

Financial Management

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MGM424

Lecture 5



Financial Management

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MGM424 Time value of money

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Chapter

05

Time value of money





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Time value of money

Time value of money

simple and compound interest.

Compute the future value of a single amount.

Compute the present value of a single amount.

Annuity

Introduction to Time Value of Money

• **Time Value of Money (TVM):** A core financial concept stating that money available today is worth more than the identical sum in the future due to its potential earning capacity.

Foundation:

- TVM is essential in finance for:
 - **Investment Valuations**
 - **Loan Amortizations**
 - **Financial Planning**

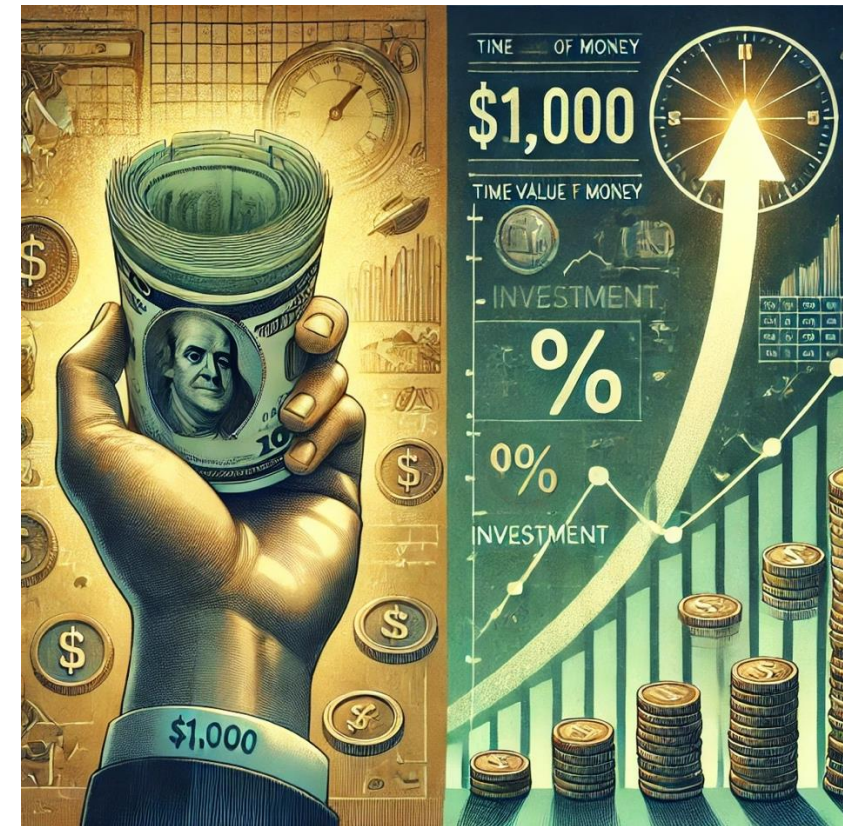


Chapter
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Introduction to Time Value of Money

•Understanding TVM:

- The principal hinges on the opportunity to earn interest or returns on money over time.
- **Key Idea:** Receiving \$1,000 today is more valuable than receiving \$1,000 a year from now because you can invest it and earn additional income.



Introduction to Time Value of Money

• Factors Influencing TVM:

- **Interest Rates:** The cost of borrowing money or the return on investment.
- **Inflation:** Erodes purchasing power over time, making future money less valuable.
- **Risk and Uncertainty:** Future payments may not be guaranteed.



Introduction to Time Value of Money

Foundation:

•Investment Valuations:

- **Present Value (PV):** Calculating the current worth of a future sum of money or stream of cash flows given a specified rate of return.
- **Future Value (FV):** Determining how much a current investment will grow over time with compound interest.
- **Example:** Evaluating whether to invest in a project by discounting future cash flows to their present value.

•Loan Amortizations:

- **Amortization Schedules:** Break down each loan payment into interest and principal components.

Introduction to Time Value of Money

- **Loan Amortizations:**

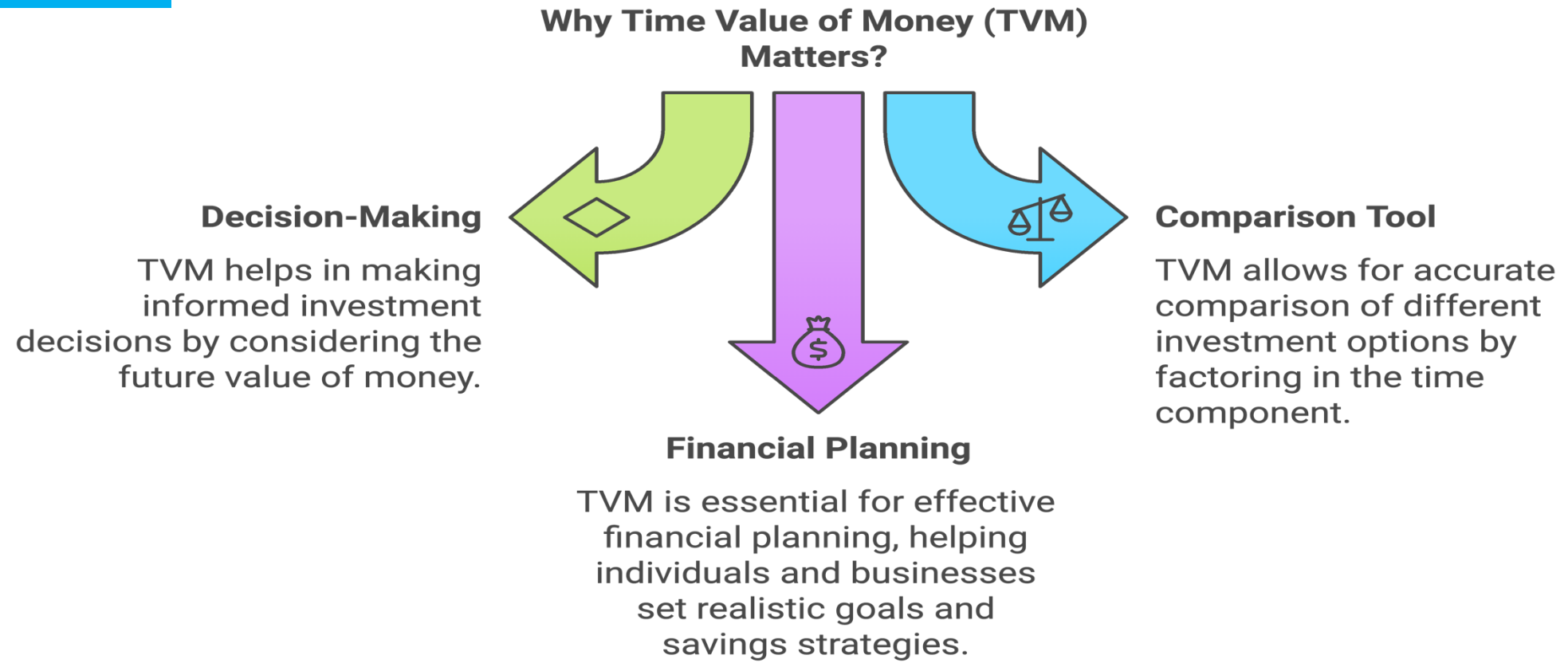
- **Understanding Interest Payments:** Knowing how much interest you pay over the life of a loan.
- **Example:** Calculating monthly mortgage payments and understanding the interest versus principal repayment over time.

