that there will be a large change in profits due to a relatively small change in sales and vice versa. Thus, higher is the leverage, higher is the risk and higher is the expected return.

8.3 TYPES OF LEVERAGES

There are three commonly used measures of leverage in financial analysis. These are:

8.3.1 Operating Leverage

Operating Leverage is defined as the "firm's ability to use fixed operating costs to magnify effects of changes in sales on its earnings before interest and taxes".

When there is an increase or decrease in sales level, the EBIT also changes. The effect of change in sales on the level of EBIT is measured by Operating Leverage.

Operating leverage in a firm is a function of three factors:

(i) The amount of fixed costs.

(ii) The contribution margin.

(iii) The volume of sales.

The operating leverage can be calculated as shown below:

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{Operating Profit}} \quad \text{or} \quad \frac{\text{C}}{\text{EBIT}}$$

Operating profit here means 'Earning before Interest and Tax' (EBIT).

Operating leverage may be favourable or unfavourable. In case the contribution (i.e., sales less variable cost) exceed the fixed cost, there is favourable operating leverage. In a reverse case, the operating leverage will be termed as unfavourable.

Degree of Operating Leverage: The degree of operating leverage may be defined as percentage change in the profits resulting from a percentage change in the sales. It may be put in the form of following formula:

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Percentage change in profits}}{\text{Percentage change in sales}}$$

Significance of Operating Leverage: The operating leverage indicates the impact of change in sales on operating income (EBIT). If a firm has a high degree of operating leverage, small changes in sales will have large effect on operating income. In other words, the operating profits (EBIT) of such a firm will increase at a faster rate than the increase in sales. Similarly, the operating profits of such a firm will suffer a greater loss as compared to reduction in its sales.

Generally, the firms do not like to operate under conditions of a high degree of operating leverage. This is a very risky situation where a small drop in sales can be excessively damaging to the firm's efforts to achieve profitability.

The concept of operating leverage will be clear from the following illustration:

Illustration 1:

The installed capacity of a factory is 600 units. Actual capacity used is 400 units. Selling price per unit is Rs.10, Variable cost is Rs.6 per unit. Calculate the operating leverage in each of the following three situations:

(i)   When fixed costs are Rs.400

(ii)   When fixed costs are Rs.1,000

(iii)   When fixed costs are Rs.1,200.

Solution:

Statement Showing Operating Leverage

	Situation-I	Situation-II	Situation-III
Sales	Rs.4,000	Rs.4,000	Rs.4,000
Less: Variable cost	Rs.2,400	Rs.2,400	Rs.2,400
Contribution (C)	Rs.1,600	Rs.1,600	Rs.1,600
Less: Fixed Cost	Rs. 400	Rs.1,000	Rs.1,200
Operating Profit Or EBIT	Rs.1,200	Rs.1,600	Rs.400
Operating Leverage = $\dfrac{C}{EBIT}$	1.33	2.67	4

The above illustration shows that the degree of operating leverage increases with every increase in share of fixed cost in the total cost structure of the firm.

However, in case of situation I, operating leverage of 1.33 means that 1% increase in sales would result into 1.33% increase in operating profit, i.e., EBIT. Further with a 1% change in sales will result in change the EBIT by 2.67% and 4% in case of situation II and situation III respectively.

8.3.2 Financial Leverage

Financial Leverage is defined as the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT or Operating profits, on the firm's Earning Per

Share (EPS). The financial leverage occurs when a firm's capital structure contains obligation of fixed financial charges, i.e., interest on debentures, dividend on preference shares, etc., along with owner's equity to enhance earnings of equity shareholders. The fixed financial charges do not vary with the operating profits or EBIT. They are fixed and are to be paid irrespective of level of operating profits or EBIT. The ordinary shareholders of firm are entitled to residual income, i.e., Earnings after fixed financial charges.

Thus, the effect of changes in operating profit or EBIT on the level of Earning Per Share (EPS) is measured by Financial Leverage.

Computation: The calculation of financial leverage can be done according to the following methods:

(a) *Where Capital Structure consists of Equity Shares and Debt:*

In such a case, financial leverage can be calculated according to the following formula:

$$\text{Financial Leverage} = \frac{\text{Operating Profit}}{\text{Profit before Tax}} \text{ (or) } \frac{\text{EBIT}}{\text{EBT}}$$

Illustration 2:

X Ltd. has a choice of the following three financial plans. You are required to calculate the financial leverage in each case and interpret it.

	X Rs.	Y Rs.	Z Rs.
Equity Capital	2,000	1,000	3,000
10% Debt	2,000	3,000	1,000
Operating Profit (EBIT)	400	400	400

Solution:

Statement Showing Financial Leverage

	X (Rs.)	Y (Rs.)	Z (Rs.)
Operating Profit (EBIT)	400	400	400
Less: Interest on Debt @ 10%	200	300	100
Earning before Tax (EBT)	200	100	300
Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$	2 times	4 times	1.33 times

As Financial Leverage indicates the change that will take place in the taxable income as a result of change in the operating income. Financial Leverage in case of Plan X is 2. It means every 1% change in Operating Profit will result in 2% change in the taxable profit. Similarly, it is 4% and 1.33% in case of Plan Y and Plan Z respectively.

Degree of Financial Leverage: Degree of Financial Leverage may be defined as the percentage change in taxable profit as a result of percentage change in 'operating profit'. This may be put in the form of following equation:

$$\text{Degree of Financial Leverage (DFL)} = \frac{\text{Percentage change in taxable income}}{\text{Percentage change in the operating income}}$$

(b) *Where the Capital Structure consists of Preference Shares and Equity Shares*

The formula for computation of financial leverage can also be applied to a financial plan having preference shares. Of course, the amount of preference dividends will have to be grossed up (as per the tax rate applicable to the company) and then deducted from the earnings before interest and tax.

Illustration 3:

The capital structure of X Ltd. consists of the following securities:

10% Preference Share Capital   Rs.1,00,000

Equity Share Capital (Rs.10 shares)   Rs.1,00,000

The amount of operating profit is Rs.60,000. The company is in 50% tax bracket.

You are required to calculate the financial leverage of the company. What would be new financial leverage if the operating profit increases to Rs.90,000 and interpret your results.

Solution:

Computation of the Financial Leverage when EBIT is Rs.60,000

	Rs.
Operating Profit or EBIT	60,000
Less: Preference dividend (after grossing up)	20,000
EARNING BEFORE TAX (EBT)	40,000

$$\text{Present Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{60,000}{40,000} = 1.5$$

Computation of Financial Leverage when EBIT is Rs.90,000

	Rs.
Operating Profit or EBIT	90,000
Less: Preference dividend (after grossing up)	20,000
EARNING BEFORE TAX (EBT)	70,000

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{90,000}{70,000} = 1.286$$

The existing financial leverage is 1.5. It means 1% change in operating profit will cause 1.5% change in taxable profit in the same direction. For example, in the present case, operating profit has increased by 50% (i.e., from Rs.60,000 to Rs.90,000). This has resulted in 75% increase in the taxable profit (i.e., from Rs.40,000 to Rs.70,000).

(c) *Where the Capital Structure consists of Equity Shares, Preference Shares and Debt:*

In such a case, the financial leverage is calculated after deducting from operating profit both interest and preference dividend on a before tax basis.

Illustration 4:

X Ltd. has the following capital structure:

Equity Share Capital	Rs.1,00,000
10% Preference Share Capital	Rs.1,00,000
8% Debentures	Rs.1,25,000

The present EBIT is Rs.50,000. Calculate the financial leverage assuming that company is in 50% tax bracket.

Solution:

Computation of Financial Leverage

	Rs.	Rs.
Operating Profit or EBIT	.....	50,000
Less: Interest on Debentures	10,000	
Preference dividend (after grossing up)	20,000	30,000
EARNING BEFORE TAX (EBT)		Rs.20,000

$$\text{Present Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{50,000}{25,000} = 2.5$$

Illustration 5:

A Ltd. has the following capital structure:

10,000 Equity Shares of Rs.10 each	Rs.1,00,000
2,000 10% Preference Shares of Rs.100 each	Rs.2,00,000
2,000 10% Debentures of Rs.100 each	Rs.2,00,000

Calculate the EPS for each of the following levels of EBIT:

(i) Rs.1,00,000; (ii) Rs.60,000; (iii) Rs.1,40,000. The company is in 50% tax bracket.

Solution:

Computation of Earning Per Share

	Plan 1	Plan 2	Plan 3
Earnings before interest and tax (EBIT)	1,00,000	60,000	1,40,000
Less: Interest on Debentures	20,000	20,000	20,000
Earning Before Tax (EBT)	80,000	40,000	1,20,000
Less: Income Tax @ 50%	40,000	20,000	60,000
Earning after Tax (EAT)	40,000	20,000	60,000
Less: Preference dividend	20,000	20,000	20,000
Earnings available for Equity Shareholders:	20,000	NIL	40,000
Earning Per Share (EPS)	....	NIL	....
	10,000		10,000
	Rs.2	NIL	Rs.4

The above table shows that:

(a) In case Plan 2, the EBIT has decreased by 40% (i.e., from Rs.1,00,000 to Rs.60,000) while the earning per share has decreased by 100% (i.e., from Rs.2 per share to NIL).

