
Appendix: Present Value Tables

APPENDIX TABLE 1 Discount factors: Present value of \$1 to be received after t years = $1/(1 + r)^t$

Number of years	Interest rate per year														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826	.812	.797	.783	.769	.756
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751	.731	.712	.693	.675	.658
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683	.659	.636	.613	.592	.572
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621	.593	.567	.543	.519	.497
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564	.535	.507	.480	.456	.432
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513	.482	.452	.425	.400	.376
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467	.434	.404	.376	.351	.327
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424	.391	.361	.333	.308	.284
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386	.352	.322	.295	.270	.247
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350	.317	.287	.261	.237	.215
12	.887	.788	.701	.625	.557	.497	.444	.397	.356	.319	.286	.257	.231	.208	.187
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290	.258	.229	.204	.182	.163
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263	.232	.205	.181	.160	.141
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239	.209	.183	.160	.140	.123
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218	.188	.163	.141	.123	.107
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198	.170	.146	.125	.108	.093
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180	.153	.130	.111	.095	.081
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164	.138	.116	.098	.083	.070
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149	.124	.104	.087	.073	.061
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092	.074	.059	.047	.038	.030
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057	.044	.033	.026	.020	.015

Number of years	Interest rate per year														
	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.862	.855	.847	.840	.833	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769
2	.743	.731	.718	.706	.694	.683	.672	.661	.650	.640	.630	.620	.610	.601	.592
3	.641	.624	.609	.593	.579	.564	.551	.537	.524	.512	.500	.488	.477	.466	.455
4	.552	.534	.516	.499	.482	.467	.451	.437	.423	.410	.397	.384	.373	.361	.350
5	.476	.456	.437	.419	.402	.386	.370	.355	.341	.328	.315	.303	.291	.280	.269
6	.410	.390	.370	.352	.335	.319	.303	.289	.275	.262	.250	.238	.227	.217	.207
7	.354	.333	.314	.296	.279	.263	.249	.235	.222	.210	.198	.188	.178	.168	.159
8	.305	.285	.266	.249	.233	.218	.204	.191	.179	.168	.157	.146	.139	.130	.123
9	.263	.243	.225	.209	.194	.180	.167	.155	.144	.134	.125	.116	.108	.101	.094
10	.227	.208	.191	.176	.162	.149	.137	.126	.116	.107	.099	.092	.085	.078	.073
11	.195	.178	.162	.148	.135	.123	.112	.103	.094	.086	.079	.072	.066	.061	.056
12	.168	.152	.137	.124	.112	.102	.092	.083	.076	.069	.062	.057	.052	.047	.043
13	.145	.130	.116	.104	.093	.084	.075	.068	.061	.055	.050	.045	.040	.037	.033
14	.125	.111	.099	.088	.078	.069	.062	.055	.049	.044	.039	.035	.032	.028	.025
15	.108	.095	.084	.074	.065	.057	.051	.045	.040	.035	.031	.028	.025	.022	.020
16	.093	.081	.071	.062	.054	.047	.042	.036	.032	.028	.025	.022	.019	.017	.015
17	.080	.069	.060	.052	.045	.039	.034	.030	.026	.023	.020	.017	.015	.013	.012
18	.069	.059	.051	.044	.038	.032	.028	.024	.021	.018	.016	.014	.012	.010	.009
19	.060	.051	.043	.037	.031	.027	.023	.020	.017	.014	.012	.011	.009	.008	.007
20	.051	.043	.037	.031	.026	.022	.019	.016	.014	.012	.010	.008	.007	.006	.005
25	.024	.020	.016	.013	.010	.009	.007	.006	.005	.004	.003	.003	.002	.002	.001
30	.012	.009	.007	.005	.004	.003	.003	.002	.002	.001	.001	.001	.001	.000	.000

E.g.: If the interest rate is 10 percent per year, the present value of \$1 received at the end of year 5 is \$0.621.

APPENDIX TABLE 2 Future value of \$1 by the end of t years = $(1 + r)^t$

Number of years	Interest rate per year														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130	1.140	1.150
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300	1.323
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443	1.482	1.521
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630	1.689	1.749
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842	1.925	2.011
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082	2.195	2.313
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353	2.502	2.660
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658	2.853	3.059
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004	3.252	3.518
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395	3.707	4.046
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836	4.226	4.652
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.335	4.818	5.350
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898	5.492	6.153
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535	6.261	7.076
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254	7.138	8.137
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067	8.137	9.358
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986	9.276	10.76
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	9.024	10.58	12.38
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263	8.613	10.20	12.06	14.23
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	11.52	13.74	16.37
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.83	13.59	17.00	21.23	26.46	32.92
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.06	13.27	17.45	22.89	29.96	39.12	50.95	66.21