- **Financial Planning:**

- **Retirement Planning:** Estimating how much you need to save now to achieve a desired retirement fund.
- **Education Savings:** Planning for future education expenses by investing early.
- **Example:** Using TVM to determine regular savings needed to reach a financial goal.

Chapter
05

Why Time Value of Money Matters



- **Highlight Importance:** The Time Value of Money (TVM) is not just a theoretical concept; it's a practical tool that significantly impacts our financial decisions.
- **Engage the Audience:** Ask if anyone has considered why receiving \$100 today is better than receiving \$100 a year from now.

Decision-Making:

•Evaluating Investments:

- **Net Present Value (NPV):** Explain how NPV uses TVM to determine the profitability of an investment by discounting future cash flows.
- **Internal Rate of Return (IRR):** Mention how IRR calculates the expected growth rate of an investment.
- **Example:** Consider investing in a project that promises returns over several years. TVM helps us determine if the future returns outweigh the initial investment.

Why Time Value of Money Matters

- **Informed Financial Choices:**

- **Loan Assessment:** Discuss how TVM helps evaluate different loan options by calculating the total cost over time.
- **Mortgage Decisions:** Compare fixed-rate and adjustable-rate mortgages using TVM principles.

Comparison Tool:

- **Analyzing Cash Flows:**

- **Present Value Calculations:** Show how to bring future cash flows to present terms for an apples-to-apples comparison.
- **Example:** Deciding between a lump-sum payment today or annuity payments over several years.

Why Time Value of Money Matters

- **Cost-Benefit Analysis:**

- **Opportunity Cost:** Emphasize the potential earnings lost when choosing future money over present money.
- **Scenario:** Choosing between receiving \$10,000 now or \$12,000 in three years.

Financial Planning:

- **Budgeting:**

- **Inflation Consideration:** Explain how TVM accounts for inflation, ensuring purchasing power is maintained.
- **Expense Forecasting:** Use TVM to estimate future expenses and plan accordingly.

Why Time Value of Money Matters

•Investing:

- **Compound Interest:** Illustrate how reinvesting earnings can significantly increase wealth over time.
- **Investment Growth:** Project how a one-time investment or regular contributions grow due to compounding.

•Retirement Planning:

- **Savings Goals:** Calculate how much needs to be saved now to reach a desired retirement fund.
- **Pension Plans:** Evaluate different pension options using TVM to determine the best financial outcome.

Interest:

is the “rent” paid for the use of money for some period of time. In dollar terms, it is the amount of money paid or received in excess of the amount of money borrowed or lent.

Simple interest:

- is computed by multiplying an initial investment times both the applicable interest rate and the period of time.
- **Ex1**, simple interest earned each year on a \$1000 investment paying 10% is \$100



simple and compound interest

Compound interest:

results in increasingly larger interest amounts for each period of the investment. The reason is that interest is now being earned not only on the initial investment amount but also on the accumulated interest earned in previous periods.



simple and compound interest

Compound interest:

Compound interest is a larger interest amounts for each period of the investment. Interest is now earned not only on the initial amount but also on the accumulated interest earned in previous periods.

Ex2,

Date	Interest (Interest rate $\times$ Outstanding balance = Interest)	Balance
Initial deposit		\$1,000
End of year 1	$10\% \times \$1,000 = \100	\$1,100
End of year 2	$10\% \times \$1,100 = \110	\$1,210
End of year 3	$10\% \times \$1,210 = \121	\$1,331

simple and compound interest

Compound interest:

Most banks compound interest more than once a year (Daily compound is common for saving accounts).

More rapid compounding has the effect of increasing the actual rate, which is called the effective rate, at which money grows per year.

Interest rate per compounding period is determined by dividing the annual interest rate by the number of compounding periods.

simple and compound interest

Effective rate:

is the rate at which money actually will grow during a full year.

Assuming an annual rate of 12%:

<u>Compounded</u>	<u>Interest Rate Per Compounding Period</u>
Semiannually	$12\% \div 2 = 6\%$
Quarterly	$12\% \div 4 = 3\%$
Monthly	$12\% \div 12 = 1\%$

Chapter
05

Time value of money

Time Value of Money

Present Value of a Single Amount

Determines the current worth of a future sum.