(b) In case Plan 3, the EBIT has increased by 40% (i.e., from Rs.1,00,000 to Rs.1,40,000) as compared to Plan 1 while the earning per share has increased by 100% (i.e., from Rs.2 per share to Rs.4 per share).

The degree of financial leverage (DFL) can therefore be calculated as follows:

$$DFL = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

Financial Leverage in between plan 1 and Plan 2   = 100/40   = 2.5

Financial Leverage in between Plan 1 and Plan 3   = 100/40   = 2.5

The same result can be obtained by using the equation EBIT/EBT as shown below:

Computation of Financial Leverage

		Plan 1	Plan 2	Plan 3
Operating Profit or EBIT		1,00,000	60,000	1,40,000
Less: Interest on Debentures	Rs.20,000			
Preference dividend (grossed up)	Rs.40,000	60,000	60,000	60,000
Earning Before Tax (EBT)		40,000	NIL	80,000

$$\text{Present Financial Leverage} = \frac{EBIT}{EBT} = \frac{1,00,000}{40,000} = 2.5$$

Significance of Financial Leverage: Financial Leverage helps the finance manager in designing the appropriate Capital structure. One of the objective of planning an appropriate capital structure is to maximize the return on equity shareholders' funds or maximize the earning per share.

Financial Leverage is double edged sword. On the one hand, it increases earning per share and on the other hand, it increases financial risk. A high financial leverage means high fixed financial costs and high financial risk, i.e., as the debt component in capital structure increases, the financial leverage increases and at the same time the financial risk also increases, i.e., risk of insolvency increases.

The finance manager therefore, is required to trade off i.e., has to bring a balance between risk and return for determining the appropriate amount of debt in the capital structure of a firm. Thus, the analysis of financial leverage is most important tool in the hands of financial managers who are engaged in financing the capital structure of business firms, keeping in view the objectives of their firm.

8.3.3 Combined Leverage

We have seen above that operating leverage influences for the operating risk and financial leverage influence for the financial risk of a firm. However, a firm has to look into overall risk or total risk of the firm, i.e., Operating risk as well as Financial risk. Hence, if we combine the operating leverage and financial leverage, the result is Combined Leverage/Composite Leverage.

Thus, combined leverage expresses the relationship between revenue on account of sales (i.e., contribution or sales less variable cost) and the taxable income. It helps in finding out the resulting percentage change in taxable income on account of percentage change in sales. This can be computed as follows:

Combined Leverage (CL) = Operating Leverage (OL) × Financial Leverage (FL)

$$= \frac{C}{EBIT} \times \frac{EBIT}{EBT} = \frac{C}{EBT}$$

Illustration 6:

X Ltd. has Sales of Rs.1,00,000. The variable costs are 40% of the sales while the fixed operating costs amount to Rs.30,000. The amount of interest on long-term debt is Rs.10,000.

You are required to calculate the Composite Leverage.

Solution:

Statement Showing Computation of Combined Leverage

Sales	
	1,00,000
Less: Variable Costs (40% of Sales)	40,000
Contribution (C)	60,000
Less: Fixed Operating Costs	30,000
Earning before Interest and Tax (EBIT)	30,000
Less: Interest on Debt	10,000
Taxable Income/Earning before Tax (EBT)	20,000

$$\text{Combined Leverage} = \frac{C}{EBT} = \frac{60,000}{20,000} = 3 \text{ Times}$$

The Combined Leverage of '3' times indicates that with every increase of 1% in sales will influence for the increase in the taxable income by 3%.

Significance of Combined Leverage: The ratio of contribution to earnings before tax, given by combined leverage shows the combined effect of financial and operating leverage. A high operating leverage and a high financial leverage combination is very risky. If the company is producing and selling at a high level, it will make extremely high profit for its shareholders. But even a small fall in the level of operations would result in a tremendous fall in earnings per share. A company must, therefore, maintain a proper balance between these two leverages.

A high operating leverage and a low financial leverage indicate that the management is careful since the higher amount of risk involved in high operating leverage has been sought to be balanced by low financial leverage. However, a more preferable situation would be to have a low operating leverage and a high financial leverage. A low operating leverage would automatically imply that the company reaches its break-even point at a low level of sales.

Therefore, risk is diminished. A highly cautious and conservative manager will keep both its operating and financial leverage at very low levels. The approach may, however, mean that the company is losing profitable opportunities.

Illustration 7:

A firm has sales of Rs. 10,00,000, variable cost of Rs. 7,00,000 and fixed costs of Rs. 2,00,000 and debt of Rs. 5,00,000 at 10% rate of interest. What are the operating, financial and combined leverages? If the firm wants to double it Earnings Before Interest and Tax (EBIT), how much of a rise in sales would be needed on a percentage basis.

(C.A. Final, N.S. Nov. 1979)

Solution:

Computation of Operating, Financial and Combined Leverages

$$\text{Operative Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{3,00,000}{1,00,000} = 3 \text{ times}$$

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBIT} - \text{INT}} = \frac{1,00,000}{1,00,000 - 50,000} = 2 \text{ times}$$

Combined Leverage = Operative Leverage × Financial leverage

= 3 × 2 = 6

Profit as Present	Rs.
Sales	10,00,000
Less: Variable Cost	7,00,000
Contribution	3,00,000
Less: Fixed Costs	2,00,000
Operating Profit (EBIT)	1,00,000
Less: Interest (10% on Rs. 5,00,000)	50,000
Profit before tax	50,000

Comments: Operating leverage is 3 times. This means that if sales increase by 100 percent, operating profit will rise by 300 per cent (i.e., 3 times the rise in sales). Therefore, in case the firm wants to double its earnings before required. This is confirmed by the following computation:

Sales after 33.33% rise	Rs. 13,33,333
Contribution	9,33,333
	4,00,000
Fixed Cost	2,00,000
Operating Profit	2,00,000

Illustration 8:

X Corporation has estimated that for a new product its break-even point is 2000 Units, if the item is sold for Rs. 14 per unit. The cost accounting department has currently identified variable cost of Rs. 9 per unit. Calculate the degree of operating leverage for sales volume of 2500 Units and 3000 units. What do you infer from the degree of operating leverage at the sales volumes of 25000 units and 3000 units and their difference, if any?

(C.S. Final, N.S. Nov., 1979)

Solution:

Operating Leverage in X Corporation

	Per Unit (Rs.)	2500 Units (Rs.)	3000 Units (Rs.)
Sales	14	35000	42000
Variables Costs	9	22500	27000
Contribution	5	12500	15000
Fixed Costs (2000 X Rs. 5 per unit)		10000	10000
EBIT		2,500	5,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \qquad = \frac{12,500}{2,500} = 5 \text{ times} \qquad = \frac{15,000}{5,000} = 3 \text{ times}$$

Inference: The degree of operating leverage is much higher at the sales volume of 2500 units than at the sales volume of 3000 units, i.e., 5 times and 3 times respectively. It means that at the sales volume of 2500 units, the variation in operating profit will be 5 times the variation in sales volume. This is apparent from the profit statement for 3000 units. A 20% increase in sales volume has resulted in a 100% increase in operating profits. However, at the sales volume resulted in a 100% increase in operating profits. However, at the sales volume of 3000 units, the degree of operating leverage is only 3 times. This means that at this level, the rise in operating profit will be 3 times the rise in sales volume.

A very high degree of operating leverage is not considered desirable as a small fall in sales volume will result in a substantial fall in operating profit.

Illustration 9:

The following data relate to Company XYZ Ltd.

		Rs.
	Sales	2,00,000
Less:	Variable Expenses (30%)	60,000
	Contribution	1,40,000
	Fixed operating expenses	1,00,000
	EBIT	40,000
Less:	Interest	5,000
	Taxable Income	35,000

1. Using the concept of leverage, by what percentage will taxable income increase if sales increase by 6 percent.

2. Using the concept of operating leverage by what percentage will EBIT increase if there is a 10 percent increase in sale?

3. Using the concept of financial leverage, by what percentage will taxable income increase if EBIT increases by 6 percent?

Solution:

1. Degree of composite leverage on sales level of Rs. 2,00,000

    $= \dfrac{\text{Contribution}}{\text{Taxable Income}} = \dfrac{1,40,000}{35,000} = 4 \text{ times}$

    If sales increase by 6 percent, taxable income will increase by $4 \times 6 = 24$ percent.

