Financial Decision Making

CHAPTER 38

Lawrence Thal

Inflation is one form of taxation that can be imposed without legislation.
Milton Friedman

I have no regard for money. Aside from its purchasing power, it's completely useless as far as I'm concerned.
Alfred Hitchcock

The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather in a lack of will.
Vincent J. Lombardi

Many elements of financial decision making have been covered in previous chapters. Specifically, debt management is covered in Chapter 6, valuation and purchase of an eye care practice in Chapter 8, elements of an office business plan (practice financing and obtaining a business loan) in Chapter 11, analysis of practice economics and growth in Chapter 36, and financial and estate planning in Chapter 37. The intent of this chapter is to provide actual tools for making financial decisions and in assisting with the comparison of financial alternatives. While it is understood that computers can sometimes provide us with an answer, it is also understood that if we do not understand the concepts, we do not know what question to ask or what information we need to yield the answer. Many optometry schools do not teach this topic because it is felt it is best left to a course in Business Administration. However, the author feels that these are such important tools for both our professional and personal decision making that he has elected to present this material here. For those who work through this chapter you will be well rewarded!

In 1975, the year this author graduated from optometry school, you could buy a Mercedes for $8,000. Private college tuition was $3,500 and an average house cost under $50,000. A bar of soap was 20 cents, a tube of toothpaste 50 cents, and ground beef and coffee were both under $1.00 per pound. And gasoline was 36 cents per gallon! Had our retirement plan been crafted then, without the ability to account for inflation, the plan would have been tremendously deficient. How could we have predicted that nearly 35 years later we would pay over $60,000 for a car, $30,000 for private school tuition annually for each of our daughters, and that there would be no homes in our neighborhood selling for less than $500,000? A bar of soap now costs $1.00, toothpaste $3.00, a pound of ground beef $4.00, and a pound of coffee $9.00.

Several years ago the Roper Organization found when surveying more than 1,650 adult Americans, that the "American Dream," the ideal life in the United States, could be achieved for $50,000 per year. That poll, commissioned by The Wall Street Journal, reported the income after taxes that Americans felt they needed to live the ideal life. If you are a recent graduate "providing you agree with this finding", how much will you need to live the American Dream when you retire in 30 or 35 years? If that tube of toothpaste cost six times as much 35 years later, does that mean the American Dream will cost $300,000 per year instead of $50,000? How much needs to be saved; what rate of return will you need to meet your goals? If you feel wholly inadequate in trying to answer those questions, you are not alone. Most people have no idea how much they will need in retirement and have even less of an idea how to get there. Add to the equation that the reader of this chapter is likely to live many more years in retirement than the previous generations, the ultimate answer as to how much needs to be saved becomes even more daunting. Financial consultants generally advise prospective retirees to plan on withdrawing no more than 5% of their savings in each year of retirement; which would mean that to retire today with an annual income of $50,000, savings would need to total $1 million. Withdrawing 5% per year from savings earning 3% annually would mean that savings would be completely depleted in 30 years (Table 38-1). Once retired, it would be reasonable to expect that we would no longer have mortgage expenses. Part of the retirement plan should be to have a mortgage completely amortized. Children are likely through with college and "off the parent's payroll." At the same time, travel expenses usually increase, as do entertainment expenses and health care costs.

Assume that $50,000 will not quite do it—either we are married to someone with greater needs or we live in one of the more expensive areas of the country. If we assume that the costs

TABLE 38-1

Years Until All Capital Is Depleted

Annual Withdrawal Rate	3%	4%	5%	6%	7%	8%	9%	10%
15%	7	7	8	8	9	9	10	11
14%	8	8	9	9	10	11	11	13
13%	8	9	9	10	11	12	13	15
12%	9	10	11	11	12	14	16	18
11%	10	11	12	13	14	16	19	25
10%	12	13	14	15	17	20	26	*
9%	13	14	16	18	22	28	*	*
8%	15	17	20	23	30	*	*	*
7%	18	21	25	33	*	*	*	*
6%	23	28	36	*	*	*	*	*
5%	30	41	*	*	*	*	*	*