Future Value of Annuity

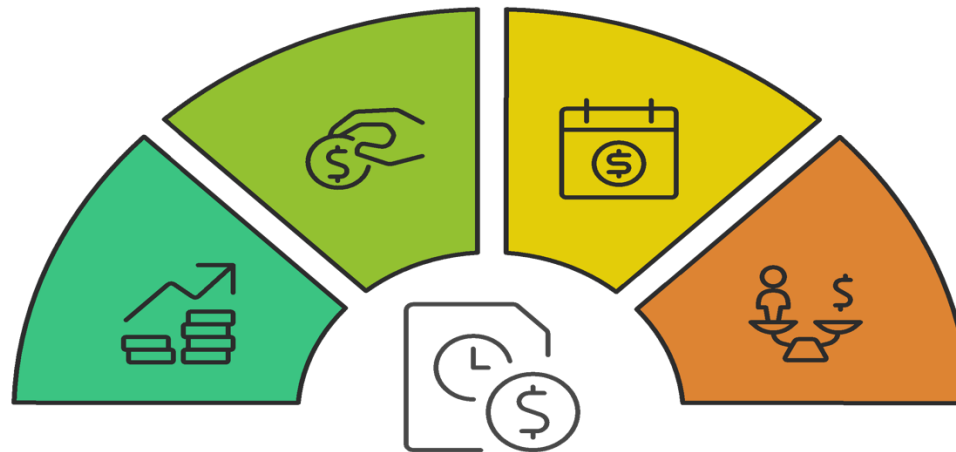
Projects the value of a series of payments over time.

Future Value of a Single Amount

Calculates the worth of a single sum at a future date.

Present Value of Annuity

Assesses the current value of future payment streams.



Compute the future value of a single amount.

Future Value of a Single Amount

future value is the amount of money that a dollar will grow to at some point in the future.

$$FV = I(1 + i)^n$$

where:

- FV = Future value of the invested amount
- I = Amount invested at the beginning of the period
- i = Interest rate
- n = Number of compounding periods

$$FV = I \times \text{FV factor}$$

TABLE 1 Future Value of \$1

$$FV = \$1 (1 + i)^n$$

<i>n/i</i>	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%	5.5%	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	20.0%
1	1.01000	1.01500	1.02000	1.02500	1.03000	1.03500	1.04000	1.04500	1.05000	1.05500	1.06000	1.07000	1.08000	1.09000	1.10000	1.11000	1.12000	1.20000
2	1.02010	1.03022	1.04040	1.05063	1.06090	1.07123	1.08160	1.09203	1.10250	1.11303	1.12360	1.14490	1.16640	1.18810	1.21000	1.23210	1.25440	1.44000
3	1.03030	1.04568	1.06121	1.07689	1.09273	1.10872	1.12486	1.14117	1.15763	1.17424	1.19102	1.22504	1.25971	1.29503	1.33100	1.36763	1.40493	1.72800
4	1.04060	1.06136	1.08243	1.10381	1.12551	1.14752	1.16986	1.19252	1.21551	1.23882	1.26248	1.31080	1.36049	1.41158	1.46410	1.51807	1.57352	2.07360
5	1.05101	1.07728	1.10408	1.13141	1.15927	1.18769	1.21665	1.24618	1.27628	1.30696	1.33823	1.40255	1.46933	1.53862	1.61051	1.68506	1.76234	2.48832
6	1.06152	1.09344	1.12616	1.15969	1.19405	1.22926	1.26532	1.30226	1.34010	1.37884	1.41852	1.50073	1.58687	1.67710	1.77156	1.87041	1.97382	2.98598
7	1.07214	1.10984	1.14869	1.18869	1.22987	1.27228	1.31593	1.36086	1.40710	1.45468	1.50363	1.60578	1.71382	1.82804	1.94872	2.07616	2.21068	3.58318
8	1.08286	1.12649	1.17166	1.21840	1.26677	1.31681	1.36857	1.42210	1.47746	1.53469	1.59385	1.71819	1.85093	1.99256	2.14359	2.30454	2.47596	4.29982
9	1.09369	1.14339	1.19509	1.24886	1.30477	1.36290	1.42331	1.48610	1.55133	1.61909	1.68948	1.83846	1.99900	2.17189	2.35795	2.55804	2.77308	5.15978
10	1.10462	1.16054	1.21899	1.28008	1.34392	1.41060	1.48024	1.55297	1.62889	1.70814	1.79085	1.96715	2.15892	2.36736	2.59374	2.83942	3.10585	6.19174
11	1.11567	1.17795	1.24337	1.31209	1.38423	1.45997	1.53945	1.62285	1.71034	1.80209	1.89830	2.10485	2.33164	2.58043	2.85312	3.15176	3.47855	7.43008
12	1.12683	1.19562	1.26824	1.34489	1.42576	1.51107	1.60103	1.69588	1.79586	1.90121	2.01220	2.25219	2.51817	2.81266	3.13843	3.49845	3.89598	8.91610
13	1.13809	1.21355	1.29361	1.37851	1.46853	1.56396	1.66507	1.77220	1.88565	2.00577	2.13293	2.40985	2.71962	3.06580	3.45227	3.88328	4.36349	10.69932
14	1.14947	1.23176	1.31948	1.41297	1.51259	1.61869	1.73168	1.85194	1.97993	2.11609	2.26090	2.57853	2.93719	3.34173	3.79750	4.31044	4.88711	12.83918
15	1.16097	1.25023	1.34587	1.44830	1.55797	1.67535	1.80094	1.93528	2.07893	2.23248	2.39656	2.75903	3.17217	3.64248	4.17725	4.78459	5.47357	15.40702
16	1.17258	1.26899	1.37279	1.48451	1.60471	1.73399	1.87298	2.02237	2.18287	2.35526	2.54035	2.95216	3.42594	3.97031	4.59497	5.31089	6.13039	18.48843
17	1.18430	1.28802	1.40024	1.52162	1.65285	1.79468	1.94790	2.11338	2.29202	2.48480	2.69277	3.15882	3.70002	4.32763	5.05447	5.89509	6.86604	22.18611
18	1.19615	1.30734	1.42825	1.55966	1.70243	1.85749	2.02582	2.20848	2.40662	2.62147	2.85434	3.37993	3.99602	4.71712	5.55992	6.54355	7.68997	26.62333
19	1.20811	1.32695	1.45681	1.59865	1.75351	1.92250	2.10685	2.30786	2.52695	2.76565	3.02560	3.61653	4.31570	5.14166	6.11591	7.26334	8.61276	31.94800
20	1.22019	1.34686	1.48595	1.63862	1.80611	1.98979	2.19112	2.41171	2.65330	2.91776	3.20714	3.86968	4.66096	5.60441	6.72750	8.06231	9.64629	38.33760
21	1.23239	1.36706	1.51567	1.67958	1.86029	2.05943	2.27877	2.52024	2.78596	3.07823	3.39956	4.14056	5.03383	6.10881	7.40025	8.94917	10.80385	46.00512
25	1.28243	1.45095	1.64061	1.85394	2.09378	2.36324	2.66584	3.00543	3.38635	3.81339	4.29187	5.42743	6.84848	8.62308	10.83471	13.58546	17.00006	95.39622
30	1.34785	1.56308	1.81136	2.09757	2.42726	2.80679	3.24340	3.74532	4.32194	4.98395	5.74349	7.61226	10.06266	13.26768	17.44940	22.89230	29.95992	237.37631
40	1.48886	1.81402	2.20804	2.68506	3.26204	3.95926	4.80102	5.81636	7.03999	8.51331	10.28572	14.97446	21.72452	31.40942	45.25926	65.00087	93.05097	1469.77160