Number of years	Interest rate per year														
	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	1.160	1.170	1.180	1.190	1.200	1.210	1.220	1.230	1.240	1.250	1.260	1.270	1.280	1.290	1.300
2	1.346	1.369	1.392	1.416	1.440	1.464	1.488	1.513	1.538	1.563	1.588	1.613	1.638	1.664	1.690
3	1.561	1.602	1.643	1.685	1.728	1.772	1.816	1.861	1.907	1.953	2.000	2.048	2.097	2.147	2.197
4	1.811	1.874	1.939	2.005	2.074	2.144	2.215	2.289	2.364	2.441	2.520	2.601	2.684	2.769	2.856
5	2.100	2.192	2.288	2.386	2.488	2.594	2.703	2.815	2.932	3.052	3.176	3.304	3.436	3.572	3.713
6	2.436	2.565	2.700	2.840	2.986	3.138	3.297	3.463	3.635	3.815	4.002	4.196	4.398	4.608	4.827
7	2.826	3.001	3.185	3.379	3.583	3.797	4.023	4.259	4.508	4.768	5.042	5.329	5.629	5.945	6.275
8	3.278	3.511	3.759	4.021	4.300	4.595	4.908	5.239	5.590	5.960	6.353	6.768	7.206	7.669	8.157
9	3.803	4.108	4.435	4.785	5.160	5.560	5.987	6.444	6.931	7.451	8.005	8.595	9.223	9.893	10.60
10	4.411	4.807	5.234	5.695	6.192	6.728	7.305	7.926	8.594	9.313	10.09	10.92	11.81	12.76	13.79
11	5.117	5.624	6.176	6.777	7.430	8.140	8.912	9.749	10.66	11.64	12.71	13.86	15.11	16.46	17.92
12	5.936	6.580	7.288	8.064	8.916	9.850	10.87	11.99	13.21	14.55	16.01	17.61	19.34	21.24	23.30
13	6.886	7.699	8.599	9.596	10.70	11.92	13.26	14.75	16.39	18.19	20.18	22.36	24.76	27.39	30.29
14	7.988	9.007	10.15	11.42	12.84	14.42	16.18	18.14	20.32	22.74	25.42	28.40	31.69	35.34	39.37
15	9.266	10.54	11.97	13.59	15.41	17.45	19.74	22.31	25.20	28.42	32.03	36.06	40.56	45.59	51.19
16	10.75	12.33	14.13	16.17	18.49	21.11	24.09	27.45	31.24	35.53	40.36	45.80	51.92	58.81	66.54
17	12.47	14.43	16.67	19.24	22.19	25.55	29.38	33.76	38.74	44.41	50.85	58.17	66.46	75.86	86.50
18	14.46	16.88	19.67	22.90	26.62	30.91	35.85	41.52	48.04	55.51	64.07	73.87	85.07	97.86	112.5
19	16.78	19.75	23.21	27.25	31.95	37.40	43.74	51.07	59.57	69.39	80.73	93.81	108.9	126.2	146.2
20	19.46	23.11	27.39	32.43	38.34	45.26	53.36	62.82	73.86	86.74	101.7	119.1	139.4	162.9	190.0
25	40.87	50.66	62.67	77.39	95.40	117.4	144.2	176.9	216.5	264.7	323.0	393.6	478.9	581.8	705.6
30	85.85	111.1	143.4	184.7	237.4	304.5	389.8	497.9	634.8	807.8	1026	1301	1646	2078	2620

E.g.: If the interest rate is 10 percent per year, the investment of \$1 today will be worth \$1.611 at the end of year 5.

APPENDIX TABLE 3 Annuity table: Present value of \$1 per year for each of t years = $1/r - 1/[r(1 + r)^t]$

Number of years	Interest rate per year														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889	3.784
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288	4.160
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946	4.772
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019
11	10.37	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234
12	11.26	10.58	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421
13	12.13	11.35	10.63	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842	5.583
14	13.00	12.11	11.30	10.56	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724
15	13.87	12.85	11.94	11.12	10.38	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142	5.847
16	14.72	13.58	12.56	11.65	10.84	10.11	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954
17	15.56	14.29	13.17	12.17	11.27	10.48	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047
18	16.40	14.99	13.75	12.66	11.69	10.83	10.06	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128
19	17.23	15.68	14.32	13.13	12.09	11.16	10.34	9.604	8.950	8.365	7.839	7.366	6.938	6.550	6.198
20	18.05	16.35	14.88	13.59	12.46	11.47	10.59	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259
25	22.02	19.52	17.41	15.62	14.09	12.78	11.65	10.67	9.823	9.077	8.422	7.843	7.330	6.873	6.464
30	25.81	22.40	19.60	17.29	15.37	13.76	12.41	11.26	10.27	9.427	8.694	8.055	7.496	7.003	6.566