    Workings:

Sales	Rs. 2,12,000
Less: Variable Expenses (30%)	63,600
Contribution	1,48,400
Less: Fixed Expenses	1,00,000
EBIT	48,400
Interest	5,000
Taxable Income	43,400

    Increase in Taxable Income Rs. 8400 i.e. 24% over Rs. 35000

2. Degree of operating leverage on sales level of Rs. 2,00,000

    $= \dfrac{\text{Contribution}}{\text{Taxable Income}} = \dfrac{1,48,400}{43,400} = 3.5 \text{ times}$

    If sales increase by 10% EBIT will increase by 3.5x10 = 35 percent :

    Workings:

Sales	Rs. 2,20,000
Less: Variable Expenses (30%)	66,000
Contribution	1,54,000
Less: Fixed Expenses	1,00,000
EBIT	54,000

    Increase is Rs. 54000 – Rs. 40000 or Rs. 14,000

    i.e. $= \dfrac{14,000}{40,000} \times 100 = 35\%$

3. Degree of financial leverage if EBIT increases by 6%

    $= 40,000 \times 1.06 = 42,400$

    $= \dfrac{\text{EBIT}}{\text{Taxable Income}} = \dfrac{42,400}{37,400} = 1.15$

    If EBIT increased by 6 percent, taxable income will increase by $1.15 \times 6 = 6.9$ percent.

    Workings:

EBIT (4,000 × 1.06)	42,400
Less : Interest	5,000
Taxable Income	37,400

    Increase is Rs. 37,400 - 35000 or $\dfrac{2400}{35,000} \times 100 = 6.9\%$

Illustration 10:

The following data relates to two companies A Ltd. and B Ltd.

	A (Rs.)	B (Rs.)
Capital employed	–	2,50000
9 % Debentures	500000	250000
Equity Share Capital		
(in Rs. 10 shares)	100000	100000
Return on capital employed	20%	20%

The equity shareholders of A Ltd. find to their dismay that inspite of same return earned by their company on the total capital employed, their earnings per share is much less as compared to B Ltd.

You are required to state for the satisfaction of the shareholders of A Ltd., the reasons for such lower earning per share on their capital. Assume that the tax at 50%.

Solution:

In order to find out the reasons of a lower rate of earning for the shareholders of A Ltd., the earnings per share for both the companies will have to be calculated :

Computation of Earning Per Share

	A Rs.	B Rs.
Earnings before Interest and Tax (EBIT)	100000	100000
Less: Debenture interest	–	22500
Profit before tax (PBT)	100000	77500
Less: Taxes at 50%	50000	38750
Earning after tax (EAT)	50000	38750
Number of Shares	50000	25000
Earning per share	1	1.55
Financial Leverage EBIT / PBT	= 1	= 1.29

The above working explains that there are two causes for a lower earnings per share in case of the company A as compared to company B. These causes are as follows:

1. The company B has a favourable financial leverage or, in other words, it is taking the advantage of trading on equity. It has been a position to borrow half of its capital employed at much lower cost as compared to the total return on its capital employed. It is paying an interest of 9% on its debentures of Rs. 250000 but is earning a return of 20%. This saving of 11% has accrued to the shareholders as owners of the firm. This has been shown below:

	(Rs.)
Earnings on Assets financed by debentures	50,000
Less: Interest charges	22,500

Favourable leverage effect	27,500
(11% on Rs. 250000)	13,750

Less: Tax at 50%

After tax favourable leverage effect	13,750

Thus, Rs. 13750 are additionally available to the shareholders B Co. as compared to the shareholders of A Co.

2. The total number of equity share issued by B Co. are only 25000 as compared to 50000 shares issued by A Co. Consequently the after tax favourable leverage effect of Rs. 13750 has accrued to shareholders of 25000 shares. This has resulted in increase in earnings per share in case of Company B as compared to company A by Re. 0.55 (i.e. Rs. 13750 ÷ 25000) per share.

Illustration 11:

Calculate operating leverage and financial leverage under situations A, B and C and financial Plans I, II and III respectively from the following information relating to the operating and capital structure of which give the highest value and the least value. How are these calculations useful to financial manager in a company

Installed Capacity	1200 Units
Actual Production and Sales	800 Units
Selling Price per unit	Rs .15
Variable Cost per Unit	Rs. 10
Fixed Cost : Situation A	Rs. 1000
Situation B	Rs. 2000
Situation C	Rs. 3000

Capital Structure	Financial Plan		
	I	II	III
Equity	5000	7500	2500
Debt	5000	2500	7500
Cost of Debt			12%

Solution:

Computation of Operating Leverage

	Situation A	Situation B	Situation C
Sales (S)	12,000	12,000	12,000
Less: Variable Cost (VC)	8,000	8,000	8,000
Contribution (C)	4,000	4,000	4,000
Fixed Cost (FC)	1,000	2,000	3,000
Operating Profit (OP)	3,000	2,000	1,000
Operating Leverage (C/OP)	1.33	2	4

Computation of Financial Leverage

	Fin. Plan I	Fin. Plan II	Fin. Plan III
Situation A:			
Operating Profit	3,000	3,000	3,000
Less: Interest	600	300	900
PBT	2,400	2,700	2,100
Financial Leverage = OP/PBT	1.25	1.11	1.4
Situation B:			
Operating Profit	2000	2000	2000
Less: Interest	600	300	900
PBT	1400	1700	1100
Financial Leverage = OP/PBT	1.43	1.18	1.82
Situation C:			
Operating Profit	1000	1000	1000
Less: Interest	600	300	900
PBT	400	700	100
Financial Leverage = OP/PBT	2.5	1.43	10

Combination of Operating Leverage and Financial Leverage

Highest Value Situation C and Financial Plan III 4 × 10 = 40

Least Value Situation A and Financial Plan II 1.33 × 1.11 = 1.476

The operating leverage and the financial leverage computed as above have a great utility for the financial manager. Since they disclose the extent of both operating and financial risk assumed by a company under a particular situation, both the leverage should neither be too high nor too low. A high degree of this leverage will indicate that the company is working under a very observing extra conservatism at the cost of equity shareholders. A financial manager would try to keep the financial leverage high and the operating leverage low to maximise the earnings per share. In case, the financial leverage is high, he should try to bring down the financial leverage gradually. Analysis of leverages is thus very crucial in financial decision making.

Illustration 12:

The Hardware Company has to make a choice between debt issue for its expansion programme. Its current position is as follows:

	Rs.
Debt 5%	20,000
Equity capital (Rs 10 per share)	50,000
Surpluses	30,000
Total Capitalisation	**1,00,000**
Sales	300,000
Less: Total Costs	2,69,000

Contd...

		Rs.
	Income before interest and Tax	31,000
Less:	Interest	31,000
		1,000
	Income Tax 50 %	30,000
	Income after tax	15000

The expansion programme is estimated to cost of Rs. 50000. If this is financed through debt, the rate of new debt will be 7% and the price earning ratio will be 6 times. If the expansion programme is financed through equity shares can be sold netting Rs. 25 per share, and the price earning ratio will be 7 times. The expansion will generate additional sales of Rs. 150000 with a return of 10% on sales before interest and taxes.

If the company is to follow a policy of maximising the market value of its shares, which form of financing should it Choose?

Solution:

Determination of Market Value of Shares under different Financial Plans

		Financial Plans	
	OP or EBIT (Present 31000+	Rs.	Rs.
	10% of Rs. 150000)	46000	46000
Less:	Interest	4500	1000
	PBT	41500	45000
Less:	Income tax (50%)	20750	22500
	PAT	20750	22500
Earning per share (EPS)		20750	22500
		5000	7000
		= 4.15	= 3.214
Price earning ratio (P/E Ratio)		6 times	7 times
Market Value of a share (EPS x P/E Ratio)		24.90	22.50

The above analysis shows that the market value of the company's share will be higher in case it chooses the debt alternative. Hence, the company should rise additional funds of Rs. 50000 through debt.

Illustration 13:

Bhaskar Manufacturer Ltd. has Equity share capital of Rs. 500000 (face value Rs. 100). To meet the expenditure of an expansion program, the company wishes to raise Rs. 3,00,000 and is having following four alternative sources to raise the funds:

Plan A :   To have full money from the issue of Equity shares.

Plan B :   To have Rs. 1,00,000 from Equity and Rs. 2,00,000 from borrowings from the financial institutions @ 10% per annum.

Plan C :   Full money from borrowings @ 10% per annum.

Plan D :   Rs. 1,00,000 in Equity and Rs. 2,00,000 from 8% Preference shares.

The company is having present earnings of Rs. 1,50,000. The corporate tax is 50%. Select a suitable plan out of the above four plans to raise the required funds.

Solution:

Determination of Suitable Plan for Raising Funds

(Rs. in Lakhs)

	EBIT	Interest	Tax 50%	PAT	Pref. Div	Profit (Net)	No. of Shares	EPS (Rs.)
Plan A	1.50	-	0.75	0.75	-	0.75	8000	9.38
Plan B	1.50	0.20	0.65	0.65	-	0.65	6000	10.83
Plan C	1.50	0.30	0.60	0.60	-	0.60	5000	12.00
Plan D	1.50	-	0.75	0.75	0.16	0.59	6000	9.83

Return to shareholders in the form of earning per share is highest in Plan C and is therefore acceptable.