Compute the future value of a single amount.

Example

Determine the future value of the following single amounts:

	<u>Invested Amount</u>	<u>Interest Rate</u>	<u>No. of Periods</u>
1.	\$15,000	6%	12
2.	20,000	8	10
3.	30,000	12	20
4.	50,000	4	12

Compute the future value of a single amount

Solution

$$FV = I \times FV \text{ factor}$$

$$1- FV = \$15,000 * 2.01220 = \$30,183$$

Future value of \$1: $n=12, i=6\%$)

$$2- 20,000 * 2.15892 = 43,178$$

* Future value of \$1: $n=10, i=8\%$

Compute the future value of a single amount

Solution

$$FV = I \times FV \text{ factor}$$

$$3- 30,000 \times 9.64629 = \$289,389$$

Future value of \$1: $n=20$, $i=12\%$

$$4- 50,000 \times 1.60103 = 80,051.$$

Future value of \$1: $n=12$, $i=4\%$

Compute the future value of a single amount

Example

Determine the future value of \$10,000 under each of the following sets of assumptions:

	Annual Rate	Period Invested	Interest Compounded
1.	10%	10 years	Semiannually
2.	12	5 years	Quarterly
3.	24	30 months	Monthly

TABLE 1 Future Value of \$1

$$FV = \$1 (1 + i)^n$$

<i>n/i</i>	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%	5.5%	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	20.0%
1	1.01000	1.01500	1.02000	1.02500	1.03000	1.03500	1.04000	1.04500	1.05000	1.05500	1.06000	1.07000	1.08000	1.09000	1.10000	1.11000	1.12000	1.20000
2	1.02010	1.03022	1.04040	1.05063	1.06090	1.07123	1.08160	1.09203	1.10250	1.11303	1.12360	1.14490	1.16640	1.18810	1.21000	1.23210	1.25440	1.44000
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10	1.10462	1.16054	1.21899	1.28008	1.34392	1.41060	1.48024	1.55297	1.62889	1.70814	1.79085	1.96715	2.15892	2.36736	2.59374	2.83942	3.10585	6.19174
11	1.11567	1.17795	1.24337	1.31209	1.38423	1.45997	1.53945	1.62285	1.71034	1.80209	1.89830	2.10485	2.33164	2.58043	2.85312	3.15176	3.47855	7.43008
12	1.12683	1.19562	1.26824	1.34489	1.42576	1.51107	1.60103	1.69588	1.79586	1.90121	2.01220	2.25219	2.51817	2.81266	3.13843	3.49845	3.89598	8.91610
13	1.13809	1.21355	1.29361	1.37851	1.46853	1.56396	1.66507	1.77220	1.88565	2.00577	2.13293	2.40985	2.71962	3.06580	3.45227	3.88328	4.36349	10.69932
14	1.14947	1.23176	1.31948	1.41297	1.51259	1.61869	1.73168	1.85194	1.97993	2.11609	2.26090	2.57853	2.93719	3.34173	3.79750	4.31044	4.88711	12.83918
15	1.16097	1.25023	1.34587	1.44830	1.55797	1.67535	1.80094	1.93528	2.07893	2.23248	2.39656	2.75903	3.17217	3.64248	4.17725	4.78459	5.47357	15.40702
16	1.17258	1.26899	1.37279	1.48451	1.60471	1.73399	1.87298	2.02237	2.18287	2.35526	2.54035	2.95216	3.42594	3.97031	4.59497	5.31089	6.13039	18.48843
17	1.18430	1.28802	1.40024	1.52162	1.65285	1.79468	1.94790	2.11338	2.29202	2.48480	2.69277	3.15882	3.70002	4.32763	5.05447	5.89509	6.86604	22.18611
18	1.19615	1.30734	1.42825	1.55966	1.70243	1.85749	2.02582	2.20848	2.40662	2.62147	2.85434	3.37993	3.99602	4.71712	5.55992	6.54355	7.68997	26.62333
19	1.20811	1.32695	1.45681	1.59865	1.75351	1.92250	2.10685	2.30786	2.52695	2.76565	3.02560	3.61653	4.31570	5.14166	6.11591	7.26334	8.61276	31.94800
20	1.22019	1.34686	1.48595	1.63862	1.80611	1.98979	2.19112	2.41171	2.65330	2.91776	3.20714	3.86968	4.66096	5.60441	6.72750	8.06231	9.64629	38.33760
21	1.23239	1.36706	1.51567	1.67958	1.86029	2.05943	2.27877	2.52024	2.78596	3.07823	3.39956	4.14056	5.03383	6.10881	7.40025	8.94917	10.80385	46.00512
25	1.28243	1.45095	1.64061	1.85394	2.09378	2.36324	2.66584	3.00543	3.38635	3.81339	4.29187	5.42743	6.84848	8.62308	10.83471	13.58546	17.00006	95.39622
30	1.34785	1.56308	1.81136	2.09757	2.42726	2.80679	3.24340	3.74532	4.32194	4.98395	5.74349	7.61226	10.06266	13.26768	17.44940	22.89230	29.95992	237.37631
40	1.48886	1.81402	2.20804	2.68506	3.26204	3.95926	4.80102	5.81636	7.03999	8.51331	10.28572	14.97446	21.72452	31.40942	45.25926	65.00087	93.05097	1469.77160