Number of years	Interest rate per year															
	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	
1	.862	.855	.847	.840	.833	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769	
2	1.605	1.585	1.566	1.547	1.528	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361	
3	2.246	2.210	2.174	2.140	2.106	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816	
4	2.798	2.743	2.690	2.639	2.589	2.540	2.494	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166	
5	3.274	3.199	3.127	3.058	2.991	2.926	2.864	2.803	2.745	2.689	2.635	2.583	2.532	2.483	2.436	
6	3.685	3.589	3.498	3.410	3.326	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643	
7	4.039	3.922	3.812	3.706	3.605	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.866	2.802	
8	4.344	4.207	4.078	3.954	3.837	3.726	3.619	3.518	3.421	3.329	3.241	3.156	3.076	2.999	2.925	
9	4.607	4.451	4.303	4.163	4.031	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019	
10	4.833	4.659	4.494	4.339	4.192	4.054	3.923	3.799	3.682	3.571	3.465	3.364	3.269	3.178	3.092	
11	5.029	4.836	4.656	4.486	4.327	4.177	4.035	3.902	3.776	3.656	3.543	3.437	3.335	3.239	3.147	
12	5.197	4.988	4.793	4.611	4.439	4.278	4.127	3.985	3.851	3.725	3.606	3.493	3.387	3.286	3.190	
13	5.342	5.118	4.910	4.715	4.533	4.362	4.203	4.053	3.912	3.780	3.656	3.538	3.427	3.322	3.223	
14	5.468	5.229	5.008	4.802	4.611	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249	
15	5.575	5.324	5.092	4.876	4.675	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268	
16	5.668	5.405	5.162	4.938	4.730	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283	
17	5.749	5.475	5.222	4.990	4.775	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295	
18	5.818	5.534	5.273	5.033	4.812	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.304	
19	5.877	5.584	5.316	5.070	4.843	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311	
20	5.929	5.628	5.353	5.101	4.870	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316	
25	6.097	5.766	5.467	5.195	4.948	4.721	4.514	4.323	4.147	3.985	3.834	3.694	3.564	3.442	3.329	
30	6.177	5.829	5.517	5.235	4.979	4.746	4.534	4.339	4.160	3.995	3.842	3.701	3.569	3.447	3.332	

E.g.: If the interest rate is 10 percent per year, the present value of \$1 received at the end of each of the next 5 years is \$3.791.

APPENDIX TABLE 4 Values of e^{rt} : Future value of \$1 invested at a *continuously compounded* rate r for t years

rt	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.00	1.000	1.010	1.020	1.030	1.041	1.051	1.062	1.073	1.083	1.094
.10	1.105	1.116	1.127	1.139	1.150	1.162	1.174	1.185	1.197	1.209
.20	1.221	1.234	1.246	1.259	1.271	1.284	1.297	1.310	1.323	1.336
.30	1.350	1.363	1.377	1.391	1.405	1.419	1.433	1.448	1.462	1.477
.40	1.492	1.507	1.522	1.537	1.553	1.568	1.584	1.600	1.616	1.632
.50	1.649	1.665	1.682	1.699	1.716	1.733	1.751	1.768	1.786	1.804
.60	1.822	1.840	1.859	1.878	1.896	1.916	1.935	1.954	1.974	1.994
.70	2.014	2.034	2.054	2.075	2.096	2.117	2.138	2.160	2.181	2.203
.80	2.226	2.248	2.271	2.293	2.316	2.340	2.363	2.387	2.411	2.435
.90	2.460	2.484	2.509	2.535	2.560	2.586	2.612	2.638	2.664	2.691
1.00	2.718	2.746	2.773	2.801	2.829	2.858	2.886	2.915	2.945	2.974
1.10	3.004	3.034	3.065	3.096	3.127	3.158	3.190	3.222	3.254	3.287
1.20	3.320	3.353	3.387	3.421	3.456	3.490	3.525	3.561	3.597	3.633
1.30	3.669	3.706	3.743	3.781	3.819	3.857	3.896	3.935	3.975	4.015
1.40	4.055	4.096	4.137	4.179	4.221	4.263	4.306	4.349	4.393	4.437
1.50	4.482	4.527	4.572	4.618	4.665	4.711	4.759	4.807	4.855	4.904
1.60	4.953	5.003	5.053	5.104	5.155	5.207	5.259	5.312	5.366	5.419
1.70	5.474	5.529	5.585	5.641	5.697	5.755	5.812	5.871	5.930	5.989
1.80	6.050	6.110	6.172	6.234	6.297	6.360	6.424	6.488	6.553	6.619
1.90	6.686	6.753	6.821	6.890	6.959	7.029	7.099	7.171	7.243	7.316

<i>rt</i>	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
2.00	7.389	7.463	7.538	7.614	7.691	7.768	7.846	7.925	8.004	8.085
2.10	8.166	8.248	8.331	8.415	8.499	8.585	8.671	8.758	8.846	8.935
2.20	9.025	9.116	9.207	9.300	9.393	9.488	9.583	9.679	9.777	9.875
2.30	9.974	10.07	10.18	10.28	10.38	10.49	10.59	10.70	10.80	10.91
2.40	11.02	11.13	11.25	11.36	11.47	11.59	11.70	11.82	11.94	12.06
2.50	12.18	12.30	12.43	12.55	12.68	12.81	12.94	13.07	13.20	13.33
2.60	13.46	13.60	13.74	13.87	14.01	14.15	14.30	14.44	14.59	14.73
2.70	14.88	15.03	15.18	15.33	15.49	15.64	15.80	15.96	16.12	16.28
2.80	16.44	16.61	16.78	16.95	17.12	17.29	17.46	17.64	17.81	17.99
2.90	18.17	18.36	18.54	18.73	18.92	19.11	19.30	19.49	19.69	19.89
3.00	20.09	20.29	20.49	20.70	20.91	21.12	21.33	21.54	21.76	21.98
3.10	22.20	22.42	22.65	22.87	23.10	23.34	23.57	23.81	24.05	24.29
3.20	24.53	24.78	25.03	25.28	25.53	25.79	26.05	26.31	26.58	26.84
3.30	27.11	27.39	27.66	27.94	28.22	28.50	28.79	29.08	29.37	29.67
3.40	29.96	30.27	30.57	30.88	31.19	31.50	31.82	32.14	32.46	32.79
3.50	33.12	33.45	33.78	34.12	34.47	34.81	35.16	35.52	35.87	36.23
3.60	36.60	36.97	37.34	37.71	38.09	38.47	38.86	39.25	39.65	40.04
3.70	40.45	40.85	41.26	41.68	42.10	42.52	42.95	43.38	43.82	44.26
3.80	44.70	45.15	45.60	46.06	46.53	46.99	47.47	47.94	48.42	48.91
3.90	49.40	49.90	50.40	50.91	51.42	51.94	52.46	52.98	53.52	54.05

