FINANCE 601 CATALOG DESCRIPTION:
To Implement The Goal of the Firm: To Select the Course of Action Which Most Increases the Present Wealth of Equity Holders of the Firm: \[ PWE_0 = NCDE_0 + VE_0. \] We “maximize” \[ PWE_0; \] i.e., “make it as large as possible”: “Max \[ APWE_0. \]” The Value of the Firm is the sum of the Value of Debt plus the Value of Equity: \[ VF_0 = VD_0 + VE_0. \] “Value” means “Present Discounted Value of Future Benefits to be received by the owner.” Valuation is the crux of finance. Valuation is subjective and proceeds from forecasted cash flows and Terminal Value meeting the forecast assumptions within the identified course of action, all discounted to the present at the risk-adjusted cost of capital. Successful entrepreneurship is choosing the future course of action which most increases the value of equity. A decision changes the future course of action from the current plan to a new and better plan. Valuing the equity of the firm under the present plan, and changes in that value under newly-designed alternative plans, is the goal of this course: first, by forecasting the future pro-forma financial statements through the Terminus (“horizon date”) \( T \) under the forecast assumptions inherent in the identified course of action; second, by forecasting the free cash flows through the Terminus \( T \); third, by forecasting the Terminal Value at the Terminus \( T \); and fourth, by discounting the stream of future forecasted cash flows and Terminal Value at the risk-adjusted cost of equity, to the present value of equity under the forecast assumptions for the identified course of action. We shall explore correct financial decision-making in a variety of situations: the correct decision is to choose the course of action which increases most the value of equity of the firm. For each decision, all of the alternative courses of action identified must be forecasted so the best one can be selected. The present value of equity of the proposed future course of action is compared with the present value of equity of the existing situation, and the increase in value of equity if the proposed course of action is implemented, is determined. The correct decision in any situation is to choose the course of future action which most increases the wealth of equity holders of the firm, after explicitly forecasting the future cash flows which will result from each possible course of action identified at the decision moment.
DISABILITY STATEMENT:
A student with a disability that qualifies for accommodations should contact Sarah Mead Smith, Director of Disability Services at 865-2990 (Academic Resource Center, Room 405, Monroe Hall). A student wishing to receive test accommodations (e.g., extended test time) should provide the instructor with an official Accommodation Form from Disability Services in advance of the scheduled test date.

ACADEMIC INTEGRITY STATEMENT:
All work in this course is strictly individual; no written or electronic source of assistance is forbidden. You must do yourself all work which you turn in for the course. All work is take-home and is open-book. You may discuss concepts and principles with each other and discuss how to do the work. Ask me any questions you may have. The penalty for compromise of your academic integrity by receiving live help from another student or giving help to another student, is disenrollment from the course with a grade of "F". See the Loyola University New Orleans Undergraduate Bulletin, pp. 50-52.

ATTENDANCE POLICY:
Students are expected to attend all classes, arrive on time, not leave early, have cell phones and pagers disabled, behave professionally, answer questions posed by the instructor, and participate in class discussion. "Preparation precedes progress." Class attendance is absolutely required. Roll will be taken daily. If you must miss class, telephone me prior to that class at (504) 495-6443 and tell me why you will miss class; leave a message if I do not answer. At the next class, turn in a written note explaining your absence. It is better to arrive late to class than to miss the entire class. If you expect to be late, telephone me before you are late at (504) 495-6443.