Compute the future value of a single amount

Solution

1. $n = 10 \times 2 = 20$

$i = 10/2 = 5\%$

$FV = \$10,000 (2.65330^*) = \$26,533$

*Future value of \$1: $n=20$, $i=5\%$ (from Table 6A-1)

2. $n = 5 \times 4 = 20$

$i = 12/4 = 3\%$

$FV = \$10,000 (1.80611^*) = \$18,061$

* Future value of \$1: $n=20$, $i=3\%$ (from Table 6A-1)

Compute the future value of a single amount

Solution

3. $n = 30$

$i = 24/12 = 2\%$

$FV = \$10,000 (1.81136^*) = \$18,114$

* Future value of \$1: $n=30$, $i=2\%$ (from Table 6A-1)

Compute the present value of a single amount

present value of a single amount

present value is today's equivalent to a particular amount in the future.

$$FV = PV (1 + i)^n$$

$$PV = \frac{FV}{(1 + i)^n}$$

$$PV = FV * PV \text{ Factor}$$

TABLE 2 Present Value of \$1

$$PV = \frac{\$1}{(1 + i)^n}$$

<i>n/i</i>	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%	5.5%	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%	12.0%	20.0%
1	0.99010	0.98522	0.98039	0.97561	0.97087	0.96618	0.96154	0.95694	0.95238	0.94787	0.94340	0.93458	0.92593	0.91743	0.90909	0.90090	0.89286	0.83333
2	0.98030	0.97066	0.96117	0.95181	0.94260	0.93351	0.92456	0.91573	0.90703	0.89845	0.89000	0.87344	0.85734	0.84168	0.82645	0.81162	0.79719	0.69444
3	0.97059	0.95632	0.94232	0.92860	0.91514	0.90194	0.88900	0.87630	0.86384	0.85161	0.83962	0.81630	0.79383	0.77218	0.75131	0.73119	0.71178	0.57870
4	0.96098	0.94218	0.92385	0.90595	0.88849	0.87144	0.85480	0.83856	0.82270	0.80722	0.79209	0.76290	0.73503	0.70843	0.68301	0.65873	0.63552	0.48225
5	0.95147	0.92826	0.90573	0.88385	0.86261	0.84197	0.82193	0.80245	0.78353	0.76513	0.74726	0.71299	0.68058	0.64993	0.62092	0.59345	0.56743	0.40188
6	0.94205	0.91454	0.88797	0.86230	0.83748	0.81350	0.79031	0.76790	0.74622	0.72525	0.70496	0.66634	0.63017	0.59627	0.56447	0.53464	0.50663	0.33490
7	0.93272	0.90103	0.87056	0.84127	0.81309	0.78599	0.75992	0.73483	0.71068	0.68744	0.66506	0.62275	0.58349	0.54703	0.51316	0.48166	0.45235	0.27908
8	0.92348	0.88771	0.85349	0.82075	0.78941	0.75941	0.73069	0.70319	0.67684	0.65160	0.62741	0.58201	0.54027	0.50187	0.46651	0.43393	0.40388	0.23257
9	0.91434	0.87459	0.83676	0.80073	0.76642	0.73373	0.70259	0.67290	0.64461	0.61763	0.59190	0.54393	0.50025	0.46043	0.42410	0.39092	0.36061	0.19381
10	0.90529	0.86167	0.82035	0.78120	0.74409	0.70892	0.67556	0.64393	0.61391	0.58543	0.55839	0.50835	0.46319	0.42241	0.38554	0.35218	0.32197	0.16151
11	0.89632	0.84893	0.80426	0.76214	0.72242	0.68495	0.64958	0.61620	0.58468	0.55491	0.52679	0.47509	0.42888	0.38753	0.35049	0.31728	0.28748	0.13459
12	0.88745	0.83639	0.78849	0.74356	0.70138	0.66178	0.62460	0.58966	0.55684	0.52598	0.49697	0.44401	0.39711	0.35553	0.31863	0.28584	0.25668	0.11216
13	0.87866	0.82403	0.77303	0.72542	0.68095	0.63940	0.60057	0.56427	0.53032	0.49856	0.46884	0.41496	0.36770	0.32618	0.28966	0.25751	0.22917	0.09346
14	0.86996	0.81185	0.75788	0.70773	0.66112	0.61778	0.57748	0.53997	0.50507	0.47257	0.44230	0.38782	0.34046	0.29925	0.26333	0.23199	0.20462	0.07789
15	0.86135	0.79985	0.74301	0.69047	0.64186	0.59689	0.55526	0.51672	0.48102	0.44793	0.41727	0.36245	0.31524	0.27454	0.23939	0.20900	0.18270	0.06491
16	0.85282	0.78803	0.72845	0.67362	0.62317	0.57671	0.53391	0.49447	0.45811	0.42458	0.39365	0.33873	0.29189	0.25187	0.21763	0.18829	0.16312	0.05409
17	0.84438	0.77639	0.71416	0.65720	0.60502	0.55720	0.51337	0.47318	0.43630	0.40245	0.37136	0.31657	0.27027	0.23107	0.19784	0.16963	0.14564	0.04507
18	0.83602	0.76491	0.70016	0.64117	0.58739	0.53836	0.49363	0.45280	0.41552	0.38147	0.35034	0.29586	0.25025	0.21199	0.17986	0.15282	0.13004	0.03756