Illustration 14:

A Ltd. has a share capital of Rs. 1,00,000 dividend into share of Rs. 10 each. It has a major expansion programme requiring an investment of another Rs. 50000. The management is considering the following alternatives for raising this amount.

i)   Issue of 5000 equity shares of Rs. 10 each

ii)   Issue of 5000, 12% preference shares of Rs. 10 each

iii) Issue of 10% debentures of Rs. 50000

The company's present earnings before interest and tax (EBIT) are Rs. 40000 per annum subject to tax @ 50%. You are required to calculate the effect of each of the above financial plan on the earnings per share presuming.

a)   EBIT continues to be the same even after expansion.

b)   EBIT increase by Rs. 10000.

Solution:

a)   When EBIT is Rs. 40000 per Annum

Projected Earning Per Share

	Plan I	Plan II	Plan III
EBIT	Rs. 40,000	Rs. 40,000	Rs. 40,000
(-) Interest	-	-	5000
Profit before Tax (EBT)	40000	40000	35000
(-) Tax @ 50%	20000	20000	17500
Profit after Tax (EAT)	20000	20000	17500
(-) Pref. Dividend	-	6000	-
Profit for Equity	20000	14000	17500
Number of equity shares	15000	10000	10000
EPS (Rs.)	1.33	1.40	1.75

b)   When EBIT is expected to increase by Rs. 10000

Projected Earning Per Share

	Plan I	Plan II	Plan III
EBIT	Rs. 50,000	Rs. 50,000	Rs. 50,000
(-) Interest	-	-	5000
Profit before Tax (EBT)	50000	50000	45000
(-) Tax @ 50%	25000	25000	22500
Profit after Tax (EAT)	25000	25000	22500
(-) Pref. Dividend	-	6000	-
Profit for Equity	25000	19000	22500
Number of equity shares	15000	10000	10000
EPS (Rs.)	1.67	1.90	2.25

So, under both assumptions of EBIT, the EPS would be highest in Plan III.

Illustration 15:

A company needs Rs. 12,00,000 for the installation of a new factory which is expected to earn an EBIT of Rs. 2,00,000 per annum. The company has the objective of maximizing the earnings per share. It is considering the possibility of issuing equity shares plus raising a debt of Rs. 2,00,000 or Rs. 6,00,000 or Rs. 10,00,000. The current market price of the share is Rs. 40 and will drop to Rs. 25 If the borrowings exceed Rs. 7,50,000. The cost of borrowing are indicated as under:

Up to Rs. 2,50,000	10%
Rs. 250000 - 625000	14%
Rs. 625000-100000	16%

Assuming the tax rate to be 50%, find out the EPS under different options.

Solution:

	Plan I Rs.	Plan II Rs.	Plan III Rs.
Total financing	12,00,000	12,00,000	12,00,000
– Debt financing	200000	600000	1000000
Equity Financing	1000000	600000	200000
Issue Price	40	40	25
Number of Shares	25000	15000	8000
Computation of Interest			
10% of Rs. 2,00,000	20000	-	-
10% of Rs. 2,50,000	-	25000	25000
14% of Rs. 3,50,000	-	49000	-
14% of Rs. 3,75,000	-	-	52500
16% of Rs. 3,75,000	-	-	60000
Total Interest	20000	74000	137500

Contd...

Calculation of EPS:

EBIT	2,00,000	2,00,000	2,00,000
Interest	20000	74000	137500
Profit before Tax (EBT)	180000	126000	62500
Tax @ 50%	90000	63000	31250
Profit after Tax (EAT)	90000	63000	31250
Number of Shares	25000	15000	8000
EPS (Rs.)	3.60	4.20	3.91

The EPS is highest (i.e. Rs. 4.20) under the plan II. The borrowings under this plan i.e. Rs. 600000 is also within limits and the market price would be maintained at Rs. 40.

Check Your Progress

State whether the following statements are true or false:

1. The size of fixed cost has considerable influence over the amount of profits available for the shareholders.

2. When the volume of sales changes, leverage helps in quantifying such influence.

3. Leverage may be defined as relative change in profits due to a change in sales.

4. A high degree of leverage implies that there will be a large change in profits due to a relatively small change in sales and vice versa.

5. The higher the leverage, the higher is the risk and the higher is the expected return.

8.4 LET US SUM UP

Leverage refers to the commitment of a business firm with regard to fixed operating and financial charges and its impact on earnings per share available for equity shareholders. Leverage can be categorized into operating, financial, and combined leverages. Operating leverage indicates the percentage of change in EBIT as a result of change in sales, whereas the Financial leverage reflects that the percentage of change in taxable profits being influenced by the change in earnings before interest and tax. However, the impact in taxable profits as a result of change in sales shall be reflected by the Combined Leverage. The financial manager, while determining the capital structure of a firm, should consider the significance of leverages with a view to attain the business goals.

8.5 LESSON END ACTIVITY

Discuss various types of leverages and the computing procedures.

8.6 KEYWORDS

Financial leverage: The leverage arising from fixed financial charges.

Operating leverage: The leverage arising from fixed Operating costs.

Degree of financial leverage: The percentage change in earnings per share as a result of one percent change in earnings before interest and taxes.

Degree of operating leverage: The percentage change in earnings before interest and taxes as a result of one percent change in sales.

Degree of combined leverage: The percentage change in earnings per share as a result of one percent change in sales.

8.7 QUESTIONS FOR DISCUSSION

1. Define the concept 'Leverage'.
2. What are the different types of Leverages?
3. What is the significance of Operating Leverage?
4. Explain the significance of Financial Leverage?
5. What is Combined Leverage?
6. What is 'Financial Risk' ?

Essay Type Questions

1. What is Leverage? Explain different kinds of Leverages with appropriate examples.
2. What is the role of a finance manager in deciding capital structure? Illustrate by using the Operating and Financial Leverages.
3. What is the significance of Operating, Financial, and Composite Leverages?

Practical Problems

1. X Ltd. supplies the following information:

   Sales Rs.9,60,000; Variable cost Rs.5,60,000; Fixed costs Rs.2,40,000; Interest on Debentures Rs.60,000. Assuming tax rate of 50%, calculate

   (i) Operating Leverage;

   (ii) Financial Leverage; and

   (iii) Combined Leverage.

2. Calculate Operating, Financial, and Combined leverages from the following data:

   Sales 1,00,000 units @ Rs.2 per unit   = Rs.2,00,000

   Variable cost per unit @ Re.0.70

   Fixed costs Rs.1,00,000

   Interest charges Rs.3,668.

Check Your Progress: Model Answers

1. T, 2. T, 3. T, 4. T, 5. T.

8.8 SUGGESTED READINGS

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UNIT V

LESSON

9

FINANCIAL FORECASTING

9.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept of financial forecasting.
- Examine the methods of forecasting financial requirement.
- Study the importance of debt equity relationship.

9.1 INTRODUCTION

Financial forecasting, an integral part of a finance manager's job, is an act of deciding in advance the quantum of funds requirements of the enterprise and the time pattern of such requirements. The forecasting of financial results is only part of the business planning in which the management takes account of the economic, competitive and technical and social environment. In a dynamic uncertain environment it is difficult to overstate the significance of financial forecasting for effective business management.

Systematic financial forecasting can stave off the enterprise from financial crisis which would otherwise have resulted due to embarking on capital expenditure programmes involving the project and resourcefulness of the enterprise to take up the project before moves are made that are difficult to retreat. If the above study indicates that although the project is desirable it will land the enterprise in financial stringency, the management can strive to cut back or reshape the programme so as to avoid embarrassing commitments.

Where the projects in hand are found considerably useful in all respects and it would be in the company's interest to implement them, prudent financial planning gives advance signal to plan and execute programmes to raise funds from different sources. Such a plan is necessary so as to garner the requisite funds from desirable sources which, besides being cheaper, do not impose unduly harsh terms and conditions on the company. In the absence of careful cash planning, the company may be forced to make hasty crash programme efforts to find funds that may result in the company's assuming loan or repayment or other commitments it subsequently finds difficult to satisfy.

Often it is seen a financial forecasting indicates surfeit of funds, investment of which tends to improve earnings of the enterprise but for which the money would have been lying idle in sterile form. Thus, financial forecasting is not only useful to companies with limited resources but to affluent concerns by pointing up opportunities to the liquid funds more profitably.

Furthermore, a company with comprehensive financial planning programmes enjoy high creditworthiness in financial as well as business circles. A banker is very much impressed with such concern and does not feel loath to grant substantial credit at relatively convenient terms and conditions. This is because it gives the banker an opportunity to discuss with the management future plans of the company, magnitude of the financial requirements involved in the plans and its time pattern, impact of such programmes on profitability and liquidity position of the enterprise, loan repayment schedule etc.

Financial forecasting can be used by the management as an important tool to control financial activities of the enterprise in that comparison of actual results against the forecasted levels of cash will indicate the extent the funds have been put to use according to the plan. This enables a finance manager to find out deviation from the planned course of action and take remedial measures. Alternatively, deviations may reveal that the plans were unrealistic and should be revised in the light of unforeseen or uncontrollable events.

