

**Formulae**

**Modigliani and Miller Proposition 2 (with tax)**

$$k_e = k_e^i + (1-T)(k_e^i - k_d) \frac{V_d}{V_e}$$

Or rearranged

$$k_e + (1-T)k_d \left( \frac{V_d}{V_e} \right) = k_e^i + (1-T)k_e^i \left( \frac{V_d}{V_e} \right)$$

**The Capital Asset Pricing Model**

$$E(r_i) = R_f + \beta_i(E(r_m) - R_f)$$

**The asset beta formula**

$$\beta_a = \left[ \frac{V_e}{(V_e + V_d(1-T))} \beta_e \right] + \left[ \frac{V_d(1-T)}{(V_e + V_d(1-T))} \beta_d \right]$$

**The Growth Model**

$$P_0 = \frac{D_0(1+g)}{(r_e - g)}$$

**Gordon's growth approximation**

$$g = br_e$$

**The weighted average cost of capital**

$$WACC = \left[ \frac{V_e}{V_e + V_d} \right] k_e + \left[ \frac{V_d}{V_e + V_d} \right] k_d(1-T)$$

**The Fisher formula**

$$(1+i) = (1+r)(1+h)$$

**Purchasing power parity and interest rate parity**

$$S_1 = S_0 \times \frac{(1+h_c)}{(1+h_b)} \quad F_0 = S_0 \times \frac{(1+i_c)}{(1+i_b)}$$

## Modified Internal Rate of Return

$$MIRR = \left[ \frac{PV_R}{PV_I} \right]^{\frac{1}{n}} (1 + r_e) - 1$$

## The Black-Scholes option pricing model

$$c = P_a N(d_1) - P_e N(d_2) e^{-rt}$$

## Present Value Table

Present value of 1 i.e.  $(1 + r)^{-n}$

Where  $r$  = discount rate

$n$  = number of periods until payment

		<i>Discount rate (r)</i>										
<i>Periods</i>		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
<b>(n)</b>		<b>1%</b>	<b>2%</b>	<b>3%</b>	<b>4%</b>	<b>5%</b>	<b>6%</b>	<b>7%</b>	<b>8%</b>	<b>9%</b>	<b>10%</b>	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1	
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	2	
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	3	
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	4	
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	5	
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	6	
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	7	
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	8	
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	9	
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	10	
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	11	
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	12	
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	13	
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	14	
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	15	
<b>(n)</b>	<b>11%</b>	<b>12%</b>	<b>13%</b>	<b>14%</b>	<b>15%</b>	<b>16%</b>	<b>17%</b>	<b>18%</b>	<b>19%</b>	<b>20%</b>		
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1	
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	2	
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	3	
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	4	
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	5	
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	6	
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	7	
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	8	
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	9	
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	10	
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	11	
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	12	
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	13	
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	14	
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	15	

## Annuity Table

Present value of an annuity of 1 i.e.  $\frac{1 - (1 + r)^{-n}}{r}$

Where  $r$  = discount rate  
 $n$  = number of periods

<i>Discount rate (r)</i>											
<i>Periods</i>											
<b>(n)</b>	<b>1%</b>	<b>2%</b>	<b>3%</b>	<b>4%</b>	<b>5%</b>	<b>6%</b>	<b>7%</b>	<b>8%</b>	<b>9%</b>	<b>10%</b>	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	2
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	3
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	4
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	5
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	6
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	7
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	8
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	9
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	10
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	11
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	12
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	13
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	14
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	15
<b>(n)</b>	<b>11%</b>	<b>12%</b>	<b>13%</b>	<b>14%</b>	<b>15%</b>	<b>16%</b>	<b>17%</b>	<b>18%</b>	<b>19%</b>	<b>20%</b>	
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	2
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	3
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	4
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	5
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	6
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	7
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	8
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	9
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	10
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327	11
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	12
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533	13
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	14
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	15