NPV.pdf

7.2 FUTURE VALUE OF A SINGLE AMOUNT

Suppose you invest Rs1,000 for three years in a savings account that pays 10 percent interest per year. If you let your interest income be reinvested, your investment will grow as follows:

First year	: Principal at the beginning	1,000
	Interest for the year (Rs1,000 × 0.10)	100
	Principal at the end	1,100
Second year	: Principal at the beginning	1,100
	Interest for the year (Rs1,100 × 0.10)	110
	Principal at the end	1,210
Third year	: Principal at the beginning	1,210
	Interest for the year (Rs1,210 × 0.10)	121
	Principal at the end	1,331

Formula

The process of investing money as well as reinvesting the interest earned thereon is called compounding. The future value or compounded value of an investment after n years when the interest rate is r percent is :

$$FV_n = PV(1+r)^n \tag{7.1}$$

In this equation $(1+r)^n$ is called the future value interest factor or simply the future value factor.

To solve future value problems you have to find the future value factors. You can do it in different ways. In the example given above, you can multiply 1.10 by itself three times or more generally $(1+r)$ by itself n times. This becomes tedious when the period of investment is long.

Fortunately, you have an easy way to get the future value factor. Most calculators have a key labelled "y^x". So all that you have to do is to enter 1.10, press the key labelled y^x, enter 3, and press the "=" key to obtain the answer.

Alternatively, you can consult a future value interest factor (FVIF) table. Exhibit 7.2 presents one such table showing the future value factors for certain combinations of periods and interest rates. A more comprehensive table is given in Appendix A at the end of the book.

Suppose you deposit Rs1,000 today in a bank which pays 10 percent interest compounded annually, how much will the deposit grow to after 8 years and 12 years?

$$\text{Rs } 1{,}000\,(1.10)^8 = \text{Rs } 1{,}000\,(2.144)$$
$$= \text{Rs } 2{,}144$$

The future value, 12 years hence, will be:

$$\text{Rs } 1{,}000\,(1.10)^{12} = \text{Rs } 1{,}000\,(3.138)$$
$$= \text{Rs } 3{,}138$$

Exhibit 7.2 *Value of $FVIF_{r,n}$ for Various Combinations of r and n*

n/r	6%	8%	10%	12%	14%
2	1.124	1.166	1.210	1.254	1.300
4	1.262	1.360	1.464	1.574	1.689
6	1.419	1.587	1.772	1.974	2.195
8	1.594	1.851	2.144	2.476	1.853
10	1.791	2.159	2.594	3.106	3.707
12	2.012	2.518	3.138	3.896	4.817

While tables are easy to use they have a limitation as they contain values only for a small

7.3 PRESENT VALUE OF A SINGLE AMOUNT

Suppose someone promises to give you Rs 1,000 three years hence. What is the present value of this amount if the interest rate is 10 percent? The present value can be calculated by discounting Rs 1,000, to the present point of time, as follows :

Value three years hence $= \text{Rs } 1{,}000$

Value two years hence $= \text{Rs } 1{,}000\left(\frac{1}{1.10}\right)$

Value one year hence $= \text{Rs } 1{,}000\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)$

Present Value $= \text{Rs } 1{,}000\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)\left(\frac{1}{1.10}\right)$

Formula

The process of discounting, used for calculating the present value, is simply the inverse of compounding. The present value formula can be readily obtained by manipulating the compounding formula:

$$FV_n = PV\,(1+r)^n \tag{7.2}$$

Dividing both the sides of Eq. (7.2) by $(1+r)^n$, we get:

$$PV = FV_n\,[1 / (1+r)^n] \tag{7.3}$$

The factor $1/(1+r)^n$ in Eq. (7.3) is called the discounting factor or the present value interest factor ($PVIF_{r,n}$). Exhibit 7.5 gives the value of $PVIF_{r,n}$ for several combinations of r and n. A more detailed table of $PVIF_{r,n}$ is given in Appendix A at the end of this book.

What is the present value of Rs 1,000 receivable 6 years hence if the rate of discount is 10 percent?