FINANCE 601 CATALOG DESCRIPTION:
To Select the Course of Action Which Most Increases the Present Wealth of Equity Holders of the Firm: PWE\(_0\) = NCDF\(_0\) + VE\(_0\). To Implement The Goal of the Firm: To Select the Course of Action Which Most Increases the Present Wealth of Equity Holders of the Firm: PWE\(_0\) = NCDF\(_0\) + VE\(_0\). We “maximize” PWE\(_0\); i.e., “make it as large as possible”: “Max \(\Delta PWE_0\).” The Value of the Firm is the sum of the Value of Debt plus the Value of Equity: \(VF_0 = VD_0 + VE_0\). “Value” means “Present Discounted Value of Future Benefits to be received by the owner.” 
 Valuation is the crux of finance. Valuation is subjective and proceeds from forecasted cash flows and Terminal Value meeting the forecast assumptions within the identified course of action, all discounted to the present at the risk-adjusted cost of capital. Successful entrepreneurship is choosing the future course of action which most increases the value of equity. A decision changes the future course of action from the current plan to a new and better plan. Valuing the equity of the firm under the present plan, and changes in that value under newly-designed alternative plans, is the goal of this course: first, by forecasting the future pro-forma financial statements through the Terminus ("horizon date") \(T\) under the forecast assumptions inherent in the identified course of action; second, by forecasting the free cash flows through the Terminus \(T\); third, by forecasting the Terminal Value at the Terminus \(T\); and fourth, by discounting the stream of future forecasted cash flows and Terminal Value at the risk-adjusted cost of equity to the present value of equity under the forecast assumptions for the identified course of action. We shall explore correct financial decision-making in a variety of situations: the correct decision is to choose the course of action which increases most the value of equity of the firm. For each decision, all of the alternative courses of action identified must be forecasted so the best one can be selected. The present value of equity of the proposed future course of action is compared with the present value of equity of the existing situation, and the increase in value of equity if the proposed course of action is implemented, is determined. The correct decision in any situation is to choose the course of future action which most increases the value of equity of the firm, after explicitly forecasting the future cash flows which will result from each possible course of action identified at the decision moment.
FINANCE 601

This course is the first MBA finance course; it will teach you the basic principles of financial analysis, valuation, and decision-making. This means that you must come to understand time preference, and the operations of compounding and discounting; and you will learn to think in terms of Present Values of future streams of cash. You will learn to compute present values of streams of future cash flows. You will learn to compute the values of shares of stock and bonds. You will learn how to compute the value of the firm as the sum of the values of all securities outstanding, including non-market loans from banks. You will learn to use the Gordon Constant Growth Model to estimate the value of the cost of equity. You will learn to compute the realized rate of return from owning a bond for less than its full lifetime. You will learn to compute the Net Present Values of alternative proposals for capital investment. You will learn the effects of capital structure on firm value, and you will learn that dividend policy affects the value of the firm through communication details which change market participants’ perceptions and expectations. You will learn to construct a chart of EPS vs. EBIT and determine the superiority of the best proposal for financing.

The goal of this course is to cause you to think in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. You will learn that risk is a subjective perception of the actor, regarding his ability to forecast accurately. Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders.

The “value of the firm” is the money price which is now equivalent to all the future cash flows which will benefit the owners through the remaining life of the firm.

You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up. Action is choosing the most valuable alternative from among those available. The most valuable alternative increases the present wealth of equity holders by the largest amount.

The sciences of Human Action (economics, sociology, etc.) are highly complex, and valuation is subjective, so we cannot know fully in advance the outcomes of particular actions involving other people: business forecasting is imprecise.

Entrepreneurship is forecasting the future result of a chosen action in the present, chosen on the basis of the actor’s values and chosen as the most profitable course available. Valuation is subjective. Cost is subjective also. Profits, either past or forecasted future, are therefore always estimates. Profit is always expected at the start of any action. Risk is subjective. Perceptions are subjective.
FINANCE 601 SUMMARY OUTLINE

VF\_0 = VD\_0 + VE\_0 \; ; \; \Theta\_t = VD\_t / VF\_t .

Goal of the Firm: Maximizing the Wealth of Shareholders. PWE\_0 = NCDE\_0 + VE\_0 . Chap. 1.


PV\_0 = \left[ \sum_{t=1}^{T} CF\_t / (1 + k)^t \right] + [ TV\_T / (1+k)^T ] \; ; \; NPV\_0 = IVS\_0 + PV\_0 , IVS\_0 < 0
\Delta PWE\_0 = NPV\_0

HW Chap 2: Q-1,2,3,4,5; ST-1,2; P-1,2,3,5,7,9,10,13,14,15,16,22, 23,24,25,28,29,30,31,33,34.

01/20 Value of Equity from Discounted Cash Flows: 
VE\_0 = \left[ \sum_{t=1}^{T} CF\_t / (1 + k)^t \right] + [ TV\_T / (1+k)^T ] \; Fin.Mkts; Valuing, Trading Bonds, Stocks; Required, Realized Rates of Return, Risk. Chaps.1,5,8


\Theta = VD/VF; \; Op \; Lvg = \Delta %EBIT/\Delta %Sales; \; Fin \; Lvg = \Delta %NIAT/\Delta %EBIT

duPont Equation: ROE = NI/NW = (S/TA) (NI/S) (TA/NW) = ROI/(1-\Theta); ROI = NI/TA;