E.g.: If the continuously compounded interest rate is 10 percent per year, the investment of \$1 today will be worth \$1.105 by the end of year 1 and \$1.221 by the end of year 2.

APPENDIX TABLE 5 Present value of \$1 per year received in a continuous stream for each of t years (discounted at an *annually compounded rate* r) = $\{1/\log(1+r)\} - \{1/\log(1+r)\}[(1+r)^t]$

Number of years	Interest rate per year														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	.995	.990	.985	.981	.976	.971	.967	.962	.958	.954	.950	.945	.941	.937	.933
2	1.980	1.961	1.942	1.924	1.906	1.888	1.871	1.854	1.837	1.821	1.805	1.790	1.774	1.759	1.745
3	2.956	2.913	2.871	2.830	2.791	2.752	2.715	2.679	2.644	2.609	2.576	2.543	2.512	2.481	2.450
4	3.922	3.846	3.773	3.702	3.634	3.568	3.504	3.443	3.383	3.326	3.270	3.216	3.164	3.113	3.064
5	4.878	4.760	4.648	4.540	4.437	4.337	4.242	4.150	4.062	3.977	3.896	3.817	3.741	3.668	3.598
6	5.825	5.657	5.498	5.346	5.202	5.063	4.931	4.805	4.685	4.570	4.459	4.353	4.252	4.155	4.062
7	6.762	6.536	6.323	6.121	5.930	5.748	5.576	5.412	5.256	5.108	4.967	4.832	4.704	4.582	4.465
8	7.690	7.398	7.124	6.867	6.623	6.394	6.178	5.974	5.780	5.597	5.424	5.260	5.104	4.956	4.816
9	8.609	8.243	7.902	7.583	7.284	7.004	6.741	6.494	6.261	6.042	5.836	5.642	5.458	5.285	5.121
10	9.519	9.072	8.657	8.272	7.913	7.579	7.267	6.975	6.702	6.447	6.208	5.983	5.772	5.573	5.386
11	10.42	9.884	9.391	8.935	8.512	8.121	7.758	7.421	7.107	6.815	6.542	6.287	6.049	5.826	5.617
12	11.31	10.68	10.10	9.572	9.083	8.633	8.218	7.834	7.478	7.149	6.843	6.559	6.294	6.048	5.818
13	12.19	11.46	10.79	10.18	9.627	9.116	8.647	8.216	7.819	7.453	7.115	6.802	6.512	6.242	5.992
14	13.07	12.23	11.46	10.77	10.14	9.571	9.048	8.570	8.131	7.729	7.359	7.018	6.704	6.413	6.144
15	13.93	12.98	12.12	11.34	10.64	10.00	9.423	8.897	8.418	7.980	7.579	7.212	6.874	6.563	6.276
16	14.79	13.71	12.75	11.88	11.11	10.41	9.774	9.201	8.681	8.209	7.778	7.385	7.024	6.694	6.390
17	15.64	14.43	13.36	12.41	11.55	10.79	10.10	9.482	8.923	8.416	7.957	7.539	7.158	6.809	6.490
18	16.48	15.14	13.96	12.91	11.98	11.15	10.41	9.742	9.144	8.605	8.118	7.676	7.275	6.910	6.577
19	17.31	15.83	14.54	13.39	12.39	11.49	10.69	9.983	9.347	8.777	8.263	7.799	7.380	6.999	6.652
20	18.14	16.51	15.10	13.86	12.77	11.81	10.96	10.21	9.533	8.932	8.394	7.909	7.472	7.077	6.718
25	22.13	19.72	17.67	15.93	14.44	13.16	12.06	11.10	10.26	9.524	8.877	8.305	7.797	7.344	6.938
30	25.94	22.62	19.89	17.64	15.75	14.17	12.84	11.70	10.73	9.891	9.164	8.529	7.973	7.482	7.047