From Oppenheimer Funds.*
Capital will never be depleted at this combination of return and withdrawal.

of the American Dream is more like $75,000, that we are now age 30, that we plan to retire at age 65, and our best estimate of inflation (increased costs of goods and services) over the next 35 years will average 4% per year, how much savings will we need? Based on the discussion above the answer is nearly $6 million, which would provide at 5% each year an annual income of $300,000—the equivalent of $75,000 in 2009 dollars. How did we get that result? How will we get that much savings? What do we need to know to make those calculations and the financial decisions that face us in both our professional and personal lives?

ACQUIRING WEALTH

As far as this author knows, there are only five ways to acquire wealth—one of which is highly not recommended (stealing it) and another that you have little or no control over (inheriting it). You can win it (I was never that good a poker player and more people lose large amounts of money than win playing the lottery), you can marry it (that can be an appealing solution but a painful one if that is the only reason for getting married), or you can earn it—yes, actually working and saving. (For those who might be lucky enough to win the lottery, what choice will you make: $25,000 per month for the rest of your life or $6 million dollars in one payment now? We will come back to that just in case you need to know someday.)

Since the majority of us will need to earn our wealth, we begin this discussion by emphasizing the importance of understanding the effects of compound interest. Optometrists will certainly earn enough in their careers to earn and save significant amounts of money. In May 2004 the US Census Bureau released evidence from the Census of 2000 about earnings for different occupations. Median annual earnings for occupations from dishwasher (the least remunerative) to physicians and surgeons (the highest) were listed. Dentistry came in second, and optometry was neck and neck with chief executives, lawyers, and podiatrists for the third through sixth spots.

What is compound interest? John Maynard Keynes (Keynes is widely considered the father of modern macroeconomics and was so influential in the twentieth century that an entire school of modern thought bears his name.) was quoted as calling it "magic" and a member of the Rothschild family was said to have proclaimed it the "eighth wonder of the world." When trying to teach this subject, it becomes abundantly evident that as many in the class are confused by the discussion as are bored with it. Compound interest, most simply stated, is "interest on top of interest." As an example, an optometry student comes to class every day with a large cappuccino at a cost of $4.00. What would be the result if he were to instead save that $4.00 each day, investing it at the end of each year until retirement in 40 years? If we rounded off his annual "coffee kitty" to $1,500, assumed that each year the cost of that coffee increased by 2% and that we had a savings rate of 5%, we would have an equivalent savings rate of 7% for 40 years. The future value of this exercise would be nearly $300,000. If we save an additional $10,000 in a retirement account, see Chapter 37, and make the same assumption that we could increase that contribution by 2% annually and achieve a savings rate of 5%, the future value of this investment would be nearly $2 million!

In Table 38-2, the factor to be used to calculate the future value of our coffee savings can be seen under the 7% column in the 40-year row (199.64). When 199.64 is multiplied by our annual coffee savings of $1,500, the total is $299,460. Similarly, 199.64 multiplied by our annual retirement savings of $10,000 is $1,996,400.

Revisiting our retirement scenario, we need $75,000 to live the American Dream in our retirement that begins 35 years from now. If we assume that inflation will average 4% per year, what will be the equivalent of $75,000 in today's (2009) dollars in future (2044) dollars?

In Table 38-3, the factor to be used can be seen under the 4% column in the 35-year row. That factor, 3.946, when multiplied by $75,000 is $295,950. What is the difference between these two tables? The difference in these two scenarios is that in the first situation we have repeated contributions—$1,500 (increasing by 2% annually) each year for 40 years. (If our assumption had been that this amount would not increase 2% each year, then we would have used a 5% growth rate, not 7%.) In the second scenario, we have a single amount, $75,000 and we want to know what this amount will be in future dollars, accounting for the effect of inflation alone, with no additional capital contributions. This situation would be exactly as if we deposited $75,000 in a bank in which the anticipated interest rate for the next 35 years would be 4% and we did not add anything to this account during these years. This will be clearer with a few more examples. It is important to realize that we have not made any allowance for the payment of taxes. The advantage of tax deferred (i.e., conventional IRA) or tax free (i.e., tax-free mutual bonds or Roth IRA) investments is that your investment grows without being reduced by annual tax payments. If you have a 6% return but one-third is lost to taxes then the actual return would be only 4%.

