

BASIC FINANCIAL CALCULATIONS USING INFORMATION SYSTEMS FOR SOLVING BUSINESS TASKS

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An Introduction

A detailed study of the financial concepts fundamentals certainly is to give some idea on the concepts of finance. The investment world can be confusing for the investors. The investors need to go through some finance theories which will help them to understand the market behavior in a better way. There are a number of factors that influence the functioning of the investment market. The individual investor's choice of investment may vary from one person to another. While some investors go for investing in the risky securities, some investors tend to play safe in the market by investing in the less risky environment.

The finance theory concept including studying the various ways by which businesses and individuals raise money, as well as how money are allocated to projects while considering the associated with them risk factors.

1. The concept of finance theory

The concept of finance also includes the study of money and other assets, managing and profiling project risks, control and management of assets, and the science of money managing. Simply, 'financing' also means provision and allocation of funds for a particular business module or project. There are a number of finance theories that offer separate approaches to the finance hypotheses. Some of the major popular finance theories of the world are: Arbitrage Pricing Theory, Rational Choice Theory, Prospect Theory, Cumulative Prospect Theory, Monte Carlo Option Model, Binomial Options Pricing Model, Gordon Model, International Fisher Effect, Black Model, and Legal Origins Theory

2. Financial Services Company

The finance industry provides to the clients a number of services. There are different types of financial services which company can provide to different commercial sectors as well as to the individuals. Some of that types of financial services are lending money for different purposes, insurances, depository services, mortgage services, investment services, credit rating services and many more. The different types of financial services jointly create one of the largest industries of the world. Every individual as well as institution has a definite income source and a particular way of expenditure. These particular sources of income, habit of investment and expenditure habit, all come under the domain of finance. Several important finance concepts have been developed through close study of all these things [2].

3. Financial Goal - Profit versus Wealth

Every firm has a predefined goal or an objective. Therefore the most important goal of a financial manager is to increase the owner's economic welfare. Here economics welfare may refer to profit maximization or maximization of shareholders wealth. Therefore Shareholders wealth maximization (SWM) plays a very crucial role as far as financial goals of a firm are concerned. Profit is the remuneration paid to the entrepreneur after deduction of all expenses. Maximization of profit can be defined as maximizing the income of the firm and minimizing the expenditure. The main responsibility of a firm is to carry out business by manufacturing goods and services and selling them in the open market. The mechanism of demand and supply in an open market determine the price of a commodity or a service. A firm can only make profit if it produces a good or delivers a service at a lower cost than what is prevailing in the market. The margin between these two prices would only increase if the firm strives to produce

these goods more efficiently and at a lower price without quality compromising. The demand and supply mechanism plays a very important role in determining the price of a commodity. A commodity which has a greater demand commands a higher price and hence may result in greater profits. Competition among other suppliers also effect profits. Tendency is manufacturers to move towards production of those goods which guarantee higher profits. As result comes a time when equilibrium is reached and profits are saturated.

According to Adam Smith – business man while are fulfilling the own goals for profit in turn benefits the whole society. Obviously when a firm tends to increase profit it eventually makes use of its resources in a more effective manner. Profit is regarded as a parameter to measure firm's productivity and efficiency. Firms which tend to earn continuous profit eventually improvise their products according to the consumers demand. Bulk production due to massive demand leads to economies of scale which eventually reduces production cost. Lower production cost directly impacts the profit margins. Profit maximization objective is a little vague in terms of returns achieved by a firm in different time period. When measuring profit the time value of money is often ignored. It leads to returns uncertainty. Two firms which use same technology and same factors of production may eventually earn different returns. It is due to the profit margin. It may not be legitimate if seen from a different stand point [5], [6].

4. Importance of Cash Flow

In case of both personal and business finance, cash flow is an important concept. It is more important with regard to solvency. Cash flow is used as a documentation of past investments and earnings. It is also used by the business entities in order to represent the direction where they want to take their company. In the present competitive world the business cash flow becomes an important phenomenon. It is assumed that people like creditors and brokers that the person or business entity that has a decent cash flow record is in a better position to make his payments at the right time. Thus it becomes easier for such parties to obtain finance for various purposes.

Equational Representation of DCF

The Discounted Cash Flow could be represented through the following equation:

$$DCF = CF_1/(1+r)^1 + CF_2/(1+r)^2 + \dots + CF_n/(1+r)^n$$

In this formula CF stands for cash flow and r represents the rate of discount.