Number of years	Interest rate per year														
	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.929	.925	.922	.918	.914	.910	.907	.903	.900	.896	.893	.889	.886	.883	.880
2	1.730	1.716	1.703	1.689	1.676	1.663	1.650	1.638	1.625	1.613	1.601	1.590	1.578	1.567	1.556
3	2.421	2.392	2.365	2.337	2.311	2.285	2.259	2.235	2.211	2.187	2.164	2.141	2.119	2.098	2.077
4	3.016	2.970	2.925	2.882	2.840	2.799	2.759	2.720	2.682	2.646	2.610	2.576	2.542	2.509	2.477
5	3.530	3.464	3.401	3.340	3.281	3.223	3.168	3.115	3.063	3.013	2.964	2.917	2.872	2.828	2.785
6	3.972	3.886	3.804	3.724	3.648	3.574	3.504	3.436	3.370	3.307	3.246	3.187	3.130	3.075	3.022
7	4.354	4.247	4.145	4.048	3.954	3.865	3.779	3.696	3.617	3.542	3.469	3.399	3.331	3.266	3.204
8	4.682	4.555	4.434	4.319	4.209	4.104	4.004	3.909	3.817	3.730	3.646	3.566	3.489	3.415	3.344
9	4.966	4.819	4.680	4.547	4.422	4.302	4.189	4.081	3.978	3.880	3.786	3.697	3.612	3.530	3.452
10	5.210	5.044	4.887	4.739	4.599	4.466	4.340	4.221	4.108	4.000	3.898	3.801	3.708	3.619	3.535
11	5.421	5.237	5.063	4.900	4.747	4.602	4.465	4.335	4.213	4.096	3.986	3.882	3.783	3.689	3.599
12	5.603	5.401	5.213	5.036	4.870	4.713	4.566	4.428	4.297	4.173	4.057	3.946	3.841	3.742	3.648
13	5.759	5.542	5.339	5.150	4.972	4.806	4.650	4.503	4.365	4.235	4.112	3.997	3.887	3.784	3.686
14	5.894	5.662	5.446	5.245	5.058	4.882	4.718	4.564	4.420	4.284	4.157	4.036	3.923	3.816	3.715
15	6.010	5.765	5.537	5.326	5.129	4.945	4.774	4.614	4.464	4.324	4.192	4.068	3.951	3.841	3.737
16	6.111	5.853	5.614	5.393	5.188	4.998	4.820	4.655	4.500	4.355	4.220	4.092	3.973	3.860	3.754
17	6.197	5.928	5.679	5.450	5.238	5.041	4.858	4.687	4.529	4.381	4.242	4.112	3.990	3.875	3.767
18	6.272	5.992	5.735	5.498	5.279	5.076	4.889	4.714	4.552	4.401	4.259	4.127	4.003	3.887	3.778
19	6.336	6.047	5.781	5.538	5.313	5.106	4.914	4.736	4.571	4.417	4.273	4.139	4.014	3.896	3.785
20	6.391	6.094	5.821	5.571	5.342	5.130	4.935	4.754	4.586	4.430	4.284	4.149	4.022	3.903	3.791
25	6.573	6.244	5.945	5.674	5.427	5.201	4.994	4.803	4.627	4.464	4.314	4.173	4.042	3.920	3.806
30	6.659	6.312	6.000	5.718	5.462	5.229	5.016	4.821	4.641	4.476	4.323	4.181	4.048	3.925	3.810

E.g.: If the interest rate is 10 percent per year, a continuous cash flow of \$1 a year for each of 5 years is worth \$3.977. A continuous flow of \$1 in year 5 only is worth $\$3.977 - \$3.326 = \$0.651$.