TABLE 38-2

Future Value Interest Factor of An Ordinary Annuity * of $1 Per Period

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	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	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	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
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	4.921	4.993	5.066	5.141	5.215	5.291	5.368
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	6.610	6.742	6.877	7.014	7.154	7.297	7.442
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	8.536	8.754	8.977	9.207	9.442	9.683	9.930
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	10.730	11.067	11.414	11.772	12.142	12.523	12.916
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	13.233	13.727	14.240	14.773	15.327	15.902	16.499
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	16.085	16.786	17.519	18.285	19.086	19.923	20.799
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	19.337	20.304	21.321	22.393	23.521	24.709	25.959
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	23.045	24.349	25.733	27.200	28.755	30.404	32.150
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	27.271	29.002	30.850	32.824	34.931	37.180	39.581
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	32.089	34.352	36.786	39.404	42.219	45.244	48.497
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	37.581	40.505	43.672	47.103	50.818	54.841	59.196
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	43.842	47.580	51.660	56.110	60.965	66.261	72.035
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	50.980	55.717	60.925	66.649	72.939	79.850	87.442
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	59.118	65.075	71.673	78.979	87.068	96.022	105.93
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	68.394	75.836	84.141	93.406	103.74	115.27	128.12
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	78.969	88.212	98.603	110.28	123.41	138.17	154.74
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	91.025	102.44	115.38	130.03	146.63	165.42	186.69
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.41	133.33	155.62	181.87	212.79	249.21	292.10	342.60	402.04	471.98
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31	164.49	199.02	241.33	293.20	356.79	434.75	530.31	647.44	790.95	966.71	1,181.9
35	41.660	49.994	60.462	73.652	90.320	111.43	138.24	172.32	215.71	271.02	341.59	431.66	546.68	693.57	881.17	1,120.7	1,426.5	1,816.7	2,314.2	2,948.3
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88	442.59	581.83	767.09	1,013.7	1,342.0	1,779.1	2,360.8	3,134.5	4,163.2	5,529.8	7,343.9
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08	1,163.9	1,668.8	2,400.0	3,459.5	4,994.5	7,217.7	10,436	15,090	21,813	31,515	45,497

*The term **annuity** is used in finance theory to refer to any terminating stream of fixed payments over a specified period of time. Examples of annuities are regular deposits to a savings account, monthly home mortgage payments and annual life insurance payments.

TABLE 38-

Future Value Interest Factor of $1 Per Period

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
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	1.160	1.170	1.180	1.190	1.200
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
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	1.561	1.602	1.643	1.685	1.728
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	1.811	1.874	1.939	2.005	2.074
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	2.100	2.192	2.288	2.386	2.488
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	2.436	2.565	2.700	2.840	2.986
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	2.826	3.001	3.185	3.379	3.583
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	3.278	3.511	3.759	4.021	4.300
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	3.803	4.108	4.435	4.785	5.160
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	4.411	4.807	5.234	5.695	6.192
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	5.117	5.624	6.176	6.777	7.430
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	5.936	6.580	7.288	8.064	8.916
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	6.886	7.699	8.599	9.596	10.699
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	7.988	9.007	10.147	11.420	12.839
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	9.266	10.539	11.974	13.590	15.407
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	10.748	12.330	14.129	16.172	18.488
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	10.761	12.468	14.426	16.672	19.244	22.186
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	10.575	12.375	14.463	16.879	19.673	22.901	26.623
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	12.056	14.232	16.777	19.748	23.214	27.252	31.948
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	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
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	26.462	32.919	40.874	50.658	62.669	77.388	95.396
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	50.950	66.212	85.850	111.065	143.371	184.675	237.376
35	1.417	2.000	2.814	3.946	5.516	7.686	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	533.869	750.378	1,051.668	1,469.772
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233	1,083.657	1,670.704	2,566.215	3,927.357	5,988.914	9,100.438