The present value is:

$$\text{Rs } 1{,}000 \times PVIF_{10\%,6} = \text{Rs } 1{,}000\ (0.5645) = \text{Rs } 564.5$$

What is the present value of Rs 1,000 receivable 20 years hence if the discount rate is 8 percent? Since Exhibit 7.5 does not have the value of $PVIF_{8\%,20}$ we obtain the answer as follows:

$$\text{Rs } 1{,}000\left(\frac{1}{1.08}\right)^{20} = \text{Rs } 1{,}000\left(\frac{1}{1.08}\right)^{10}\left(\frac{1}{1.08}\right)^{10}$$

$$= \text{Rs } 1{,}000\ (PVIF_{8\%,10})(PVIF_{8\%,10})$$

$$= \text{Rs } 1{,}000\ (0.463)(0.463) = \text{Rs } 214$$

Exhibit 7.5 *Value of $PVIF_{r,n}$ for Various Combinations of r and n*

n/r	6%	8%	10%	12%	14%
2	0.890	0.857	0.826	0.797	0.770
4	0.792	0.735	0.683	0.636	0.592
6	0.705	0.630	0.565	0.507	0.456
8	0.626	0.540	0.467	0.404	0.351
10	0.558	0.463	0.386	0.322	0.270
12	0.497	0.397	0.319	0.257	0.208

7.4 FUTURE VALUE OF AN ANNUITY

An annuity is a stream of constant cash flow (payment or receipt) occurring at regular intervals of time. The premium payments of a life insurance policy, for example, are an annuity. When the cash flows occur at the end of each period, the annuity is called an ordinary annuity or a deferred annuity. When the cash flows occur at the beginning of each period, the annuity is called an annuity due. Our discussion here will focus on a regular annuity—the formulae of course can be applied, with some modification, to an annuity due.

Exhibit 7.8 *Time Line for an Annuity*

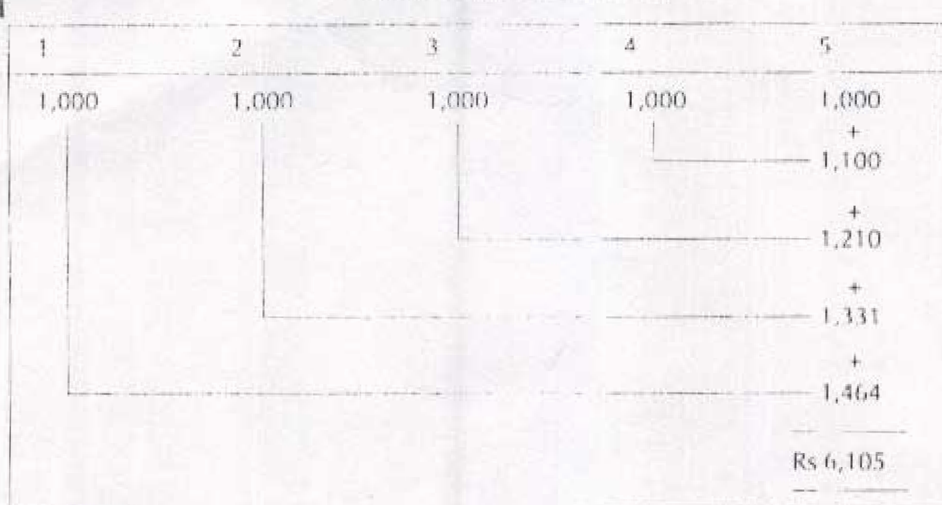


Exhibit 7.9 *Value of $FVIFA_{r,n}$ for Various Combinations of r and n*

n/r	6%	8%	10%	12%	14%
2	2.060	2.080	2.100	2.120	2.140
4	4.375	4.507	4.641	4.779	4.921
6	6.975	7.336	7.716	8.115	8.536
8	9.897	10.636	11.436	12.299	13.232
10	13.181	14.487	15.937	17.548	19.337
12	16.869	18.977	21.384	24.133	27.270

Applications

The future value annuity formula can be applied in a variety of contexts. Its important applications are illustrated as follows:

Knowing What Lies in Store for You Suppose you have decided to deposit Rs 30,000 per year in your Public Provident Fund Account for 30 years. What will be the accumulated amount in your Public Provident Fund Account at the end of 30 years if the interest rate is 11 percent?

The accumulaied sum will be: Rs 30,000 ($FVIFA_{11\%, 30yrs}$)

$$= \text{Rs } 30{,}000 \left(\frac{(1.11)^{30} - 1}{0.11} \right)$$

$$= \text{Rs } 30{,}000 \, [\, 199.02]$$

$$= \text{Rs } 5{,}970{,}600$$

How Much Should You Save Annually You want to buy a house after 5 years when it is expected to cost Rs 2 million. How much should you save annually if your savings earn a compound return of 12 percent?