The movement of cash into non-cash assets and back into cash again takes place on a continuous basis in almost all business concerns. Such a movement is often described as a circular flow without a beginning or end, and is characterized as funds circulating throughout the business.

Circular flow of cash through an enterprise could be timed. Some money would take not more than a year to complete the cycle and return in the form of cash. In contrast, others may take many years to complete the cycle. Non-cash assets that take very short period to return in cash are collectively designated as current assets or working capital. Current assets comprise inventories of goods to be processed and sold, accounts receivable, short-term holdings of investment in securities and certain prepaid expenses and deferred charges. Route taken by the current assets is designated as short cycle.

Conversion of certain assets to cash takes long time. Such assets are termed as fixed assets including buildings, factory machinery and equipment, furniture and fixtures and similar other assets which will not be completely used up (or converted into cash) in normal business course within one year. Undoubtedly a part of total funds invested in fixed assets is returned in cash within a year but the over all process of conversion generally takes many years. Conversion route of such assets is known as the long cycle.

9.2 TECHNIQUES OF FINANCIAL FORECASTING

There are number of techniques which are invariably employed to forecast financial needs of a company. These are: Cash Flow Forecast, Proforma Balance Sheet, Sensitivity Analysis and Simulation. We shall discuss in the present chapter the nature and significance of these techniques and the basic procedures involved in these techniques in building a financial forecast for an enterprise. Although fundamentals of each of these techniques are equally applicable to all enterprises of different nature and sizes, details of the approach should be adopted to the distinctive needs and circumstances of the enterprise concerned. Of late, two more techniques, viz., sensitivity analysis and simulation, have been developed to undertake the financial forecasting.

9.2.1 Cash Flow Forecast

Cash flow forecast in a company is prepared to accomplish the following objectives:

i)   To project company's cash position in future period.

ii)   To predict cash surplus or deficit in the ensuing months.

iii) To permit planning for financing in advance of need. By indicating when cash will be required, the forecast helps the management to arrange in advance bank loans or other short-term credits, to prepare for a sale of securities or to make other preparations for new financing.

iv)   To help in selection of proper source of financing cash requirements of the company.

v)   To permit proper utilization of idle cash.

vi)   To maintain adequate balance between cash and working capital, sales, investments and loans.

vii) To exercise effective control over cash expenditure by limiting the spending of the various departments.

9.2.2 Preparation of Cash Flow Forecast

The cash flow forecast is prepared generally by finance manager. Since the cash flow forecast is based on numerous estimates originating throughout the company, finance manager should consult other executives of the company while preparing it. Preparation of the cash flow forecast involves the following steps:

i)   Estimating cash receipts

ii)   Estimating cash disbursements

iii) Determining financial needs

Before preparing the cash flow forecast finance manager must determine the period for which it will be prepared. The cash flow forecast period should be decided in the light of stability of the company's sales and production. If volume of sales and product prices are stable and production can be scheduled at more or less constant rate, the period can be set quite long even beyond the one-year limit. In case of volatile fluctuations in sale, period of the cash flow forecast should be shortened. After the determination of the total span of time to be covered, the next step is to formulate the unit of time into which the total span is to be divided. Monthly periods constitute a convenient unit since they synchronize with the conventional accounting period of a month and because this allows incorporation of seasonal variations in cash flows. Some organizations even prepare the

statement on daily basis. In that case projections of cash inflows and outflow are limited to one month and monthly intervals are used for the remainder of the forecast period. As the second month approaches, a cash budget based on daily time periods is prepared for this month. This process is repeated for the rest of the months.

Once the forecast period has been decided the finance manager starts the exercise of forecasting. The first step in the process of the preparation of the cash flow forecasts is estimation of cash receipts.

i)   *Estimating Cash Receipts*: In predicting cash inflows the finance manager should first of all recognize sources of cash receipts. This is, to a large measure, dependent upon nature of business operations. Generally, a business enterprise derives cash from cash sales, collection of accounts receivables, income from loan and investments, sale of fixed assets, etc. In manufacturing and trading concerns cash sales and collection of receivables constitute the major sources of cash receipts. Accordingly cash flow forecasting begins with the forecasting of sales. There are two approaches to determine the projected sales. The first among these is internal approach in which salesmen are asked to predict sales for the ensuring forecasting period. These estimates are made product-wise, area-wise and month-wise. The sales manager screens these estimates and consolidates them to prepare on overall sales estimate for the enterprise. The underlying limitation of this approach is that it overlooks general economic and business conditions that definitely influence the volume of business activity of an enterprise. This is why many companies employ external approach also. In this approach a forecast of economic situation for several years to come and of industry sales during this period is made by economic analysts. Thereafter, an estimate of market share of individual products, prices that are likely to prevail and the likely reception of new products is made.

Sales estimates made on the basis of external approach is tallied with that on internal approach and in case of difference between the two a compromise is reached. On the basis of the past experience it has to be decided as to which forecast is more accurate. In general external forecast should provide the basis for the final sales forecast. This would lead to more accurate forecast of sales than that based either on internal or external approach.

Once sales estimates has been done the finance manager's job begins. He has to determine the cash receipts from sales. He has to first separate cash sales from credit sales taking the historical ratios of cash to credit sales as the basis, allowance being made for anticipated changes in general business trend and other indicated conditions. If there is no time lag between point of sales and realization of cash, the estimated sales in the sales forecast will be shown in the cash flow forecast as the cash receipts from that source. Problem arises where the company sells on account. In case of credit sales there will be time lag between the point of sale and realization of cash. The actual time lag between the two will depend upon the credit terms, the type of customer and the two will depend upon the credit terms, the type of customer and the credit and collection policies of the company. The finance manager should therefore, collect data regarding percentage of credit sales collected in 30 days, 60 days and so forth. It would be more useful to collect such information from various sales districts and for different classes of customers. This information should be used with considered judgement.

After deciding the time interval between credit sales and collection of receivables, the finance manager should also determine the amount that will be collected on accounts. In the light of amount of cash discounts offered by the company, paying

habits of customers and bad debt losses, estimate for amount of collection on account should be made. Generally the past collection rate is applied to the estimated credit sales for the forecasting period. To the resultant figure is added the collections outstanding at the beginning of the period in order to obtain the estimated total collections for the period.

In a business concern cash receipts from other than sales form a negligible proportion. However, estimate of these receipts should also be made. Examples of such receipts are interest and dividends from investments, liquidation of such investments, royalties from licensing arrangements with other concerns for manufacturing a product under its patents. While there is no problem in estimating dividend and interest income and receipts from sale of assets, it is not easy to predict probable cash receipts from royalties. However, this does not pose great problem because flows from the sources are of small magnitude and if there is any inaccuracy in forecasting these flows it will not have material effect on the overall cash flow forecast.

ii) **_Estimating Cash Disbursements_**: Next step in construction of the cash flow forecast is to predict cash disbursements in different months of the forecasting period. Generally, a company makes payments for purchase of raw materials, direct labour, out of pocket expenses, capital additions, retirement of indebtedness and corporate disbursements such as dividends. The forecasts for these item certainly provide the basis for estimating the cash requirements.

Estimate of the amount and timing of payment for raw materials or finished goods during a forecasting period closely follows sales estimates but the relationship is not necessarily a precise one. A decision to hold larger inventories would call for purchases more than what would be required to meet projected sales; while a decision to cut inventories would make it possible to meet a portion of estimated sales out of inventory already held, resulting in less purchase requirements for the forecasting period than what would otherwise have been. At any time, the timing of purchases and of payments, therefore, will not be difficult to estimate on the basis of sales estimate and inventory policy decisions when production schedule and buying programmes have been estimated.

In predicting month-wise payments of raw materials and finished goods the finance manager must make separate estimate of cash purchases, purchases on account and probable returns and allowances. He should also take into account the credit terms of the various suppliers supplying goods to the company and cash discounts offered to enable the prompt payment. An estimate of paying suppliers on obligations standing on the book at the beginning of the budget periods well as postponing payment on obligations that will originate during the period but will not reach their due or discount date of its end, should also be made.

Business concerns paying wages to labourers on piece rate basis can predict the wage will by simply applying the price rates to the units of output called for the production budget, at the same time taking into consideration prospective rise in wage costs in the company, social security taxes, paid holidays and vacations, payments into company pension funds, payment for overtime work and such bonuses as may be prescribed by incentive systems in operation. Where labourers are paid on hourly basis wage bill can be estimated by multiplying the number of labour hours of various skills required to turn out units of output as scheduled in production budget by the respective hourly rates and adding in supplemental wage costs of the kinds referred to above.