Okay, so you win the lottery. The lottery commission is offering you $25,000 each month for the rest of your life or one lump sum payment of $6 million. Which will you take? If you are 30 years old but none of your relatives have lived past age 80 and you assume that inflation will average 4% annually for the next 50 years, the present value of an income stream of $25,000 per month for 50 years would be $6.5 million. In fact, if you live to just age 70 you break even—it does not matter what your choice, absent any consideration of taxation.

In Table 38-4 the factor to be used can be found under the 4% column in the row for 50 years and that factor is 21.482. When $25,000 per month is multiplied by 12 months and then multiplied by 21.482, the total is $6,444,600. Likewise, the applicable factor for 40 years is 19.793.

The retirement problem presents some interesting challenges. For example, how will we save $6 million without winning the lottery? The following are some ways to get there:

1. Saving $80,000 per year for 35 years earning 4% each year will yield a future value of $6 million.

2. Saving $35,000 per year for 35 years earning 8% each year will yield a future value of $6 million.

3. Saving $14,000 per year for 35 years earning 12% each year will yield a future value of $6 million. Again, the applicable future value factors would be found in the 35 year row in Table 38-2:

73.652 divided into $6 million equals $81,464

172.32 divided into $6 million equals $34,819

431.66 divided into $6 million equals $13,900

Most would think that earning 12% on our investments would be an unrealistic expectation, especially if we were to invest conservatively. As discussed in Chapter 37, one of the first investments we should make once we decide where we wish to reside long term would be our home. We can digress for a moment and look at the return on that investment.

We can use as an example, a $500,000 home for which we can borrow 90% of the purchase price. We put $50,000 down and borrow $450,000. The mortgage payment table (Table 38-5) will allow you to estimate your monthly principal and interest payments for a fixed interest rate mortgage. You cannot reliably use this chart to calculate the monthly payment for an adjustable rate mortgage, except for the initial period; after that, of course, the rate, term, and payments will be different. In Table 38-5, you can see that monthly payments for a 30-year term mortgage with an interest rate of 5.75% will be $2,628 (5.84 × 450).

Return on real estate investments come from four sources:

- *Appreciation* is the amount over time that the value of your property increases. Recent periods have yielded returns in the 10% or more range in some areas of the country, although the recent sub-prime mortgage abuses have lowered those expectations. Temporarily, expected real estate rates of return are considerably lower. With real estate selling at market lows, there are currently (and for the foreseeable future) tremendous opportunities for growth in a real estate investment. Conservatively, you may be justified to assume that appreciation will be in the neighborhood of 4% annually for property purchased wisely and in a desirable area.
- *Equity build* is the amount of equity that is automatically increased each year through your payment of principal on your mortgage. Eventually you own the entire home, once all the borrowed money has been repaid. It is not unreasonable to expect a 1% to 2% return from equity build.
- *Tax benefits* are due to the fact that you are able to take itemized income tax deductions for the interest paid on your mortgage, real estate taxes paid, and possibly for a home office deduction, when allowed. In the early years of a mortgage most of our payment is interest and thus yielding a higher interest deduction. Over the 30 years of the mortgage, the tax benefit for this deduction decreases as more of the payment is allocated to principal; however, the average of this deduction alone may equal a return of 1% to 2%.
- *Cash flow:* For income producing property (i.e., commercial or a residential duplex), cash flow can be fairly significant; however, in this example, we assume that the property is a single family residence for which there is no cash flow.

For the example above, we have a minimum return of 6% (4% appreciation, 1% equity build and 1% tax benefits) on a home that cost $500,000. This would be the equivalent of $30,000 per year. But is that really a 6% return ($30,000 divided by $500,000)? Actually, we have only invested $50,000 for a down payment and have borrowed the remaining $450,000. The actual return would be $30,000 annually on a $50,000 investment or a return of 60% ($30,000 divided by $50,000)!