If g = b and is constant forever, then P_0 = d_1 / (k_e - g) ; in equil, k_e = (d_1/P_0) + g

\mu = (\Theta kd) (1 - \tau) + (VE/VF) ke + (VP/VF) kp . Ch.10

02/03 Perceived Risk. Req’d Rate of Return: Capital Asset Pricing Model to value risky assets. Chs 6,7
ke = R_f + \beta (E[RM] - R_f ) + \phi

02/17 Capital Budgeting: Choosing the Best Investment. Ch. 11: NPV\_0 \geq 0 \iff IRR \geq kf\_*
MIRR = Modified Internal Rate of Return, assumes cash inflows invested at kf\_*, not IRR.
NPV\_0 = IVS\_0 + \sum_{t=1}^{T} \Delta CF\_t^*/(1+kf\_*)^t + TV\_T/(1+kf\_*)^T

\Delta CF\_t^* = (\Delta S - \Delta C - \Delta D) (1 - \tau ) + \Delta D ; \Delta = \text{with - without}

02/24 Mardi Gras Holiday: No Class

03/03 MID-TERM EXAMINATION—Closed Book and Notes


03/24 Real Options. Chap. 13.
04/07 Easter Holiday: No Class
04/14 Corporate Valuation. Chap. 15.
04/21 Capital Structure and Valuation. Chap. 16.
04/28 Capital Acquisition and Disbursement. Chap. 18.

05/05 FINAL EXAMINATION—Closed Book and Notes; Begins at 6:00 PM
Purpose of Finance 601 Course:

TO TEACH YOU TO THINK COMPREHENSIVELY, SYSTEMATICALLY, COHERENTLY, AND INTELLIGIBLY ABOUT THE ENTREPRENEURIAL CREATION OF VALUE AND FINANCIAL DECISIONS. To teach you how to think in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow.

"Action" is choosing and implementing the course for the future, based on values and perceptions.

Human action is purposeful behavior. Or we may say: Action is will put into operation and transformed into an agency, is aiming at ends and goals, is the ego's meaningful response to stimuli and to the conditions of its environment, is a person's conscious adjustment to the state of the universe that determines his life.

Action is not simply giving preference....acting man chooses, determines, and tries to reach an end. Of two things both of which he cannot have together he selects one and gives up the other. Action therefore always involves both taking and renunciation....Action means the employment of means for the attainment of ends. As a rule one of the means employed is the acting man's labor. But this is not always the case. Under special conditions a word is all that is needed. He who gives orders or interdictions may act without any expenditure of labor....to do nothing and to be idle are also action, they too determine the course of events. Wherever the conditions for human interference are present, man acts no matter whether he interferes or refrains from interfering. He who endures what he could change acts no less than he who interferes in order to attain another result....Action is not only doing but no less omitting to do what possibly could be done.

We may say that action is the manifestation of a man's will. But this would not add anything to our knowledge. For the term means nothing else than man's faculty to choose between different states of affairs, to prefer one, to set aside the other, and to behave according to the decision made in aiming at the chosen state and forsaking the other.

We call contentment or satisfaction that state of a human being which does not and cannot result in any action. Acting man is eager to substitute a more satisfactory state of affairs for a less satisfactory [state]. His mind imagines conditions which suit him better, and his action aims at bringing about this desired state. The incentive that impels a man to act is always some uneasiness. A man perfectly content with the state of his affairs would have no incentive to change things. He would have neither wishes nor desires; he would be perfectly happy. He would not act; he would simply live free from care.

But to make a man act, uneasiness and the image of a more satisfactory state alone are not sufficient. A third condition is required: the expectation that purposeful behavior has the power to remove or at least to alleviate the felt uneasiness. In the absence of this condition no action is feasible. Man must yield to the inevitable. He must submit to destiny.

The ultimate goal of human action is always the satisfaction of the acting man's desire. There is no standard of greater or lesser satisfaction other than individual judgments of value, different for various people and for the same people at various times. What makes a man feel uneasy and less uneasy is established by him for the standard of his own will and judgment, from his personal and subjective valuation. Nobody is in a position to decree what should make a fellow man happier.

...the incentive of human activity is always some uneasiness and its aim [is] always to remove such uneasiness as far as possible...

[Man] arranges his wishes and desires into a scale, he chooses; in short, he acts.