Among overhead expenses some expenses like property taxes, property insurance, some of the executive salaries and certain kinds of maintenance charges are fixed in character. These fixed expenses are expected to hold up a specific level regardless of variations in volume of business. But fixity in an expense does not mean that it will not change from this year to next year. Local governments may raise their rates for property insurance or the forecasting concern may be planning additions to fixed assets which will attract additional property tax and the company will have to pay insurance cost on this property. Fixed expenses, therefore suggest that if a change takes place the new level will prevail regardless of the scale of operations next year. One must, therefore, be careful in estimating fixed overhead expenses. Estimates of variable expenses should not pose a great problem because of the fact that such expenses by definition are expected to vary in proportion to production or sales. But difficulties cannot be wholly avoided. There are possibilities of future changes in prices and costs that create complication. If the selling prices of the company's products are to be lowered with no change in the salesmen's commission rate, the fall in total commissions can hardly be expected to be proportional to the fall in unit sales.

Forecasting difficulties in respect of semi-variable expenses emanate from two directions. First, the different kinds of expenses in this group tend to have disproportional patterns of variations in relation to volume of operations. Secondly, changes in prices and rates affect them no less than fixed and variable expenses. A forecast of lower sales for the forecast period may be coupled with budgetary provisions for a substantial increase in spending for advertising with a view to preventing further decline in sales. If the market for the product expands there may arise slight need to increase the advertising expenditure to cover the new portion of the market since sales will themselves increase. If, however, the company is interested to increase its market share, increase in spending becomes inevitable. At the same time change in advertising expenditure may also be expected in view of the decision for a more extended coverage and also because of expected increase in advertising rates.

Cash requirements for interest and dividend payments, repayment of loans and retirement of debt, payments for acquisition of fixed assets and non-operating assets such as real estate should be carefully estimated as these are related to manufacturing processes, selling efforts and administration.

iii) *Determination of Financial Needs:* After estimates for cash inflows and outflows are made, these are then combined to obtain the net cash inflow or outflow for each month. When the net cash flow is added to the beginning cash balance the resulting figure gives cash position of the concern. Given the company's cash position for each month, finance manager would keep in mind the minimum cash requirements of the concern, decide the amount that the company would need to borrow from bank and other short-term sources.

9.2.3 Significance of Cash Flow Forecast

Cash flow forecast is an extremely important tool available in the hands of a finance manager for planning fund requirements and for controlling cash position in the company. As a planning device, cash flow forecast helps the finance manager to know in advance the cash position of the concern in different time periods. The cash forecast indicates in which months there will be cash surfeit and in which months it will experience cash drain and by how much. With the help of this information the finance manager can draw up a programme for financing cash requirements. It indicates the most opportune time to

undertake the financing process. There will be two advantages if the finance manager knows in advance as to when additional funds will be required. First, funds will be available in hand when needed and there will be no idle funds. In the absence of the cash flow forecast it may be difficult to determine cash requirements in different months. If cash required is not available in time it will land the company in financial turmoil. The company's output is reduced because of imbalance in financial structure and the rate of return consequently declines. If the company is marginal, decline in profits could lead to disaster. Further, it would be difficult for the company to meet its commitments and would consequently lose its credit standing. A company with a poor credit standing stands little chance of succeeding.

With the help of the cash flow forecast the finance manager can determine precisely the months in which there will be cash surplus. No doubt a reasonably adequate amount of cash adds to the company's debt paying power, excess cash for any period of time is largely a wasted resource yielding no return. This will result in the decline in profits. The cash flow forecast offsets the possibility of decline in profits because the finance manger in that case will invest idle cash in marketable securities. Thus, with the help of the cash flow forecast, the finance manager can maintain high liquidity without jeopardizing the company's profitability.

The cash flow forecast, besides indicating cash requirements, reflects the length of the time for which funds will be needed. This will help the finance manager to decide the most likely source from which the funds can be obtained. A company which stands in need of funds for a short-term duration will use a source different from the one requiring funds for a long time. Bank loan is the most appropriate source to cover temporary cash requirements while permanent funds requirements are met by selling stocks and bonds. If long-term cash requirements are met through short-term funds, this will leave the company in considerable financial predicament. The company will have to either renew the loans to make it long-term or an entirely new loan must be negotiated. In either case the negotiations are on a much shorter notice than the original loan and the renewal of new loan will very likely be made with less favourable terms. Further planning for cash may infuse confidence among suppliers of cash and credit to such an extent that they are more likely to grant loans on easier terms. Usually bankers are loath to lend to companies which do not follow good managerial practices with respect to their financial requirements. However, when they grant loans, they usually charge higher interest rates and place restrictive clauses in the loan contract. When funds are obtained for period longer than necessary, cost of capital will go up resulting in decline in profits.

The cash flow forecast is also conductive in formulation of sound dividend policy for the enterprise. As stated elsewhere, availability of adequate amount of cash is necessary for dividend payments. Company may experience cash drain despite earnings because of the fact that bulk of sales was effected through credit. Even if the company has sufficient cash in hand it may not be able to pay high dividends because of the need to repay loan or retire debt, to carry inventories and to meet other emergent requirements. Keeping the company's cash position in mind the finance manager can reach suitable dividend decisions.

The cash budget is also a useful device to establish a sound basis for current control of the cash position. The cash budget sets the limitation on cash expenditures which must be observed by all those whose activities involve cash disbursements. With the help of the cash budget reports prepared periodically, the finance manager can compare actual receipts and expenditures with the estimated figures. With these reports the finance manager can find out deviations and study reasons for variations and finally take steps to remedy the variations.

9.2.4 Limitations of Cash Flow Forecast

This tool is however, not devoid of its limitations. Errors in estimation anywhere along the line of forecast that must be prepared prior to the cash flow forecast will obviously create inaccuracies in the cash flow forecast. This means that the cash flow forecast should be reviewed from time to time against actual performance so that corrections can be made and plans adjusted accordingly.

Another drawback of the cash flow forecast is that it fails to indicate time segments of cash flows. For example, if a company has planned to invest money in short-term securities in the month of April, the forecast would not indicate when in April. Will it be early or late April? It is quite possible that the company could run out of cash altogether by April 10 leaving it without adequate cash balance with which to meet wage bills. Thus, the finance manager may find it useful to prepare more than one cash flow forecast depending on how critical he feels his company's cash position is. He may prepare a weekly forecast for the next 30 to 60 days, another for one year by month and yet another long-range forecast for several years. This points up another reason for close administration of the forecast.

9.3 PROFORMA BALANCE SHEET

Proforma balance sheet method of forecasting financial needs of an enterprise is built around a forecast of the magnitude of key items of balance sheet for some future period. Thus, preparation of proforma balance sheet involves the following four steps:

i)   Forecast of the current and fixed assets levels required to carry out operations at the level planned on the date involved.

ii) Estimate the liabilities that can be counted on without special negotiation.

iii) Estimate the net worth on the date involved.

iv) Comparing the projected assets with total sources of funds – debt and net worth of the total of assets required exceeds the total for expected liabilities and networth, the difference represents the additional sources that must be negotiated if the planned operations are to be carried out. If the expected sources more than cover the needed asset investment, the excess indicates the additional cash above the desired minimum level.

Let us now discuss in detail as to how projections are made for constructing proforma balance sheet.

First item to be estimated is the anticipated investment in accounts receivables on the forecast date. Key factor influencing the size of the receivables investment is the volume of sales. The past receivables turnover figure adjusted in the light of any anticipated changes in credit terms, in the leniency with which credit will be granted or in any other factor that might affect the receivable balance, can reasonably be applied to forecast sales immediately preceding the forecast data. Likewise, inventory requirements of the company can be projected on the basis of inventory turnover. Alternatively, beginning inventory plus purchases plus value added in manufacture, less cost of goods sold equals value of inventory left on hand. It should be noted in this connection that all inventory values are expressed in terms of cost rather than selling prices.

The projected investment in fixed assets can be ascertained by adding planned acquisition of new plant or equipment to the existing net investment in fixed assets and subtracting planned depreciation.

On the liability side of the balance sheet, anticipated accounts payable figure has to be determined. On the basis of planned purchases, the assumed purchase terms and the company's policy in making trade payables on the dates, the purchases for which payment will not yet have been made on the forecast date can be tabulated and posted in the balance sheet as the anticipated accounts payable.

Accrued wages and other accrued expenses can be calculated with reference to the production schedule, making adjustment for the normal lag between the incurring of the wage and other expenses and the required payment of the accrued expenses.

In order to arrive at the amount of accrued taxes which will be outstanding on the date of forecasting the taxes accrued on income to be earned before the forecast date are added to the currently outstanding balance of accrued income taxes. From the figure so arrived at is deducted scheduled payment of taxes so as to determine the accrued taxes outstanding on the forecast date.

Finally, networth figure on the date of forecasting is estimated. For this purpose, existing networth is adjusted in the light of planned sales of stock, stock retirements or any other such change in future. Projected amount of surplus is added to the above figure. This amount is calculated by subtracting planned dividend payments from net profits after taxes. Profit forecast is usually based on the projected income statement.

Having projected assets and liabilities of the company, the finance manger matches the two to determine the balancing figure. When estimated assets exceed anticipated liabilities and networth, the balancing figure represents the additional funds which the company would require to permit the planned asset investment. If, on the other hand, the sources exceed the asset needed, the excess presumably will accrue as the cash above the required minimum amount.