19	0.82774	0.75361	0.68643	0.62553	0.57029	0.52016	0.47464	0.43330	0.39573	0.36158	0.33051	0.27651	0.23171	0.19449	0.16351	0.13768	0.11611	0.03130
20	0.81954	0.74247	0.67297	0.61027	0.55368	0.50257	0.45639	0.41464	0.37689	0.34273	0.31180	0.25842	0.21455	0.17843	0.14864	0.12403	0.10367	0.02608
21	0.81143	0.73150	0.65978	0.59539	0.53755	0.48557	0.43883	0.39679	0.35894	0.32486	0.29416	0.24151	0.19866	0.16370	0.13513	0.11174	0.09256	0.02174
24	0.78757	0.69954	0.62172	0.55288	0.49193	0.43796	0.39012	0.34770	0.31007	0.27666	0.24698	0.19715	0.15770	0.12640	0.10153	0.08170	0.06588	0.01258
25	0.77977	0.68921	0.60953	0.53939	0.47761	0.42315	0.37512	0.33273	0.29530	0.26223	0.23300	0.18425	0.14602	0.11597	0.09230	0.07361	0.05882	0.01048
28	0.75684	0.65910	0.57437	0.50088	0.43708	0.38165	0.33348	0.29157	0.25509	0.22332	0.19563	0.15040	0.11591	0.08955	0.06934	0.05382	0.04187	0.00607
29	0.74934	0.64936	0.56311	0.48866	0.42435	0.36875	0.32065	0.27902	0.24295	0.21168	0.18456	0.14056	0.10733	0.08215	0.06304	0.04849	0.03738	0.00506
30	0.74192	0.63976	0.55207	0.47674	0.41199	0.35628	0.30832	0.26700	0.23138	0.20064	0.17411	0.13137	0.09938	0.07537	0.05731	0.04368	0.03338	0.00421
31	0.73458	0.63031	0.54125	0.46511	0.39999	0.34423	0.29646	0.25550	0.22036	0.19018	0.16425	0.12277	0.09202	0.06915	0.05210	0.03935	0.02980	0.00351
40	0.67165	0.55126	0.45289	0.37243	0.30656	0.25257	0.20829	0.17193	0.14205	0.11746	0.09722	0.06678	0.04603	0.03184	0.02209	0.01538	0.01075	0.00068

Compute the future value of a single amount

Example

Determine the present value of the following single amounts:

	Future Amount	Interest Rate	No. of Periods
1.	\$20,000	7%	10
2.	14,000	8	12
3.	25,000	12	20
4.	40,000	10	8

Compute the future value of a single amount

Solution

$$PV = \frac{FV}{(1 + i)^n}$$

 $PV = FV * PV \text{ Factor}$

$$PV = FV * 1/(1 + i)^n$$

$$1- PV = 20,000 * 0.50835 = 10167$$

* Present value of \$1: $n=10$, $i=7\%$ (from Table 6A-2)

Compute the future value of a single amount

Solution

$$PV = \frac{FV}{(1 + i)^n}$$

 $PV = FV * PV \text{ Factor}$

$$PV = FV * 1/(1 + i)^n$$

$$2- PV = 14,000 * 0.39711 = 5559$$

* Present value of \$1: $n=12$, $i=8\%$ (from Table 6A-2)

Compute the future value of a single amount

Solution

$$PV = \frac{FV}{(1 + i)^n}$$

 $PV = FV * PV \text{ Factor}$

$$PV = FV * 1/(1 + i)^n$$

$$3- PV = 25,000 * 0.10367 = 2,591$$

* Present value of \$1: $n=20$, $i=12\%$ (from Table 6A-2)

Compute the future value of a single amount

Solution

$$PV = \frac{FV}{(1 + i)^n}$$

 $PV = FV * PV \text{ Factor}$

$$PV = FV * 1/(1 + i)^n$$

$$4- PV = 40,000 * 0.46651 = 18,660$$

* Present value of \$1: $n=8$, $i=10\%$ (from Table 6A-2)

Compute the future value of a single amount

Example

What is the future value of \$5,000 at the end of six periods at 8% compound interest?

Solution

$$FV = I \times FV \text{ factor}$$

$$FV = \$5,000 \times 1.58687^* = \$7,937$$

*Future value of \$1: $n = 6$, $i = 8\%$ (from Table 1)

Compute the future value of a single amount

Example

What is the present value of \$8,000 to be received eight periods from today assuming a compound interest rate of 12%?

Solution

$$PV = FV \times 1/(1 + i)^n$$

$$PV = \$8,000 \times .40388^* = \$3,231$$

*Present value of \$1: $n = 8$, $i = 12\%$ (from Table 2)

Compute the future value of a single amount

Example

What is the present value of \$10,000 to be received two years from today assuming an annual interest rate of 24% and monthly compounding?