Discounted Cash Flow in Mathematics

The method of Discounted Cash Flow is used in Mathematics as well. The formula for discounted Cash Flow has been deduced from the future value formula. The future value formula is used to calculate the following:

* **Compounding Returns**

* **Time Value of Money**

5. Basic principles of finance

It is a basic principle of finance that separate amounts of money cannot be equated, added or subtracted if they are at different times. Interest is present in all of the problems we consider. This means that, looking backward a dollar today is worth less yesterday, or, looking forward, it is worth more tomorrow. The principle of bringing all amounts to a common point, usually called a pivot point, is absolutely fundamental when solving finance problems. Complete freedom of choice is available for the pivot point, as the correct answer to a finance problem does not depend on the chosen pivot point. Therefore, the pivot point is usually chosen for convenience of calculation.[4],[10]

The basic principles and equations are developed for elementary finance, based on the concept of compound interest. The five quantities of interest in such problems are present value, future value, also amount of periodic payment, number of periods and the rate of interest per period.

The fundamental mathematical topics on which elementary finance is based are the arithmetic and geometric sequences. Other terms in use are AP and GP, where the "P" stands for progression,

an older term for sequence. Arithmetic sequences correspond to problems where simple interest is used, and geometric sequences to those involving compound interest. We do not consider arithmetic sequences and simple interest here.

A sound understanding of basic finance is a very important and useful skill for life, even if a career in finance is not the ultimate goal. At least in western societies, everyone needs at least a basic understanding of the implications of borrowing or investing money in a compound interest environment. With the advent of the modern electronic spreadsheet, as exemplified by Microsoft Excel, it is now not only possible, but rather easy to improve drastically on this approach to the teaching of basic finance.

In the spreadsheet environment, we advocate a three-pronged approach, and it is tacit that all three approaches must yield the same result for any given problem. The approaches are:

- Traditional algebraic formulas, sometimes supplemented with the powerful Goal Seek
- Linear recursive schedule, also sometimes with Goal Seek
- Excel intrinsic financial functions

6. The basic equation

$$FV = PV(1+I)^N$$

FV = future value
 PV = present value
 I = interest
 N = number of periods

7. Excel Spreadsheets. Financial Functions [1], [3], [7], [8], [9], [11]

Below is the list of the 5 most useful ones:

Functions	What it Does
FV	Returns the future value of an investment
NPER	Returns the number of periods for an investment
PMT	Returns the periodic payment for an annuity
RATE	Returns the interest rate per period of an annuity
IRR	Rreturn the Internal Rate of Return for a supplied series of periodic cash flows

7.1. The RATE Function

The question to which RATE brings an answer to is:

- What is the real interest rate if they ask me for a certain amount each period to pay a loan?

	A	Descriptions
1	48	Number of periods (years, months, weeks..etc)
2	\$550	Periodic payment
3	\$24,000	Total amount of loan
4	0	The balance left to pay at the end of the period. If you omit this argument Excel uses "0".
5	0	Payment made at the beginning of the period (1) or at the end of the period (0). If you omit this argument Excel uses "0" saying that the payment is made at the end of each period which is usually the reality when you borrow money.
6	5.00%	The result with the formula using the RATE function. Note: the format of this cell must be "Percentage" with any number of decimals. In this example the number of decimals is 2

Here is the formula in cell A6:

=RATE(A1,-A2,A3,A4,A5)*12

Notes on the formula: The payment argument is negative (-A2); If you use months as periods and you want an annual rate you multiply by 12, if you use a years as periods and you want an

annual rate you don't multiply.....; If you don't use the "Percentage" format in cell A6 the result of this example will be 0.05; The formula could also be **=RATE(A1,-A2,A3)*12** the arguments in A4 and A5 being optional

7.2. The PMT Function

The question to which PMT brings an answer to is: at the end of a certain period of time what will be the
 - If I borrow a certain amount of money and I want it repaid periodic payment?

	A	Descriptions
1	5.00%	The annual interest rate. Note: the format of this cell must be "Percentage" with any number of decimals. In this example the number of decimals is 2
2	48	Number of periodic payments (years, months, weeks)
3	\$24,000	Total amount of loan
4	0	The balance left to pay at the end of the period. If you omit this argument Excel uses "0".
5	0	Payment made at the beginning of the period (1) or at the end of the period (0). If you omit this argument Excel uses "0" saying that the payment is made at the end of each period which is usually the reality when you borrow money.
6	-\$550.41	The result with the formula using the PMT function.

Here is the formula in cell A6:

=PMT(A1/12,A2,A3,A4,A5)

Notes on the formula: If you don't use the "Percentage" format in cell A1 enter 0.05; If you use months as periods the rate must be divided by 12 (A1/12), if you use weeks then you divide by 52 (A1/52), if there are 4 payments per year you will divide the rate by 4 (A1/4) and if the payment is annual you don't divide the rate argument (A1); The formula could also be **=PMT(A1/12,A2,A3)** the arguments in A4 and A5 being optional; If you want the

payment to show as a positive value add a minus sign before the equal sign (**=PMT(A1/12,A2,A3,A4,A5)**)

7.3. The FV Function (Future value)

The question to which **FV** brings an answer to is:
 - If I put a certain amount of money in the bank each month, how much money I will have saved at the end of a certain period of time?