Action always aims at the removal of future uneasiness, be it only the future of the impending instant. Between the setting in of action and the attainment of the end sought there always elapses a fraction of time, viz, the maturing time in which the seed sown by the action grows to maturity....Acting man does not look at his condition with the eyes of a historian. He is not concerned with how the present situation originated. His only concern is to make the best use of the means available today for the best possible removal of future uneasiness. The past does not count for him. He has at his disposal a definite quantity of material factors of production....He values the available means exclusively from the aspect of the services they can render him in his endeavors to make future conditions more satisfactory. The period of production and the duration of serviceableness are for him categories in planning future action, not concepts of academic retrospection and historical research. They play a role in so far as the actor has to choose between periods of production of different length and between the production of more durable and less durable goods. Action is not concerned with the future in general, but always with a definite and limited fraction of the future. This fraction is limited, on the one side, by the instant in which the action must take place [called the 'present moment']. Where its other [future] end lies depends on the actor's decision and choice....We may call the fraction of future time for which the actor in a definite action wants
to provide in some way and to some extent, the period of provision. In the same way in which acting man chooses among various kinds of want-satisfaction within the same fraction of future time, he chooses also between want-satisfaction in the nearer and in the remoter future. Every choice implies also a choice of a period of provision. In making up his mind how to employ the various means available for the removal of uneasiness [during the period of production], man also determines implicitly the period of provision. In the market economy the demand of the consumers also determines the length of the period of provision.


All decisions choose between alternative future courses of action, because only the future can be altered.

Time Preference. Man, and all beings who live finite lives in time, possesses time preference: each man prefers to achieve a given end, value, satisfaction, or good, sooner rather than later. Other things being equal, we prefer to achieve a goal sooner rather than later. Therefore a particular good is more valuable to us now in the present than if we do not now possess it, but will surely possess it in the future, no matter how short the time during which we must wait to possess it. A present good is more valuable to each person than the same good in the future, because the future is not here yet, and the person does not now have the good. Having is better than wanting. (Dr. Barnett may disagree.) Therefore, each human being possesses a positive personal time-preference rate, or personal interest rate, and discounts the future good to a smaller present value. This is true for all goods and all events, and is not peculiar to money. All goods have "time value": they are more valuable the sooner we get them. This is a manifestation of human nature and the time-structure of Creation, not of the goal of this course is to cause you to think in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principal is violated. You will learn to compute present values of streams of future cash flows. You will learn to compute the values of shares of stock and bonds. You will learn how to compute the value of the firm as the sum of the values of all securities outstanding, including non-market loans from banks. You will learn to use the Gordon Constant Growth Model to estimate the value of the cost of equity. You will learn to compute the realized rate of return from owning a bond for less than its full lifetime. You will learn to construct a chart of EPS vs. EBIT and determine the superiority of the best proposal for financing.

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**Profession** (engineering, medicine, business administration, finance) vs. **science** (physics, chemistry, biology, economics):

*Science is the study of how the world is; a profession seeks to change the world in accordance with man's purpose.*

**Business school is a professional school.**

Finance is a “profession”: action designed to change the world in a good way based on scientific knowledge and good will. Beethoven 5 built on Bruckner 8 and 9 and Mahler 2 and 3.

A "professional" is a trustworthy, reliable, honest, knowledgeable, perceptive, erudite, sophisticated, articulate, and capable person hired to do a job.

The sciences of Human Action (economics, sociology, etc.) are highly complex, and **valuation is subjective**, so we cannot know fully in advance the outcomes of particular actions involving other people: business forecasting is imprecise.

**Entrepreneurship** is forecasting the future result of a chosen action in the present, chosen on the basis of the actor’s values and chosen as the most profitable course available. Valuation is subjective. **Cost is subjective** also. **Profits**, either past or forecasted future, are therefore **always estimates**. Profit is always expected at the start of any action. Risk is subjective. Perceptions are subjective.

**Personal Analysis for the future** ("I think" or "I estimate" instead of "it is") is done because we have incomplete scientific ability to analyze and forecast; hence, error is likely. Remember that historical financial statements may be incorrect also.

**Clear and Explicit Statement of Forecast Assumptions is always necessary.**

**Each forecasted number on a spreadsheet should have an explanation of how it was forecasted; e.g., "Sales growth at constant rate of 4.5% per year"; or "Inventory turnover forecasted at 4.8 X per year"; or "Total asset turnover forecasted at 3.7 X per year."** The reader of a spreadsheet should be able to duplicate all of the calculations and numbers without further assistance.