In preparing proforma balance sheet analysis of prior balance sheet, proforma income statement and cash flow forecast is made.

One of the limitations of the balance sheet method is that it depicts the funds requirements as of the particular date only. It does not shed light on the varying financial needs in the interim period. For companies which experience sharp fluctuations in their financial requirements from month to month or seasonally, the balance sheet method will not prove any meaningful. To get over this problem some forecaster sets the minimum level of cash desired at a high enough level to take care of short lived peak needs within the forecast period. However, this method can be a costly affair.

Check Your Progress 1

1. Define financial forecasting.

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    ....

2. Define cash flow forecast.

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9.4 SENSITIVITY ANALYSIS

Sensitivity analysis is a very useful technique in planning the company's future financing. In this type of analysis value of uncertain variables is changed and a revised outcome is calculated. This is how we test the sensitivity of our answers to changes in uncertain input variables.

In an uncertain world, forecasts made on the basis of cash flow estimate and proforma balance sheet are prone to big errors. It would, therefore, be meaningful to estimate the range of possible capital needs alongside the best guess provided by the forecast. It is in this context that the sensitivity analysis is undertaken. In this analysis the finance manager determines the sensitivity of the company's requirements for external capital to changes in the values of uncertain input variables viz., sales, receivables, inventories, etc. This calls for construction of new proforma balance sheet and income statement at the various sales levels. Such an exercise reveals that although capital needs of the enterprise, say Rs.5,00,000/- arrived at on the basis of cash flow forecast and proforma balance sheet, is the most likely estimate, actual need could range between Rs.4,80,000 – Rs.5,20,000. This sort of information received in advance can be very helpful in planning the company's future financing.

Thus, sensitivity analysis is always a valuable exercise when input variables are subject to uncertainty. However, the major drawback of this analysis is that only one uncertain variable can be tested at a time. For example, the sensitivity analysis level of accounts receivables and inventory is changed in response to variation in level of sales presuming the receivables turnover remains constant. In real world, relationship between sales and inventories and receivables may change because of a number of factors. On account of this, range of possible outcomes may turn out to be unrealistic. Sensitivity analysis fails to take cognizance of these contingencies. Simulation technique has, therefore, been developed to deal with such problems.

9.5 SIMULATION

Simulation is one of the recently introduced techniques in business decisions which have found wider acceptance among business executives in diverse areas including cash planning. This model does not solve the manager's problem in the sense of indicating optimal decision. However, it provides much firmer information on which to base a decision.

Simulation is a mathematical model with equations and probability distributions which describe the important variables in a risky decision. Construction of simulation model as applied to cash planning involves the following steps:

(i)   Express the desired output in terms of number of input variables in the present statement which tell us the need for external capital in terms of basic input variables like sales, accounts receivable, inventories and dividends.

(ii)   Assign a probability distribution to each of these variables that is subject to uncertainly and specify any correlations among them.

Illustration 1:

Rakesh Mohan wishes to commence a new trading business and supplies the following information:

(i)   The total estimated sales in the year will be Rs. 24,00,000.

(ii) His expenses are estimated at a fixed expense of Rs.4,000 per month plus a variable expense equal to 5% of his turnover.

(iii) He expects to fix a sale price of each product which will be 25% in excess of his cost of purchase.

(iv) He expects to turn over his stock 4 times in the year.

(v) The sales and purchases will be evenly spread throughout the year. All sales will be for cash but he expects one month's credit for purchases.

Calculate estimated profit for the year.

Solution:

Yearly Estimate Profits of Rakesh Mohan

	Rs.	Rs.
Sales	24,00,000	
Purchases	19,20,000	
Gross Profit 25/125 x 24,00,000	4,80,000	
Expenses:		
Fixed	48,000	
Variable		
(5% of Rs.24,00,000)	1,20,000	1,68,000
Net Profit		3,12,000

Illustration 2:

The following is a summarized Balance Sheet of Modern Breweries Ltd. as on 31st December, 2000.

	Amount (Rs.)		Amount (Rs.)
Share Capital	8,00,000	Fixed Assets	4,48,000
Reserves	11,84,000	Stock	11,52,000
Bank Overdrafts	5,76,000	Debtors	16,00,000
Trade Creditors	6,40,000		
	32,00,000		32,00,000

Trade Creditors are equal to the last 2 month's sales. For the half year ending, 31st December 2000, sales amounted to Rs.50,42,000 and gross profit earned at a uniform rate was Rs.10,08,000.

The following estimates and information are available:

(1) With effect from 1st January, 2001 goods purchased will cost 25% higher and sale prices will be increased by 20%.

(2) During the half-year ending 30th June, 2001 quantities sold are expected to be 10% higher than the quantities sold in the preceding half-year. Sales for January are estimated at Rs.13,72,800 and for the remaining five months the sales will be evenly spread.

(3) Credit terms for purchase and sales will remain unchanged.

(4) Closing Stock on 30th June, 2001, is expected to be 10 per cent higher in quantity than on 31st December, 2000 purchases being spread evenly throughout the year.

(5) All expenses will be paid within the month in which they accrue and are estimated at Rs.64,800 per month.

(6) No fixed assets are proposed to be acquired for the half year ending 30th June, 2001.

You are required to prepare a projected profit and loss account for the half-year ending 30th June, 2001.

Solution:

Projected Profit and Loss Account of Modern Breweries Ltd.
for the Half Year Ending June 30, 2001

	Amount (Rs.)		Amount (Rs.)
To Opening Stock	11,52,000	By Sales	66,52,800
To Purchases	56,88,000	By Closing Stock	15,84,000
To Gross Profit	13,96,800		
	82,36,800		82,36,800
To Expenses	3,88,800	By Gross Profit	13,96,800
To Net Profit	10,08,000		
	13,96,800		13,96,800

Working Notes:

(I) Sales For Six Months Ending 31st December, 2000

	Rs.
Sales for the six months ending 31st December, 2000	50,42,000
Add: 10% increase in quantity	10,08,000
Add: 10% increase in price	5,04,000
Total Sales	66,52,800

(II) Gross Profit Percentage

	Six months to 31.12.2000	Six months to 30.06.2001
Sales	100	120
Cost of Sales	80	100
	20	20
% of Sales	20	16 2/3

(III) Purchase To Be Made

	Rs.	Rs.
Sales (as per 1)		66,52,800
Less: Sales of stock on 31.12.2000	11,52,800	
Add: Profit (25%)	2,88,000	
	14,40,000	
Add: 20% increase in price	2,88,000	17,28,000
Sales out of cement purchases.		49,24,800
Gross Profit @ 16 2/3%		8,20,800
Cost of Sales		41,44,000

Check Your Progress 2

State whether the following statements are true or false:

1. Financial forecasting is an integral part of a finance manager's job.

2. The forecasting of financial results is only part of the business planning in which the management takes account of the economic, competitive and technical and social environment.

3. Systematic financial forecasting can stave off the enterprise from financial crisis.

4. Where the projects in hand are found considerably useful in all respects and it would be in the company's interest to implement them.

5. In the absence of careful cash planning, the company may be forced to make hasty crash programme efforts to find funds that may result in the company's assuming loan or repayment or other commitments it subsequently finds difficult to satisfy.

9.6 DEBT EQUITY RATIO

Debt Equity Ratio

The debt-equity ratio is determined to ascertain the soundness of the long-term financial policies of the company. It is also known as "External-Internal" equity ratio. It may be calculated as follows :

$$\text{Debt-Equity Ratio} = \frac{\text{External equities}}{\text{Internal equities}}$$

The term external equities refers to total outside liabilities and the term internal equities refers to shareholders' funds or the tangible net worth (as used in the proforma balance sheet given in the preceding chapter). In case the ratio is 1 (i.e. outsiders' funds are equal to shareholders' funds) it is considered to be quite satisfactory.

In case debt-equity ratio is to be calculated as a long-term financial ratio, it may be calculated as follows :

(i) Debt-Equity Ratio $= \dfrac{\text{Total long-term debt}}{\text{Total long-term funds}}$

(ii) Debt-Equity Ratio $= \dfrac{\text{Shareholders' funds}}{\text{Total long-term funds}}$

(iii) Debt-Equity Ratio $= \dfrac{\text{Total long-term funds}}{\text{Shareholders' funds}}$

Method (iii) is most popular.

Ratios (i) and (ii) give the proportion of long -term debt/shareholders' funds in total long-term funds (including borrowed) as well as owned funds). While Ratio (iii) indicates the proportion between shareholders' funds (i.e. tangible net worth), and the total long-term borrowed funds.

Ratios (i) and (ii) give the proportion of long term-term debt/shareholders' funds in total long-term funds (including borrowed as well as owned funds). While Ratio (iii) indicates the proportion between shareholders' funds (i.e. tangible net worth), and the total long-term borrowed funds.