	A	Descriptions
1	5.00%	The annual interest rate. Note: the format of this cell must be "Percentage" with any number of decimals. In this example the number of decimals is 2
2	48	Number of periodic deposits (years, months, weeks)
3	\$550	Amount of periodic deposits
4	\$0	Beginning balance. If you omit this argument Excel uses "0".
5	1	Deposits made at the beginning of the period (1) or at the end (0). If you omit this argument Excel uses "0". In the case of the FV function make sure that you enter "1".
6	-\$29,279.68	The result with the formula using the FV function.

	A	Descriptions
1	5.00%	The annual interest rate. Note: the format of this cell must be "Percentage" with any number of decimals. In this example the number of decimals is 2
2	48	Number of periodic deposits (years, months, weeks)
3	\$550	Amount of periodic deposits
4	\$0	Beginning balance. If you omit this argument Excel uses "0".
5	1	Deposits made at the beginning of the period (1) or at the end (0). If you omit this argument Excel uses "0". In the case of the FV function make sure that you enter "1".
6	-\$29,279.68	The result with the formula using the FV function.

Here is the formula in cell A6:

=FV(A1/12,A2,A3,A4,A5)

Notes on the formula: If you don't use the "Percentage" format in cell A1 enter 0.05; If you use months as periods the rate must be divided by 12 (A1/12), if you use weeks then you divide by 52 (A1/52), if there are 4 payments per year you will divide the rate by 4 (A1/4) and if the payment is annual you don't divide the rate argument (A1); The formula could also be **=FV(A1/12,A2,A3)** the arguments in A4 and A5 being optional; If you want the

RESULT to show as a positive value add a minus sign before the equal sign (**=FV(A1/12,A2,A3,A4,A5)**)

7.4. The NPER Function

The question to which **NPER** brings an answer to is:
 - How many months would it take me to repay a certain loan at a certain interest rate if I pay a certain amount each month?

	A	Descriptions
1	5.0%	The annual interest rate. Note: the format of this cell must be "Percentage" with any number of decimals. In this example the number of decimals is 2
2	\$550	Periodic payment

3	\$24,000	Total amount of loan
4	0	The balance left to pay at the end of the period. If you omit this argument Excel uses "0".
5	0	Payment made at the beginning of the period (1) or at the end (0). If you omit this argument Excel uses "0".
6	48.26	The result with the formula using the NPER function.

Here is the formula in cell A6:

=NPER(D1/12,-D2,D3,D4,D5)

Notes on the formula: If you don't use the "Percentage" format in cell A1 enter 0.05; The second argument MUST BE NEGATIVE; If you use months as periods the rate must be divided by 12 (A1/12), if you use weeks then you divide by 52 (A1/52), if there are 4 payments per year you will divide the rate by 4 (A1/4) and if the payment is annual you don't divide the rate argument (A1); The formula could also be **=NPER(A1/12,A2,A3)** the arguments in A4 and A5 being optional;

7.5. The IRR Function (Internal Rate of Return)

The Internal Rate of Return (IRR) indicates the profitability of an investment and therefore is commonly used in business, when choosing between investments.

This measurement uses a series of cash flows (including an initial investment, along with the net income) over a number of periods, to calculate the compounded return, assuming the Net Present Value of the investment is zero.

The value of the IRR is calculated as the value of r that satisfies the following equation:

$$\sum_{n=0}^N \frac{C_n}{(1+r)^n} = 0$$

where the series of cash flows provide the values for C_n and N is the number of periods over which the returns have been made.

The Excel IRR function returns the Internal Rate of Return for a supplied series of periodic cash flows (ie. a set of values, which includes an initial investment value and a series of net income values).

The syntax of the function is :

IRR(values, [guess]),

where the arguments are as follows:

values - A reference to a range of cells containing the series of cash flows (investment and net income values) - must contain at least one negative and at least one positive value

[guess] - An initial guess at what you think the IRR might be. This is an optional argument, which, if omitted, takes on the default value of 10% (=0.1) - This is only a value for Excel to start off working with - Excel then uses an iterative procedure to converge to the IRR.

Conclusion

Each company main goal is to achieve profit, which goal requires additional operations and solving many financial problems. By optimal valuation of the cash flows, applying mathematical financial models and using the capabilities of free software - spreadsheets, management experts of the companies will be able to successfully optimize the company's activities and maximize profits.

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