When you sell your home under the current tax law, a married couple filing a joint tax return can permanently exclude up to $500,000 in gain from Federal taxes. For those whose gain exceeds that amount, the tax paid is based on a lower capital gains rate instead of the higher ordinary income rate (see Chapter 39). This illustrates the potential advantage of investing in real estate: it is the advantage of being able to leverage your investment through financing 80% or 90% of the investment, which is something much more difficult and risky to attempt in the stock market, for example.

Many a successful retirement plan has been funded with real estate investment. Considering the challenge of acquiring $6 million for retirement in 35 years, look at what happens when the return rates approach those potentially available with investments in real estate:

1. Saving $6,800 per year for 35 years earning 15% each year will yield a future value of $6 million.

2. Saving $2,000 per year for 35 years earning 20% each year will yield a future value of $6 million.

3. Saving $185 per year for 35 years earning 30% each year will yield a future value of $6 million.

To illustrate the importance of beginning early in funding a retirement plan, compare the result for the same identical challenge but with only 20 years remaining before retirement. The previous example would show dramatically different results, even with these very high rates of return, providing we start 15 years later:

TABLE 38-4

Present Value Interest Factor of an (Ordinary) Annuity * of $1 Per Period

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
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	0.877	0.870	0.862	0.855	0.847	0.840	0.833
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	1.605	1.585	1.566	1.547	1.528
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	2.246	2.210	2.174	2.140	2.106
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	2.798	2.743	2.690	2.639	2.589
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	3.274	3.199	3.127	3.058	2.991
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	3.685	3.589	3.498	3.410	3.326
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	4.039	3.922	3.812	3.706	3.605
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	4.344	4.207	4.078	3.954	3.837
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	4.607	4.451	4.303	4.163	4.031
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	4.833	4.659	4.494	4.339	4.192
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	5.453	5.234	5.029	4.836	4.656	4.486	4.327
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	5.660	5.421	5.197	4.988	4.793	4.611	4.439
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	5.842	5.583	5.342	5.118	4.910	4.715	4.533
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	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.954	5.405	5.162	4.938	4.730
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	6.373	6.047	5.749	5.475	5.222	4.990	4.775
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	6.467	6.128	5.818	5.534	5.273	5.033	4.812
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	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
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	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999

*The term annuity is used in finance theory to refer to any terminating stream of fixed payments over a specified period of time. Examples of annuities are regular deposits to a savings account, monthly home mortgage payments and annual life insurance payments.

TABLE 38-5

Monthly Payments per $1,000 Borrowed (Total Cost of Principal and Interest Combined)

Using the Table

This chart covers interest rates from 5.5% to 8.5%, and loan terms of 15 and 30 years. Each of the term columns shows the monthly payment (Principal + Interest), and the total amount you will pay back for each $1,000 of the loan. Scan down the interest rate column to a given interest rate, such as 7%; then follow across to the Payment Factor for either a 15- or 30-year term. Multiply the factor shown by the number of thousands in your mortgage amount, and the result is your monthly principal and interest payment. For the total cost of holding the loan to term, multiply the number of thousands in your loan by the Total Amount factor.

In our example, with a loan of $450,000, for 30 years with an interest rate of 5.75%, multiply 5.84 × 450 = $2,628 per month; your loan will have a total cost of $945,387 (2100.86 × 450).