The future value interest factor for a 5 year annuity, given an interest rate of 12 percent, is:

$$\text{FVIFA}_{n=5,\ r=12\%} = \frac{(1+0.12)^5 - 1}{0.12} = 6.353$$

The annual savings should be:

$$\frac{\text{Rs } 2{,}000{,}000}{6.353} = \text{Rs } 314{,}812$$

Annual Deposit in a Sinking Fund Futura Limited has an obligation to redeem Rs 500 million bonds 6 years hence. How much should the company deposit annually in a sinking fund account wherein it earns 14 percent interest to cumulate Rs 500 million in 6 years time?

The future value interest factor for a 5 year annuity, given an interest rate of 14 percent is:

$$\text{FVIFA}_{n=6,\ r=14\%} = \frac{(1+0.14)^6 - 1}{0.14} = 8.536$$

The annual sinking fund deposit should be:

$$\frac{\text{Rs 500 million}}{8.536} = \text{Rs 58.575 million}$$

Finding the Interest Rate A finance company advertises that it will pay a lump sum of Rs 8,000 at the end of 6 years to investors who deposit annually Rs 1,000 for 6 years. What interest rate is implicit in this offer?

The interest rate may be calculated in two steps:

1. Find the $\text{FVIFA}_{r,6}$ for this contract as follows:
   $\text{Rs } 8{,}000 = \text{Rs } 1{,}000 \times \text{FVIFA}_{r,6}$

   $$\text{FVIFA}_{r,6} = \frac{\text{Rs } 8{,}000}{\text{Rs } 1{,}000} = 8000$$

2. Look at the $\text{FVIFA}_{r,n}$ table and read the row corresponding to 6 years until you find a value close to 8,000. Doing so, we find that
   $\text{FVIFA}_{12\%,6}$ is 8.115
   So, we conclude that the interest rate is slightly below 12 percent. ✓

7.5 PRESENT VALUE OF AN ANNUITY

Suppose you expect to receive Rs 1,000 annually for 3 years, each receipt occurring at the end of the year. What is the present value of this stream of benefits if the discount rate is 10 percent? The present value of this annuity is simply the sum of the present values of all the inflows of this annuity:

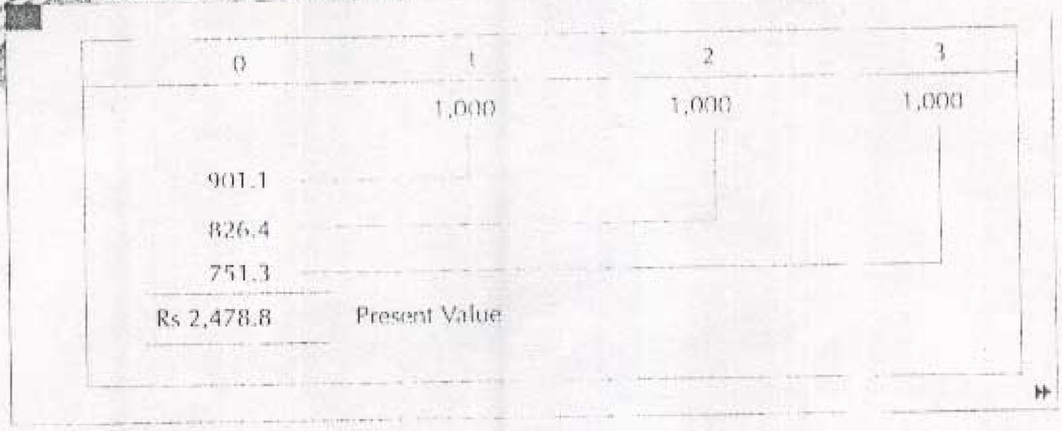
$$\text{Rs } 1{,}000\left(\frac{1}{1.10}\right) + \text{Rs } 1{,}000\left(\frac{1}{1.10}\right)^2 + \text{Rs } 1{,}000\left(\frac{1}{1.10}\right)^3$$

$$= \text{Rs } 1{,}000 \times 0.9091 + \text{Rs } 1{,}000 \times 0.8264 + \text{Rs } 1{,}000 \times 0.7513$$

$$= \text{Rs } 2{,}478.8$$

The time line for this problem is shown in Exhibit 7.10.