Solution

$$PV = FV \times 1/(1 + i)^n$$

$$n = 2 \times 12 = 24$$

$$i = 24/12 = 2$$

$$PV = \$10,000 \times .62172^* = \$6,217$$

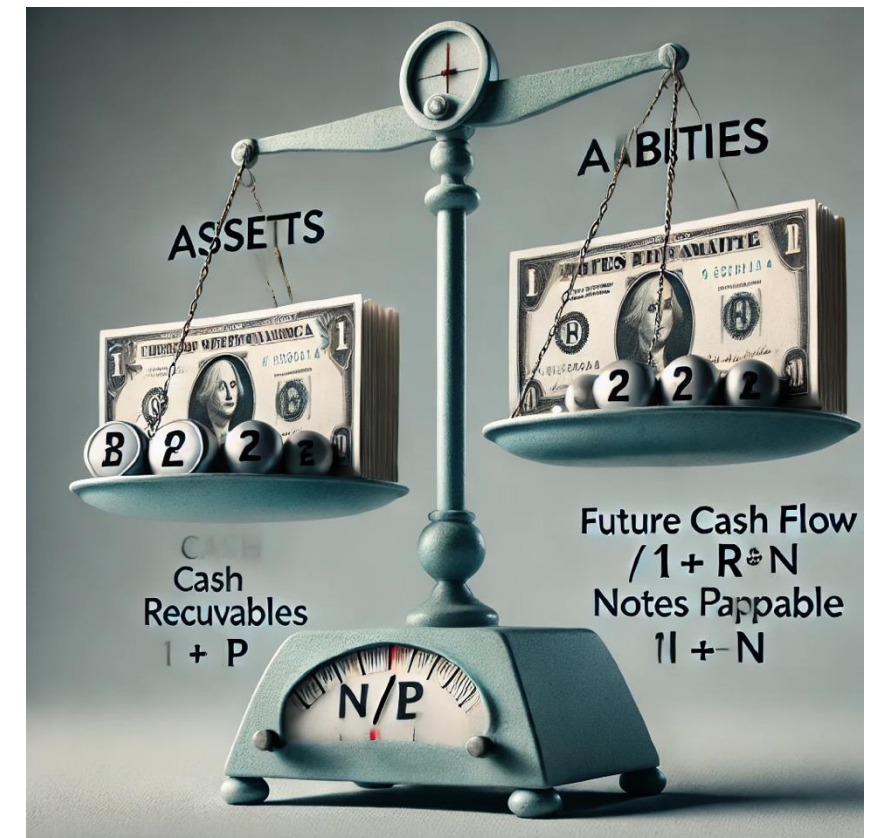
*Present value of \$1: $n = 24$, $i = 2\%$ (from Table 2)

Compute the future value of a single amount

Accounting Applications of Present Value Techniques—Single Cash Amount

Many assets and most liabilities are monetary in nature. assets include money and claims to be received, and liabilities are obligations to be paid, the amount of which is fixed or determinable.

Ex, if you borrow money from a bank and signed a N/P the amount of cash to be repaid is fixed
We value most receivables and payables at PV of future cash flows.



Compute the future value of a single amount

Example:

The Field Detergent Company sold merchandise to the Abel Company on June 30, 2013. Payment was made in the form of a noninterest-bearing note requiring Abel to pay \$85,000 on June 30, 2015. Assume that a 10% interest rate properly reflects the time value of money in this situation.

Required:

Calculate the amount at which Field should record the note receivable and corresponding sales revenue on June 30, 2013.

Compute the future value of a single amount

Solution

$$FV = 85,000$$

$$i = 10\%$$

$$n = 2 \text{ y}$$

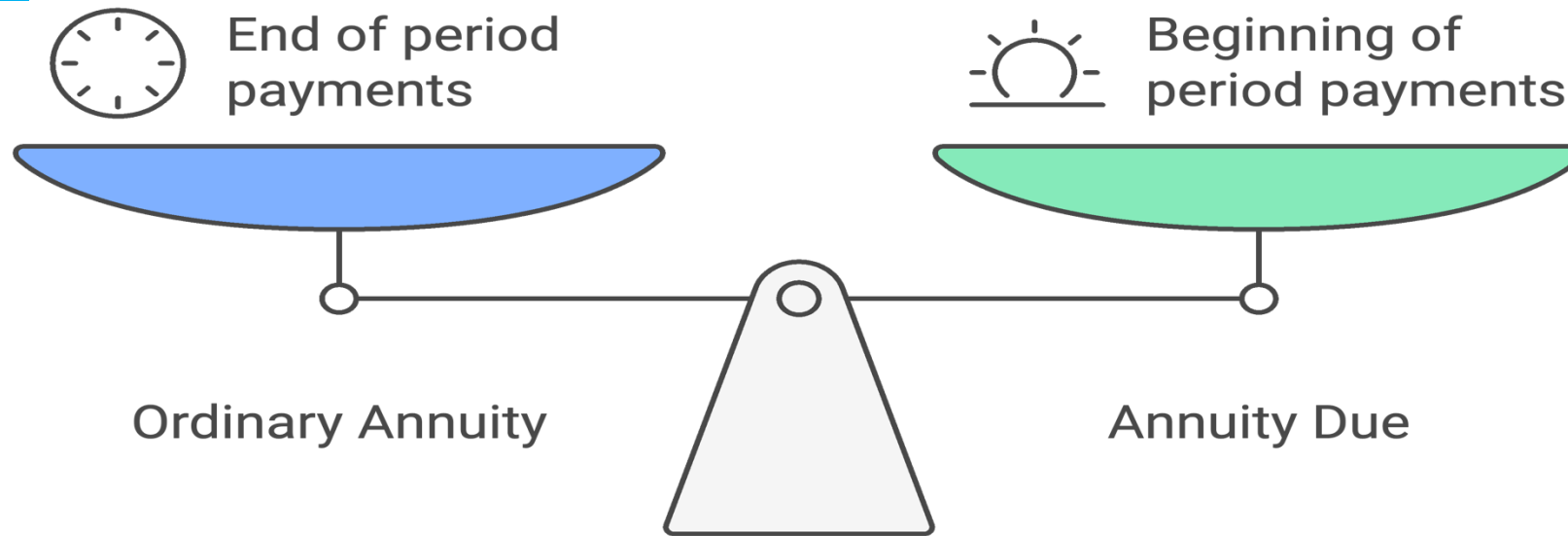
$$PV = FV \cdot (1/1+i)^n$$

$$pv = 85,000 \cdot 0.82645 = 70,248$$

Field should record the note receivable and corresponding sales revenue on June 30, 2013, at PV 70,248