Interest Rate (%)	15-Year Term		30-Year Term	
	Payment Factor	Total Amount	Payment Factor	Total Amount
5.50	8.18	1470.75	5.68	2044.04
5.625	8.24	1482.72	5.76	2074.36
5.75	8.31	1494.73	5.84	2100.86
5.875	8.37	1506.81	5.92	2129.54
6.00	8.44	1518.94	6.00	2158.38
6.125	8.51	1531.13	6.08	2187.40
6.25	8.58	1543.36	6.16	2216.58
6.375	8.64	1555.65	6.24	2245.93
6.50	8.72	1567.99	6.33	2275.44
6.625	8.78	1580.39	6.40	2305.12
6.75	8.85	1592.83	6.49	2334.95
6.875	8.92	1605.34	6.57	2364.94
7.00	8.99	1617.89	6.65	2395.09
7.125	9.06	1630.49	6.74	2425.39
7.25	9.13	1643.15	6.82	2455.83
7.375	9.20	1655.86	6.91	2486.43
7.50	9.27	1668.62	6.99	2517.17
7.625	9.34	1681.43	7.08	2548.06
7.75	9.41	1694.29	7.16	2579.08
7.875	9.48	1707.20	7.25	2610.25
8.00	9.56	1720.17	7.34	2641.55
8.125	9.63	1733.19	7.42	2672.99
8.25	9.70	1746.25	7.51	2704.56
8.375	9.77	1759.37	7.60	2736.26
8.50	9.85	1772.53	7.69	2768.09

1. Saving $58,500 per year for 20 years earning 15% each year will yield a future value of $6 million.

2. Saving $32,000 per year for 20 years earning 20% each year will yield a future value of $6 million.

3. Saving $9,500 per year for 20 years earning 30% each year will yield a future value of $6 million.

In the earlier example, saving $80,000 per year for 35 years earning 4% each year reached the $6 million target; with only 20 years to achieve the same result, you would need to save $200,000 per year. Clearly, you cannot get there if you do not start early! Thus the "magic" of compound interest is illustrated.

You should note that the experiences of the author may not be the preferred strategy toward retirement for the reader; however, the overriding principle is that whatever investment strategy is chosen, it is imperative to begin early, which cannot be stressed enough. For some, the strategy may be conservative investments yielding lower rates of return, thus it is even more crucial to begin early. For others, it may involve investments in the somewhat riskier stock market in which the multitude of possibilities may seem confusing and daunting. Professional advice may be helpful in choosing which stocks to purchase, although the reader may be interested to know that according to the *Financial Analysts Journal* (July/August 1986) 94% of an investment plan's performance is attributed to the asset allocation itself (stocks, bonds, or real estate) and only 6% is attributable to such factors of specific selection of securities and market timing. In fact, Harry Markowitz, who should be known in every household, won a Nobel Prize for that discovery. Before the 1950s, diversification of investments was a somewhat vague concept. Although most investors recognized that diversification was beneficial, no one had quantified how

beneficial diversification was. In 1952 Harry Markowitz published his paper, "Portfolio Selection" in the *Journal of Finance*. By carefully selecting different investment types, Markowitz showed that investors could satisfy their investment objectives with less risk by concentrating on "asset allocation" instead of specific stock and bond selection within that asset allocation or through market timing. (Since 1952 numerous papers and doctoral theses have been written based upon and confirming Markowitz's premises and asset allocation theories that resulted therefrom.)

Although Chapter 37 deals in greater depth with the possibilities for diversification of investments, the following are some basic concepts that are worth restating:

- *Tax considerations:* Your overall success investing will be greatly enhanced by considering the tax effect of your investments. Do not overlook the advantages of the tax benefits that accrue to most retirement plans. For example, contributions made to 401(k) plans or Keogh plans are not taxed at either the federal or state level and once the investment is made earnings are compounded tax-deferred until withdrawal.
- *Start saving early:* It is often said that "it is not what you make that is important, but what you keep." If you are not investing 10% of your pre-tax earnings, you should carefully examine your budget and see where additional savings may be realized. Clearly, from the examples given earlier and the problems at the end of this chapter, it can easily be seen why it is so important to invest as much as possible as early as possible.
- *Debt:* Chapter 6 deals with debt management. Leveraging your investment dollars (as in the real estate example) may be a very wise use of debt. (This is especially true considering that if renting, you are contributing to the return on investment of the landlord, not your own.) However, debt should be totally avoided, if at all possible, for consumer purchases. Figure 38-1 demonstrates the worst example that the author has seen, yet these schemes would not exist if people did not foolishly fall in the trap. This example results in an annual interest rate of nearly 30%!
- *Insurance:* Protect your assets with adequate amounts of catastrophic insurance coverage for major lawsuits or illness, either which can devastate your net worth.
- *Set goals:* Chapter 2 deals with setting goals. Goals should be SMART: s pecific, m easurable, a ttainable, r ealistic, and t imely. Perhaps nowhere can goals be more specific and measurable than with investing.
- *Enjoy life:* Money is not an end-all, and for those who spend their entire lives amassing a fortune all too often they do not enjoy the fruits of that labor. Maintaining balance in one's life is the secret to happiness. Occasional indulgences—nights out or foreign travel—may be part of that balance. Make it part of your goals and investment strategy. What follows are a number of present value problems.