Finance proceeds via **Comprehensive and Systematic Analysis**: The "Spider-Web" analogy.

**Comprehensive analysis includes all relevant data and factors.**

Systematic analysis includes the **correct relationships** among factors.

Think of the structure of a spider web: the nodes of intersection of strands of web represent facts, and the strands connecting nodes represent equations describing the relationship between facts. Sequences of strands connect together nodes which are far away from each other. Intersecting strands connect nodes from far away in different directions.

**Complete Accuracy and Highest Precision is necessary in analysis.** Your work should be the best work possible, given the information provided. Your name on a report should indicate the highest quality possible, completely reliable in all respects.

**Absolute Truth** must be stated in all reports and statements so that the recipient of your personal analysis may know what is factual and what is estimated. You must cite the source of all factual statements to contrast them with the estimations and forecasts you have made. If something you say is not known to be factual, you must state that you have estimated it.

Always identify each and every cash flow with its particular **time point of occurrence** and always show the time-index subscript on each cash flow; for example: $RCPT_3$ or $LFCFE_2$ or $IVS_4$
Finance is an abstract science. You must be able to apply the appropriate principles to actual situations in the world of action. You must know both theory and practice. You must be able to work complicated problems because that is how life is. You must be able to put together into the proper sequence the relevant individual elements to move from the data given to the conclusion.

This is a course to make you a finance professional.

God has made us each free and self-responsible: absolutely so. Each of you individually is in charge of his own doors of perception. You choose what to believe and what you believe to be true. You have the freedom to be wrong about truth. Any learning that you do is done by you as an act of choice—deliberately and purposely. Your development is the result of your own actions. "Teaching" is not a meaningful concept. All I can do is hold up an idea for your examination and suggest developmental exercises; it is your task to learn and internalize that idea if you find it to be true and to perform the exercises to improve your capabilities.

"The market is a process of creation, discovery and adjustment."
"Entrepreneurship is the alert creation and pursuit of previously-unsuspected opportunities."
--Israel Kirzner

"The future is unknowable but not unimaginable. We live in a world of unexpected surprise."
--Ludwig Lachmann

"With wings I have won for myself, in fervent love I shall soar to the Light which no eye has seen....What has battered you, my Soul, will bear you to God."
--Gustav Mahler, Symphony No. 2 in c-minor, “Resurrection”

**BASICS OF VALUATION:**

**FINANCE PROCEEDS USING FINANCIAL CASH FLOWS**

**VALUATION IS THE CRUX OF FINANCE**

**SUCCESSFUL ENTREPRENEURSHIP CREATES VALUE**

Discounting future cash flows to present value: spot rates, forward rates, the Term Structure of Interest Rates, Inflation: nominal and real rates. CAPM for Cost of Equity Capital; 
kf* Weighted-Average Cost of Capital; Gordon Growth Model; Sustainable Growth Model; Computing the Net Present Value.

“http://online.wsj.com/mdc/public/page/2_3020-treasury.html”
or “http://screen.yahoo.com/bonds.html”.

A bond Yield to Maturity is neither a Spot Rate nor a Forward Rate, but is an Internal Average Rate of Return. A Spot Rate \(0s_n\) relates the present moment to one moment only at some time in the future which is \(n\) periods from now: \(PV_0 = CF_n / (1 + 0s_n)^n\). A Forward Rate \(n-1f_n\) relates one moment at the beginning of the \(n\)th period with one moment at the end of the period; if the forward rates cover one year each, a stream of \(n\) interest factors is required to discount a future cash flow \(n\) years in the future to today:

\[ PV_0 = CF_n / (1 + 0f_1)(1 + 1f_2)(1 + 2f_3)(1 + 3f_4)\ldots(1 + n-1f_n) \]

An Average Annual Discount Rate, \(k = 0k_n\) relates the present moment 0 to one moment \(n\) periods from now and is applied annually, so that it is raised to the \(n\)th power. This is the ordinary discounting that you have seen thus far.

\[ PV_0 = CF_n / (1 + k)^n \]

Note that \(k\) is NOT equal to \(0s_n\).

A risk-adjusted rate \(ke = risk-free rate R_f + risk adjustment R_{risk}\).
CAPM: \( ke = R_f + \beta (E[R_M] - R_f) + \text{NSRA} \)
\( ke = kd + k_{\text{risk}} \) also, where \( kd = R_f + k_{\text{bond risk}} \).
\( kf^* = \theta kd (1 - \tau) + (1 - \theta) ke \)

ke is used to discount dividends and LFCFE’s; \( kf^* \) is used to discount UFCF’s

“http://online.wsj.com/mdc/public/page/2_3020-treasury.html”
or “http://screen.yahoo.com/bonds.html”.