Chapter
05

Annuity



Compare timing of cash flows in annuities.

Ordinary Annuity: In an ordinary annuity cash flows occur **at the end of each period.**

Annuity Due: In an annuity due cash flows occur **at the beginning of each period.**

Example:

What is the future value of an annuity of \$2,000 invested at the end of each of the next six periods at 8% interest?

Solution

$$A=2000$$

$$n= 6$$

$$i= 8\%$$

Ordinary Annuities

$$FVA = \$2,000 \times 7.3359^* = \$14,672$$

*Future value of an ordinary annuity of \$1: $n = 6$, $i = 8\%$ (from Table 3)

Example:

What is the future value of an annuity of \$2,000 invested at the beginning of each of the next six periods at 8% interest?

Solution

$$A=2000$$

$$n= 6$$

$$i= 8\%$$

Annuity due

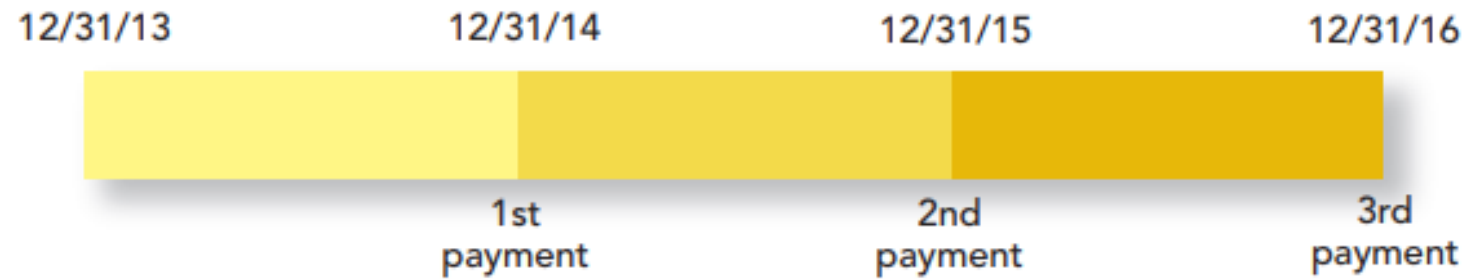
$$FVAD = \$2,000 \times 7.9228^* = \$15,846$$

*Future value of an annuity due of \$1: $n = 6$, $i = 8\%$ (from Table 5)

Annuity

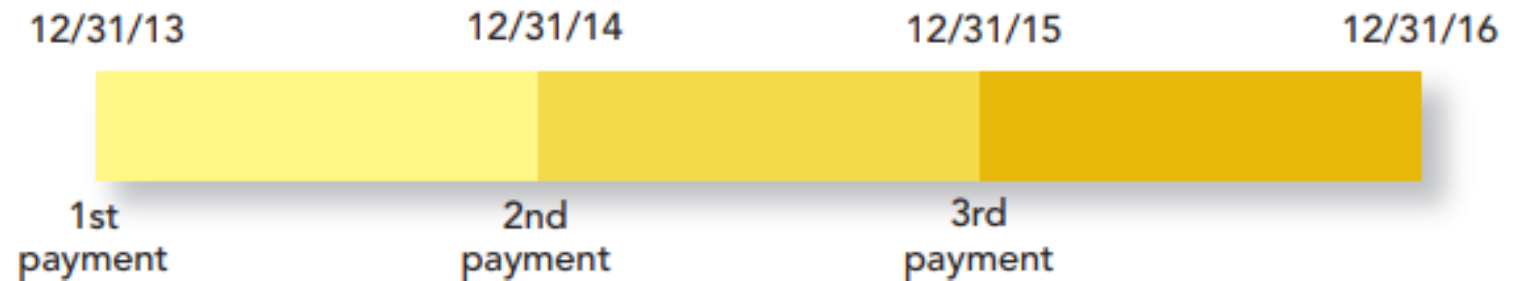
Ordinary Annuity VS Annuity Due
\$14,672 VS \$15,846

Ordinary annuity.



Ordinary Annuity VS Annuity Due
\$14,672 VS \$15,846

Annuity due.



Note: no interest is charged on the last payment of ordinary annuity

Present Value of an Annuity:

Example

What is the present value of an annuity of \$6,000 to be received at the end of each of the next eight periods assuming an interest rate of 10%?

Solution

$A = 6000$

$n = 8$

$i = 10\%$

Ordinary Annuities

$$PVA = \$6,000 \times 5.33493^* = \$32,010$$

*Present value of ordinary annuity of \$1: $n = 8$, $i = 10\%$ (from Table 4)

Example

What is the present value of an annuity of \$6,000 to be received at the beginning of each of the next eight periods assuming an interest rate of 10%?

Solution

$$A=6000$$

$$n= 8$$

$$i= 10\%$$

Annuity due

$$PVAD = \$6,000 \times 5.86842^* = \$35,211$$

*Present value of an annuity due of \$1: $n = 8$, $i = 10\%$ (from Table 6)



Thank You