Working through these and understanding how the calculations are made will allow you to more fully understand how to use these tools to make financial decisions and manage your investment goals. Although it is possible to do some of


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Sincerely,

Milo Lewis

Milo Lewis
Branch Manager, Beneficial

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FIGURE 38-1 Loan enticement for a $7,000 loan at an interest rate of nearly 30%.

these calculations on Internet sites, those who rely on those sites never grasp the full impact of their importance. It is certainly true, however, that if you do not get anything out of this chapter other than the importance of compound interest, whether applying its principal by calculation or computer; the author has accomplished his purpose.

Use Tables 38-2, 38-3, 38-4, and 38-6 to solve the practice scenarios. Once you have worked through these problems, you should be able to use these techniques for both your professional and personal financial planning.

Practice Scenarios

1. Dr. A deposits $2,000 in a bank for a period of 30 years at 5% interest compounded annually. How much will Dr. A have at the end of 30 years?

In Table 38-3, the appropriate factor of 4.322 can be found under the 5% column at 30 years: 4.322 multiplied by $2,000 equals $8,644.

2. Dr. A deposits $2,000 in a bank but each and every year he adds another $2,000 at 5% interest compounded annually. How much will Dr. A have at the end of 30 years?

In Table 38-2, the appropriate factor of 66.439 can be found under the 5% column at 30 years: 66.439 multiplied by $2,000 equals $132,878.

3. Dr. Smith makes an investment in XYZ Development Corporation that calls for a $10,000 return for each of the

TABLE 38-6

Present Value Interest Factor of $1 Per Period

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
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	0.877	0.870	0.862	0.855	0.847	0.840	0.833
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	0.769	0.756	0.743	0.731	0.718	0.706	0.694
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	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
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	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
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	0.400	0.376	0.354	0.333	0.314	0.296	0.279
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	0.351	0.327	0.305	0.285	0.266	0.249	0.233
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	0.308	0.284	0.263	0.243	0.225	0.209	0.194
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	0.270	0.247	0.227	0.208	0.191	0.176	0.162
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	0.237	0.215	0.195	0.178	0.162	0.148	0.135
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	0.208	0.187	0.168	0.152	0.137	0.124	0.112
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	0.182	0.163	0.145	0.130	0.116	0.104	0.093
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	0.160	0.141	0.125	0.111	0.099	0.088	0.078
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	0.140	0.123	0.108	0.095	0.084	0.074	0.065
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	0.123	0.107	0.093	0.081	0.071	0.062	0.054
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	0.108	0.093	0.080	0.069	0.060	0.052	0.045
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	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
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	0.073	0.061	0.051	0.043	0.037	0.031	0.026
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	0.038	0.030	0.024	0.020	0.016	0.013	0.010
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	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

first 5 years. XYZ Development Corporation promises a 9% return on investment each year. How much will Dr. Smith's investment be worth after 5 years?

In Table 38-2, the appropriate factor of 5.985 can be found under the 9% column at 5 years: 5.985 multiplied by $10,000 equals $59,850.