APPENDIX TABLE 6 Call Option Value as Percent of Share Price

		STANDARD DEVIATION TIMES SQUARE ROOT OF TIME																
		.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85
804	.5	0	0	0	0	.03	.15	.44	.94	1.67	2.61	3.75	5.06	6.51	8.08	9.76	11.51	13.33
	.6	0	0	0	.04	.24	.7	1.44	2.43	3.66	5.06	6.61	8.27	10.03	11.85	13.73	15.65	17.61
	.7	0	0	.05	.35	1.03	2.04	3.33	4.82	6.45	8.2	10.03	11.91	13.84	15.8	17.78	19.77	21.76
	.8	0	.05	.5	1.48	2.83	4.42	6.15	7.99	9.89	11.83	13.8	15.78	17.77	19.77	21.76	23.74	25.72
	.85	0	.24	1.15	2.54	4.19	5.99	7.87	9.81	11.77	13.76	15.75	17.75	19.74	21.72	23.7	25.66	27.61
	.9	.03	.79	2.25	3.99	5.86	7.79	9.76	11.75	13.74	15.73	17.72	19.71	21.68	23.64	25.59	27.53	29.44
	.92	.1	1.18	2.83	4.67	6.6	8.57	10.55	12.55	14.54	16.53	18.52	20.49	22.45	24.4	26.34	28.26	30.16
	.94	.27	1.69	3.49	5.42	7.38	9.37	11.36	13.36	15.35	17.33	19.31	21.27	23.22	25.15	27.07	28.98	30.86
	.96	.6	2.32	4.24	6.22	8.21	10.2	12.19	14.18	16.16	18.14	20.1	22.04	23.98	25.9	27.8	29.69	31.56
	.98	1.16	3.09	5.07	7.07	9.06	11.05	13.04	15.01	16.98	18.94	20.88	22.82	24.73	26.64	28.52	30.39	32.24
	1	2	3.99	5.98	7.97	9.95	11.92	13.89	15.85	17.8	19.74	21.67	23.58	25.48	27.37	29.23	31.08	32.92
	1.02	3.11	5.01	6.95	8.91	10.86	12.81	14.76	16.7	18.63	20.54	22.45	24.34	26.22	28.09	29.94	31.77	33.58
	1.04	4.45	6.13	7.99	9.88	11.8	13.72	15.63	17.54	19.45	21.34	23.23	25.1	26.96	28.8	30.63	32.44	34.24
	1.06	5.95	7.34	9.07	10.9	12.76	14.63	16.51	18.39	20.27	22.14	24	25.85	27.69	29.51	31.32	33.11	34.89
	1.08	7.54	8.63	10.2	11.93	13.73	15.56	17.4	19.25	21.09	22.93	24.77	26.59	28.41	30.21	32	33.77	35.52
	1.1	9.14	9.96	11.36	12.99	14.72	16.49	18.29	20.1	21.91	23.72	25.53	27.33	29.12	30.9	32.67	34.42	36.15
	1.15	13.05	13.39	14.37	15.71	17.23	18.84	20.52	22.22	23.94	25.68	27.41	29.14	30.87	32.59	34.3	36	37.68
	1.2	16.67	16.79	17.41	18.46	19.75	21.2	22.73	24.32	25.95	27.59	29.25	30.91	32.57	34.23	35.88	37.52	39.16
1.3	23.08	23.09	23.29	23.85	24.73	25.83	27.07	28.42	29.83	31.29	32.78	34.29	35.82	37.35	38.88	40.42	41.94	
1.4	28.57	28.57	28.63	28.89	29.44	30.23	31.2	32.3	33.51	34.78	36.11	37.47	38.86	40.26	41.68	43.14	44.53	
1.5	33.33	33.33	33.35	33.46	33.78	34.32	35.06	35.95	36.96	38.06	39.23	40.44	41.7	42.98	44.29	45.61	46.93	
1.75	42.86	42.86	42.86	42.87	42.94	43.13	43.47	43.95	44.57	45.3	46.13	47.03	47.99	49	50.05	51.12	52.22	
2	50	50	50	50	50.01	50.07	50.22	50.47	50.83	51.31	51.88	52.53	53.26	54.04	54.88	55.75	56.66	
2.5	60	60	60	60	60	60.01	60.03	60.09	60.21	60.41	60.67	61.01	61.42	61.9	62.43	63.01	63.63	

SHARE PRICE DIVIDED BY PV (EXERCISE PRICE)

	STANDARD DEVIATION TIMES SQUARE ROOT OF TIME															
	.9	.95	1	1.05	1.1	1.15	1.2	1.25	1.5	2	2.5	3	3.5	4	4.5	5
.5	15.2	17.12	19.06	21.03	23.01	25	27	28.99	38.78	56.51	70.8	81.43	88.83	93.64	96.57	98.26
.6	19.58	21.57	23.56	25.55	27.55	29.53	31.5	33.46	42.93	59.73	73.06	82.91	89.73	94.16	96.86	98.4
.7	23.76	25.75	27.73	29.69	31.65	33.58	35.5	37.39	46.49	62.39	74.9	84.1	90.46	94.58	97.08	98.52
.8	27.68	29.63	31.56	33.47	35.36	37.22	39.06	40.88	49.57	64.64	76.43	85.09	91.06	94.92	97.27	98.61
.85	29.54	31.46	33.35	35.23	37.08	38.9	40.71	42.49	50.96	65.64	77.11	85.52	91.32	95.07	97.35	98.65
.9	31.34	33.21	35.07	36.9	38.72	40.5	42.26	44	52.27	66.58	77.74	85.92	91.56	95.21	97.42	98.69
.92	32.04	33.9	35.74	37.56	39.35	41.12	42.87	44.59	52.78	66.93	77.98	86.07	91.65	95.26	97.45	98.71
.94	32.73	34.57	36.39	38.19	39.97	41.73	43.45	45.16	53.27	67.28	78.21	86.22	91.74	95.31	97.48	98.72
.96	33.4	35.23	37.04	38.82	40.58	42.32	44.03	45.72	53.75	67.62	78.44	86.36	91.82	95.36	97.5	98.73
.98	34.07	35.88	37.67	39.44	41.18	42.9	44.6	46.27	54.22	67.95	78.66	86.5	91.91	95.4	97.53	98.75
1	34.73	36.52	38.29	40.04	41.77	43.47	45.15	46.8	54.67	68.27	78.87	86.64	91.99	95.45	97.56	98.76
1.02	35.38	37.15	38.9	40.64	42.35	44.03	45.69	47.33	55.12	68.58	79.08	86.77	92.07	95.49	97.58	98.77
1.04	36.01	37.77	39.51	41.22	42.91	44.58	46.23	47.85	55.56	68.89	79.28	86.9	92.14	95.54	97.6	98.78
1.06	36.64	38.38	40.1	41.79	43.47	45.12	46.75	48.35	55.99	69.19	79.48	87.02	92.22	95.58	97.63	98.79
1.08	37.26	38.98	40.68	42.36	44.01	45.65	47.26	48.85	56.41	69.48	79.67	87.15	92.29	95.62	97.65	98.81
1.1	37.87	39.57	41.25	42.91	44.55	46.17	47.76	49.33	56.82	69.76	79.86	87.26	92.36	95.66	97.67	98.82
1.15	39.35	41	42.64	44.25	45.85	47.43	48.98	50.51	57.81	70.45	80.31	87.55	92.53	95.76	97.72	98.84
1.2	40.77	42.38	43.97	45.54	47.09	48.63	50.14	51.63	58.76	71.1	80.74	87.82	92.69	95.85	97.77	98.87
1.3	43.46	44.97	46.47	47.96	49.43	50.88	52.31	53.73	60.51	72.3	81.53	88.31	92.99	96.02	97.86	98.91
1.4	45.95	47.37	48.78	50.18	51.57	52.95	54.31	55.65	62.11	73.38	82.24	88.75	93.25	96.16	97.94	98.95
1.5	48.26	49.59	50.92	52.24	53.55	54.85	56.14	57.42	63.57	74.37	82.88	89.16	93.49	96.3	98.01	98.99
1.75	53.34	54.47	55.6	56.74	57.88	59.02	60.15	61.28	66.75	76.5	84.26	90.01	94	96.59	98.16	99.07
2	57.6	58.56	59.53	60.51	61.51	62.5	63.5	64.5	69.39	78.26	85.4	90.72	94.41	96.82	98.29	99.13
2.5	64.3	64.99	65.71	66.43	67.21	67.98	68.77	69.56	73.54	81	87.16	91.8	95.05	97.18	98.48	99.23