The market interactions of the personal time-preference rates of market participants lead to the emergence of a system of market interest rates. The mathematics of compounding and discounting are fundamental to all financial decisions. Computations of present values of streams of future cash flows are stressed.

Freedom in economic transactions is essential to the allocative efficiency of markets. It is the existence of the system of market interest rates within the structure of the private-property economy which allows the making of rational financial decisions within the firm and the allocation of goods within a society across time in accordance with the values of the people who compose the society. The relationship between risk and required return is explored, and the term structure of interest rates is investigated.

A bond Yield to Maturity is neither a Spot Rate nor a Forward Rate, but is an Internal Average Rate of Return. A Spot Rate \( 0s_n \) relates the present moment to one moment only at some time in the future which is \( n \) periods from now:
\[
PV_0 = CF_n / (1 + 0s_n)^n
\]

A Forward Rate \( n-1f_n \) relates one moment at the beginning of the \( n \text{th} \) period with one moment at the end of the period; if the forward rates cover one year each, a stream of \( n \) interest factors is required to discount a future cash flow \( n \) years in the future to today:
\[
PV_0 = CF_n / (1 + 0f_1) (1 + 1f_2) (1 + 2f_3) (1 + 3f_4) ... (1 + n-1f_n).
\]

An Average Annual Discount Rate, \( k = 0k_n \) relates the present moment \( 0 \) to one moment \( n \) periods from now and is applied annually, so that it is raised to the \( n \text{th} \) power. This is the ordinary discounting that you have seen thus far.
\[
PV_0 = CF_n / (1 + k)^n. \quad \text{Note that} \ k \ \text{is NOT equal to} \ 0s_n.
\]

A risk-adjusted rate \( ke = \text{risk-free rate} R_f + \text{risk adjustment} R_{\text{risk}} \).

CAPM: \( ke = R_f + \beta (E[R_M] - R_f) + \text{NSRA} \)
\( ke = kd + k_{\text{risk}} \) also, where \( kd = R_f + k_{\text{bond risk}} \).
\( kf^* = \theta kd (1 - \tau) + (1 - \theta) ke \)

ke is used to discount dividends and LFCFE’s; \( kf^* \) is used to discount UFCF’s
Goal of the Firm:

- to increase as much as possible the present wealth of the shareholders, \( PWE_0 \).

Maximize \( PWE_0 = NCDE_0 + VE_0 \).

\( NCDE_0 \) is the current cash flow received by the equity suppliers.

\( VE_0 \) is the present value of the future (i.e., beginning at \( t_1 \) one period into the future from now) cash flows (dividends plus stock repurchases) which the equity suppliers will receive, going all the way to the end of the world, \( t_\infty \).

The present wealth of the shareholders takes full account of the risk the shareholders perceive and bear in owning the equity of the firm.

\[
VE_0 = \sum_{t=1}^{\infty} \frac{d_t}{(1 + ke)^t}
\]

Achievement of the Goal of the Firm is accomplished by choosing the alternative course of action with the largest Net Present Value, \( NPV_0 \) for the entire lifetime of the firm, after subtracting the cash outlay necessary to purchase the course of action, \( IVS_0 < 0 \), and after discounting the forecasted future incremental net after-tax cash flows at the risk-adjusted cost of capital; \( T = \text{terminus value} \), the last explicitly-forecasted time point and the location of the Terminal Value \( TV_T \). The Terminal Value \( TV_T \) is the value at time \( T \) of all of the remaining cash flows beyond time \( T \) in the future for the remaining lifetime of the firm. Most commonly, \( TV_T \) is estimated using the Gordon constant-perpetual-growth model, \( TV_T = CF_{T+1} / (k - g_\infty) \). For individual assets, we generally stop computing cash flows for the individual asset at the asset’s lifetime \( T \).

The amount of the Net Present Value of a newly-embarked-on course of action is immediately added to the wealth of the shareholders: \( \Delta PWE_0 = NPV_0 \). Loosely speaking, we often say the same thing about the Value of Equity: \( \Delta VE_0 = NPV_0 \).