4. Dr. Goodwill is considering investing in a lot that has good development potential. She can buy the property today and hopes to sell it 4 years from now for $50,000. She also believes that 9% is a fair return on investment for holding the property for 4 years. The asking price for the lot is $40,000. The question is should she buy it? If not, what if the asking price were $30,000?

In Table 38-6 the appropriate factor of .708 can be found under the 9% column at 4 years: .708 multiplied by $50,000 equals $35,400. She should not purchase the lot for anymore than $35,400.

5. Dr. Stanley can make an investment that yields the following returns: $2,000 during the first year, $4,000 during the second year, and $7,000 during the third year. Assuming he desires a 9% return on investment, how much should be paid for the investment?

In Table 38-6, the appropriate factors can be found under the 9% column for 1, 2, and 3 years, respectively.

.917 multiplied by $2,000 equals 1,834

.842 multiplied by $4,000 equals 3,368

.772 multiplied by $7,000 equals 5,404 The present value of those returns is $10,606.

6. An investment opportunity promises the following returns: $5,000 per year for 5 years and $25,000 at the end of the fifth year. Assuming an investor desires a 10% return on investment, how much should be paid for this opportunity?

In Table 38-4, the appropriate factor is 3.791 when multiplied by $5,000 equals 18,955.

In Table 38-6, the appropriate factor is .621 when multiplied by $25,000 equals 15,525. The present value of those two returns is $34,480.

7. Your retinal camera loan is for $30,000. It is a 15-year amortizing loan at a fixed rate of 8.5%. What will your monthly payments be?

In the Table 38-5, the factor of 9.85 multiplied by 30 equals $295 per month.

8. You anticipate remodeling your office in 10 years at a future cost of $100,000. How much should you put aside each year in a savings account that compounds your savings annually at an interest rate of 4%?

In Table 38-2, the appropriate factor is 12.006 when divided into $100,000 equals $8,329.

9. You purchase a partnership interest in a practice for $150,000. You agree to pay $30,000 now and the balance in 8 years. How much have you paid for this practice in today's dollars using the 9% annual compound interest table?

In Table 38-6, the appropriate factor is .502 when multiplied by the balance to be paid of $120,000 equals $60,240. When added to the down payment of $30,000 the total paid in present day dollars is $90,240.

10. Your landlord proposes an 84-month lease at $2,360 per month. You and your partner do not feel that you can afford more than $1,600 per month for the first 24 months. Using a 9% discount rate, how much will you have to pay the last 60 months to have an equivalent lease to the one your landlord proposed? (This is the problem referred to in Chapter 7, Principles of Negotiation.)

The landlord proposes a 7-year lease at $2,360 per month or $28,320 per year. Using the 9% factor of 5.033 from Table 38-4 multiplied by $28,320, the present value of what the landlord proposes would be $142,535.

Assuming that you can only afford $1,600 per month or $19,200 annually for the first 2 years, the appropriate factor from Table 38-4 of 1.759 multiplied by $19,200, the present value of the first 2 years payments would be $33,773.

Subtracting $33,773 from $142,535 leaves a shortfall in present value rent to be made up in the last 5 years of $108,762.

The appropriate factor for 5 years of payments at 9% from Table 38-4 is 3.890. However, that present value is not the value at the beginning of the lease but is the present value 2 years out; therefore that present value needs to be reduced further by the factor from Table 38-6 of .842 from the 9% column for 2 years.

Future rent multiplied by 3.890 multiplied by .842 must equal the remaining rent to be paid of $108,762. X (the annual rent to be paid the last 5 years) multiplied by 3.890 multiplied by .842 equals $108,762. Therefore, X equals $33,206 divided by 12 months equals $2,767 per month.

CONCLUSION

It is hoped that once armed with the tools presented in this chapter, the reader will be better equipped to set goals (see Chapter 2), construct a financial plan (see Chapters 37 and 39), and understand the long-term impact of one's decisions involving acquisition of debt (see Chapters 6 and 11). At a minimum, the author hopes the reader has learned to appreciate the "miracle" of compounding interest and the advantage of investing for the future early and as often as is feasible.