APPENDIX TABLE 7 Put Option Value as Percent of Share Price

		STANDARD DEVIATION TIMES SQUARE ROOT OF TIME																
		.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85
SHARE PRICE DIVIDED BY PV (EXERCISE PRICE)	.5	100	100	100	100	100.03	100.15	100.44	100.94	101.67	102.61	103.75	105.06	106.51	108.08	109.76	111.51	113.33
	.6	66.67	66.67	66.67	66.71	66.91	67.36	68.1	69.1	70.32	71.72	73.27	74.94	76.69	78.52	80.4	82.32	84.27
	.7	42.86	42.86	42.91	43.21	43.88	44.9	46.19	47.67	49.31	51.06	52.89	54.77	56.7	58.66	60.64	62.63	64.62
	.8	25	25.05	25.5	26.48	27.83	29.42	31.15	32.99	34.89	36.83	38.8	40.78	42.77	44.77	46.76	48.74	50.72
	.85	17.65	17.88	18.8	20.19	21.84	23.64	25.52	27.46	29.42	31.41	33.4	35.39	37.38	39.37	41.35	43.31	45.26
	.9	11.14	11.9	13.36	15.1	16.97	18.9	20.87	22.86	24.85	26.84	28.84	30.82	32.79	34.76	36.7	38.64	40.55
	.92	8.8	9.88	11.52	13.37	15.3	17.26	19.25	21.24	23.24	25.23	27.21	29.19	31.15	33.1	35.03	36.95	38.85
	.94	6.65	8.07	9.88	11.8	13.77	15.75	17.75	19.74	21.73	23.72	25.69	27.65	29.6	31.54	33.46	35.36	37.24
	.96	4.76	6.49	8.41	10.38	12.37	14.37	16.36	18.35	20.33	22.3	24.26	26.21	28.15	30.07	31.97	33.85	35.72
	.98	3.2	5.13	7.11	9.11	11.1	13.09	15.08	17.05	19.02	20.98	22.92	24.86	26.77	28.68	30.56	32.43	34.28
	1	2	3.99	5.98	7.97	9.95	11.92	13.89	15.85	17.8	19.74	21.67	23.58	25.48	27.37	29.23	31.08	32.92
	1.02	1.15	3.05	4.99	6.95	8.9	10.85	12.8	14.74	16.66	18.58	20.49	22.38	24.26	26.13	27.98	29.81	31.62
	1.04	.61	2.28	4.14	6.04	7.95	9.87	11.79	13.7	15.6	17.5	19.38	21.25	23.11	24.96	26.79	28.6	30.39
	1.06	.29	1.68	3.41	5.23	7.1	8.97	10.85	12.73	14.61	16.48	18.34	20.19	22.03	23.85	25.66	27.45	29.23
	1.08	.13	1.22	2.79	4.53	6.32	8.15	9.99	11.84	13.69	15.53	17.36	19.19	21	22.8	24.59	26.36	28.12
	1.1	.05	.87	2.27	3.9	5.63	7.4	9.2	11.01	12.82	14.63	16.44	18.24	20.03	21.81	23.57	25.33	27.06
	1.15	0	.34	1.32	2.66	4.18	5.8	7.47	9.18	10.9	12.63	14.37	16.1	17.83	19.55	21.26	22.95	24.64
	1.2	0	.12	.74	1.79	3.09	4.53	6.07	7.66	9.28	10.92	12.58	14.24	15.9	17.56	19.21	20.86	22.49
	1.3	0	.01	.21	.78	1.65	2.75	3.99	5.34	6.75	8.21	9.7	11.21	12.74	14.27	15.81	17.34	18.87
1.4	0	0	.05	.32	.87	1.65	2.63	3.73	4.94	6.21	7.54	8.9	10.29	11.69	13.11	14.53	15.96	
1.5	0	0	.01	.13	.45	.99	1.73	2.62	3.63	4.73	5.89	7.11	8.37	9.65	10.96	12.27	13.6	
1.75	0	0	0	.01	.08	.27	.61	1.1	1.71	2.45	3.27	4.17	5.13	6.14	7.19	8.27	9.37	
2	0	0	0	0	.01	.07	.22	.47	.83	1.31	1.88	2.53	3.26	4.04	4.88	5.75	6.66	
2.5	0	0	0	0	0	.01	.03	.09	.21	.41	.67	1.01	1.42	1.9	2.43	3.01	3.63	