Exhibit 7.10 *Time Line*



9.3 CASH FLOW ILLUSTRATIONS

To show how cash flows are determined, bearing in mind the principles discussed above, two illustrations are presented in this section.

Illustration I

Naveen Enterprises is considering a capital project about which the following information is available:

- The investment outlay on the project will be Rs 100 million. This consists of Rs 80 million on plant and machinery and Rs 20 million on net working capital. The entire outlay will be incurred at the beginning of the project.
- The project will be financed with Rs 45 million of equity capital, Rs 5 million of preference capital, and Rs 50 million of debt capital. Preference capital will carry a dividend rate of 15 percent; debt capital will carry an interest rate of 15 percent
- The life of the project is expected to be 5 years. At the end of 5 years, fixed assets will fetch a net salvage value of Rs 30 million whereas net working capital will be liquidated at its book value.
- The project is expected to increase the revenues of the firm by Rs 120 million per year. The increase in costs on account of the project is expected to be Rs 80 million per year (This includes all items of cost other than depreciation, interest, and tax). The effective tax rate will be 30 percent.
- Plant and machinery will be depreciated at the rate of 25 percent per year as per the written down value method. Hence, the depreciation charges will be:

First year :	Rs 20.00 million
Second year :	Rs 15.00 million
Third year :	Rs 11.25 million
Fourth year :	Rs 8.44 million
Fifth year :	Rs 6.33 million

Given the above details, the project cash flows are shown in Exhibit 9.2 .

Exhibit 9.2 *Project Cash Flows*

Rs. in million

	0	1	2	3	4	5
1. Fixed assets	(80.00)	–	–	–	–	–
2. Net working capital	(20.00)	–	–	–	–	–
3. Revenues		120	120	120	120	120
4. Costs (other than depreciation and interest)		80	80	80	80	80
5. Depreciation		20	15	11.25	8.44	6.33
6. Profit before tax		20	25	28.75	31.56	33.67
7. Tax		6	7.5	8.63	9.47	10.10
8. Profit after tax		14.0	17.5	20.12	22.09	23.57
9. Net salvage value of fixed assets		–	–	–	–	30.00
10. Recovery of net working capital		–	–	–	–	20.00
11. Initial outlay	(100.00)					
12. Operating cash inflow (8+5)		34.0	32.5	31.37	30.53	29.90
13. Terminal cash inflow (9 + 10)		–	–	–	–	50.0
14. Net cash flow (11+12+13)	(100.00)	34.0	32.5	31.37	30.53	79.90
Book value of Investment	100	80	65	53.75	45.31	–

Illustration II

Appendix A

Table A.1 Future Value Interest Factor
$FVIF(r, n) = (1 + r)^n$

Period *n*	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	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	1.100	1.110	1.120	1.130
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
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
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
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
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
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
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
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
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
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
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
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.056	3.452	3.883	4.363	4.898
14	1.149	1.319	1.513	1.732	1.930	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535
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
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
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
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
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	10.197
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.728	8.062	9.646	11.523
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	21.231
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892	29.960	39.116

Table A.2 ***Future Value Interest Factor for an Annuity***

$$FVIF(r, n) = \frac{(1+r)^n - 1}{r}$$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
1	1.000	1.000	1.000	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	2.110	2.120	2.130
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	155.620
30	34.785	40.568	47.575	56.805	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	293.199

Table A.3 *Present Value Interest Factor*

$PVIF(r, n) = (1 + r)^{-n}$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	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	0.901	0.893	0.885
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693
4	0.961	0.924	0.889	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543
6	0.942	0.888	0.838	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111
19	0.828	0.686	0.570	0.475	0.396	0.331	0.276	0.232	0.194	0.164	0.138	0.116	0.098
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026

Table A.4 *Present Value Interest Factor for an Annuity*

$$PVIF(r, n) = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

Period n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%
0	1.000	1.000	1.000	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	0.901	0.893	0.885
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
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
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
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
6	5.795	5.601	5.417	5.242	5.076	4.917	4.766	4.623	4.486	4.355	4.231	4.111	3.998
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
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
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
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
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.060	7.606	7.191	6.811	6.462
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.312	7.824	7.379	6.974	6.604
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.128	8.514	7.963	7.469	7.025
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330
30	25.808	22.397	19.600	17.292	15.373	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496