Ratio (i) and (ii) may be taken as ideal if they are 5 each while the ratio (*iii*) may be taken as ideal if it is 1. In other words, the investor may take debt-equity ratio as quite satisfactory if shareholders' funds are equal to borrowed funds. However, a lower ratio, say 2/3rd borrowed funds and 1/3rd owned funds, may also not be considered as unsatisfactory if the business needs heavy investment in fixed assets and has an assured return on its investment, e.g. in case of public utility concerns.

It is to be noted that preference shares redeemable within a period of 12 years from the date of their issue should be taken as a part of debt.

Illustration 3:

From the following figures calculate the Debt-Equity Ratio:

	Rs.		Rs.
Preference Share Capital	1,00,000	Unsecured Loans	50,000
Equity Share Capital	2,00,000	Creditors	40,000
Capital Reserves	50,000	Bills Payable	20,000
Profit & Loss Account	50,000	Provision for Taxes	10,000
12% Mortgage Debentures	1,00,000	Provision for Dividends	20,000

Solution:

The debt-equity ratio may be calculated according to any of the following methods depending on the purpose for which the information is required.

(i) Debt-equity ratio $= \dfrac{\text{External Equities}}{\text{Internal Equities}} = \dfrac{2,40,000}{4,00,000} = 0.6$

(ii) $= \dfrac{\text{Total long-term debt}}{\text{Total long-term funds}} = \dfrac{4,00,000}{5,50,000} = 0.27$

(iii) $= \dfrac{\text{Shareholder's funds}}{\text{Total long-term funds}} = \dfrac{4,00,000}{5,50,000} = 0.73$

(iv) $= \dfrac{\text{Total long-term debt}}{\text{Shareholder's funds}} = \dfrac{1,50,000}{4,00,000} = 0.375$

Significance: The ratio indicate the proportion of owners' stake in the business. Excessive liabilities tend to cause insolvency. The ratio indicates the extent to which the firm depends upon outsiders for its existence. The ratio provides a margin of safety to the creditors. It tells the owners the extent to which they can gain the benefits or maintain control with a limited investment.

Proprietary Ratio

It is a variant of debt-equity ratio. It establishes relationship between the proprietor's funds and the total tangible assets. It may be expressed as:

$$= \dfrac{\text{Shareholder's funds}}{\text{Total tangible assets}}$$

Illustration 4:

From the following, calculate the proprietary ratio:

	Amount (Rs.)		Amount (Rs.)
Preference Share Capital	1,00,000	Fixed Assets	2,00,000
Equity Share Capital	2,00,000	Current Assets	1,00,000
Reserves & Surplus	50,000	Goodwill	50,000
Debentures	1,00,000	Investments	1,50,000
Creditors	50,000		
	5,00,000		5,00,000

Solution:

$$\text{Proprietary ratio} \quad = \dfrac{\text{Shareholder's funds}}{\text{Total tangible assets}}$$

$$= \dfrac{\text{Rs. } 3,00,000}{\text{Rs. } 4,50,000} = 0.67 \text{ or } 67\%$$

Significance: This ratio focuses the attention on the general financial strength of the business enterprise. The ratio is of particular importance to the creditors who can find out the proportion of shareholders' funds in the total assets employed in the business. A high proprietary ratio will indicate a relatively little danger to the creditors, etc., in the event of forced reorganisation or winding up of the company. A low proprietary ratio indicates greater risk to the creditors since in the event of losses a part of their money may be lost besides loss to the proprietors of the business. The higher the ratio, the better it is. A ratio below 50% may be alarming for the creditors since they may have to lose heavily in the event of company's liquidation on account of heavy losses.

Some of the basic accounting rations, explained in the preceding pages, are being summarised in the table on pages B.58 to B.60 for the sake of ready reference.

Capital Gearing Ratio

Capital gearing (or leverage) refers to the proportion between fixed interest or dividend bearing funds and non-fixed interest or dividend bearing funds in the total capital employed in the business. The fixed interest or dividend-bearing funds include the funds provided by the debentureholder and preference shareholders. Non-fixed interest or dividend-bearing funds are the funds provided by the equity shareholders. The amount, therefore, include the Equity Share Capital and other Reserves. A proper proportion between the two funds is necessary in order to keep the cost of capital at the minimum.

The capital gearing ratio can be ascertained as follows:

$$\frac{\text{Funds bearing fixed interest or fixed dividends}}{\text{Total capital employed}}$$

$$\text{OR}$$

$$\frac{\text{Funds bearing fixed interest or fixed dividends}}{\text{Equity Shareholders' Funds}}$$

In case the amount of fixed interest or fixed dividend-bearing funds is more than the equity shareholders' funds, the capital structure is said to be "high geared". If the amount of equity shareholders' funds is more than the fixed interest or dividend bearing funds, the capital structure is said to be "low geared". In case the two are equal, the capital structure is said to be "even geared".

The gearing ratio is useful in indicating the extra residual benefits accruing to the equity shareholders. Such a benefit accrues to the equity shareholders because the company earns a certain rate of return on total capital employed but is required to pay to the preference shareholders and debentureholders only at a fixed rate. The surplus earned on their funds can be utilised for paying dividend to the equity shareholders at a rate higher than the rate of return on the total capital employed in the company. Such situation is called "Trading on Equity". This will be clear with the help of the following illustration.

Illustration 5:

The capital employed in a business has been financed as below:

Equity Share Capital	3,00,000
Reserves	1,00,000
6% Debentures	4,00,000
7% Preference Share capital	2,00,000
	10,00,000

The company earns a profit of Rs.2,00,000 before interest and tax. Calculate the gearing ratio and test it for "Trading on Equity". Tax rate may be taken at 50%.

Solution:

The capital gearing ratio has been calculated as follows :

$$\frac{\text{Funds bearing fixed interest or fixed dividends}}{\text{Total capital employed}}$$

$$\frac{6,00,000}{10,00,000} = .6 \text{ or } 60\%$$

The capital structure is "high geared". There should be "trading on equity". This can be verified as follows:

	Rs.
Profit as given	2,00,00
Less : Interest	24,000
	1,76,000
Less : Tax	88,000
	88,000
Less Preference Dividend	14,000
Profit available to equity shareholders	74,000

Rate of Return on Equity Shareholders' Funds

$$= \frac{74,000}{4,00,000} \times 100 \qquad\qquad = 18.5\%$$

$$\text{General Rate of Return} = \frac{1,12,000}{10,00,000} \times 100 \qquad = 11.2\%$$

The general rate of return is only 11.2% while the return on equity shareholders' funds is 18.5%. Thus, there is trading on equity.

It is to be noted that the profits available to equity shareholders of a company having a high gearing ratio will be subject to wider fluctuations as compared to a company which has a low capital gearing ratio. This is because in case of a company having a high capital gearing ratio, a fixed amount of profit will go to the persons who have provided fixed interest or dividend bearing funds and the balance left will be distributed among the equity shareholders.

9.7 LET US SUM UP

The financial forecasting is most important aspect of financial management. The over or under estimation of funds requirement lead to so many danger and hamper the existence of the firm. Hence the management should forecast the requirements in proper manner. The different techniques like cash flow forecast, sales forecast, etc. may be made, based on which the firms future plans are built.

Financial forecasting, an integral part of a finance manager's job, is an act of deciding in advance the quantum of funds requirements of the enterprise and the time pattern of such requirements. The forecasting of financial results is only part of the business planning in which the management takes account of the economic, competitive and technical and social environment. In a dynamic uncertain environment it is difficult to overstate the significance of financial forecasting for effective business management.

Systematic financial forecasting can stave off the enterprise from financial crisis which would otherwise have resulted due to embarking on capital expenditure programmes involving the project and resourcefulness of the enterprise to take up the project before moves are made that are difficult to retreat. If the above study indicates that although the project is desirable it will land the enterprise in financial stringency, the management can strive to cut back or reshape the programme so as to avoid embarrassing commitments.

9.8 LESSON END ACTIVITY

What methods do you adopt for forecasting the financial requirements of:

a)   a new firm, and

b)   an existing firm?

9.9 KEYWORDS

Simulation: Simulation is one of the recently introduced techniques in business decisions which have found wider acceptance among business executives in diverse areas including cash planning.

Systematic financial Forecasting: This can stave off the enterprise from financial crisis.

9.10 QUESTIONS FOR DISCUSSION

1.   What do you mean by financial forecasting?

2.   How the cash flow forecast will help the management in forecasting future requirements?

3.   What is debt equity ratio? Signify its importance.

Check Your Progress: Model Answers

CYP 1

1.   Financial forecasting, an integral part of a finance manager's job, is an act of deciding in advance the quantum of funds requirements of the enterprise and the time pattern of such requirements.

2.   Cash flow forecast helps the finance manager to know in advance the cash position of the concern in different time periods. The cash forecast indicates in which months there will be cash surfeit and in which months it will experience cash drain and by how much. With the help of this information the finance manager can draw up a programme for financing cash requirements.

CYP 2

1.   T,   2.   T,   3.   T,   4.   T,   5.   T.

9.11 SUGGESTED READINGS

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