SHARE PRICE DIVIDED BY PV (EXERCISE PRICE)

	.9	.95	1	1.05	1.1	1.15	1.2	1.25	1.5	2	2.5	3	3.5	4	4.5
.5	115.2	117.12	119.06	121.03	123.01	125	127	128.99	138.78	156.51	170.8	181.43	188.83	193.64	196.1
.6	86.25	88.23	90.23	92.22	94.21	96.19	98.17	100.12	109.6	126.4	139.73	149.58	156.4	160.83	163.1
.7	66.61	68.6	70.58	72.55	74.5	76.44	78.35	80.25	89.34	105.25	117.76	126.96	133.32	137.43	139.1
.8	52.68	54.63	56.56	58.47	60.36	62.22	64.06	65.88	74.57	89.64	101.43	110.09	116.06	119.92	122.1
.85	47.19	49.1	51	52.87	54.72	56.55	58.35	60.13	68.61	83.29	94.76	103.17	108.96	112.71	115
.9	42.45	44.33	46.18	48.02	49.83	51.61	53.38	55.11	63.39	77.69	88.85	97.03	102.67	106.32	108.1
.92	40.73	42.59	44.43	46.25	48.05	49.82	51.56	53.28	61.47	75.63	86.67	94.77	100.34	103.95	106.1
.94	39.11	40.95	42.78	44.58	46.35	48.11	49.84	51.54	59.65	73.66	84.59	92.6	98.12	101.69	103.6
.96	37.57	39.4	41.2	42.99	44.75	46.49	48.2	49.88	57.91	71.79	82.6	90.53	95.99	99.52	101.6
.98	36.11	37.92	39.71	41.48	43.22	44.94	46.64	48.31	56.26	69.99	80.7	88.54	93.95	97.44	99.51
1	34.73	36.52	38.29	40.04	41.77	43.47	45.15	46.8	54.67	68.27	78.87	86.64	91.99	95.45	97.56
1.02	33.42	35.19	36.94	38.68	40.38	42.07	43.73	45.37	53.16	66.62	77.12	84.81	90.11	93.53	95.61
1.04	32.17	33.92	35.66	37.37	39.07	40.73	42.38	44	51.72	65.04	75.44	83.05	88.3	91.69	93.76
1.06	30.98	32.72	34.44	36.13	37.81	39.46	41.09	42.69	50.33	63.53	73.82	81.36	86.56	89.92	91.97
1.08	29.85	31.57	33.27	34.95	36.61	38.24	39.85	41.44	49	62.07	72.27	79.74	84.88	88.21	90.24
1.1	28.78	30.48	32.16	33.82	35.46	37.08	38.67	40.24	47.73	60.67	70.77	78.17	83.27	86.57	88.56
1.15	26.31	27.96	29.59	31.21	32.81	34.38	35.94	37.47	44.77	57.41	67.27	74.51	79.49	82.72	84.66
1.2	24.11	25.71	27.3	28.87	30.43	31.96	33.47	34.97	42.09	54.43	64.08	71.15	76.03	79.18	81.1
1.3	20.39	21.9	23.39	24.88	26.35	27.8	29.24	30.66	37.43	49.22	58.45	65.23	69.91	72.94	74.78
1.4	17.38	18.8	20.21	21.61	23	24.38	25.74	27.08	33.54	44.81	53.67	60.18	64.68	67.59	69.37
1.5	14.93	16.26	17.58	18.9	20.22	21.52	22.81	24.09	30.24	41.04	49.55	55.82	60.16	62.97	64.66
1.75	10.48	11.61	12.75	13.89	15.03	16.16	17.3	18.42	23.89	33.64	41.41	47.16	51.14	53.73	55.31
2	7.6	8.56	9.53	10.51	11.51	12.5	13.5	14.5	19.39	28.26	35.4	40.72	44.41	46.82	48.25
2.5	4.3	4.99	5.71	6.45	7.21	7.98	8.77	9.56	13.54	21	27.16	31.8	35.05	37.18	38.48