So choosing the course of action with the largest \( NPV_0 \) automatically increases the Present Wealth of the Equity Suppliers as much as is possible. This increment to the value of equity is made immediately upon the decision to pursue that course of action, before any physical action has been taken.

Cash Flows of Project Discounted to Compute the Net Present Value of the Project at \( t_0 \):

The after-tax marginal (additional with the project) differential (“with – without”) net cash flows, including opportunity costs, ignoring sunk costs, which we discount are the following:

1) \( \Delta CF_t^* \) = differential/incremental net after-tax operating cash flow to the firm at time \( t \); \n\[
\Delta CF_t^* = (\Delta S_t - \Delta C_t - \Delta D_t) (1 - \tau) + \Delta D_t
\]

In addition to the operating net cash inflows \( \Delta CF_t^* \), we must take account also of:

- requirements of new net working capital:

- \textbf{Net Working Capital} = NWC = \textbf{Current Assets minus Current Liabilities}:

- \( NWC = CA - CL \) (\( ANWC_t < 0 \));

- releases of net working capital at the end of a machine’s lifetime (\( \Delta NWC_t > 0 \));

- cash outlays to purchase the machinery initially (\( IVS_0 < 0 \));

- cash outlays to refurbish or clean it during its lifetime (\( IVS_t < 0 \));

- any other outlays required, such as cleaning the site (\( IVS_T < 0 \)); and

- selling the scrap (\( SV_T > 0 \)).
2) \( \text{LFCFE}_t \) = the leveraged free cash flow available to equity holders at time \( t \); the number of dollars the firm can afford to pay in dividends without adversely affecting the future growth of the firm.

\[
\begin{align*}
\text{LFCFE}_t &= \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \Delta \text{NWC}_t - \text{PP}_t + \text{NDC}_t + \text{NEC}_t + \text{NPS}_t - \text{Pfd Divs}_t \\
\end{align*}
\]

\( \text{LFCFE}_t \) = Leveraged Free Cash Flow to Equity

3) \( \text{UFCFF}_t \) = the unleveraged free cash flow available to all capital suppliers at time \( t \).

\[
\begin{align*}
\text{UFCFF}_t &= \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t \left( 1 - \tau \right) - \text{IVS}_t - \Delta \text{NWC}_t + \text{NDC}_t + \text{NEC}_t + \text{NPS}_t - \text{Pfd Divs}_t \\
\end{align*}
\]

\( \text{UFCFF}_t \) = Unleveraged Free Cash Flow to the Firm

The future cash flows to be discounted must first be forecasted under all the assumptions of the proposed course of action and after taxes. Often, the future cash flows cannot be forecasted until after the future financial statements have been forecasted under the relevant assumptions. The capital structure \( \Theta = \frac{\text{VD}_0}{\text{VF}_0} \) must first be specified. Generally, the future pro-forma income statements are

There are four types of decisions:

1) **Investment Decision**—selecting the best capital asset available to the firm:

\[
\text{NPV}_0(\text{Proposed Asset}) = \text{NPV}_0 \text{ of } \Delta \text{Cf}_1^* \text{ through } \Delta \text{Cf}_T^* \text{ discounted at } k_f^*, \text{ assuming } \Theta \text{ constant; } \Delta \text{Cf}_1^* \text{ = the after-tax incremental (or “differential”) net cash flow from operations (i.e., the cash flow of the firm with the new investment minus the cash flow of the firm without the investment), including any necessary outlays (IVS}_t < 0), and including any necessary new differential net working capital (\Delta \text{NWC}_t < 0), and including any end-of-lifetime cash inflows such as salvage value (SV}_T > 0), or outflows such as replenishment of work station (IVS}_T < 0);}

2) **Capital Structure Decision**—selecting the best portion of debt in the capital structure:

Issuing New Debt Capital and Finding the value of \( \Theta \) which raises \( \text{VE}_0 = \text{discounted LFCFE}_t \)’s at \( ke \) as much as possible;

3) **Capital Acquisition/Disbursement Decision**—New Equity Capital Issuance and Dividend Payment

Policy: how much \( \text{NEC}_0 \) to issue and \( \text{NCDE}_t \) for each time period for max \( \text{VE}_0 \) taking Account of \( \Delta ke \) as \( \Theta \) changes: \( \text{VE}_0 = \text{present value of LFCFE}_t \)’s discounted at \( ke \);

4) **Valuation of the entire Firm or its Equity portion: \( \text{VF}_0 \) or \( \text{VE}_0 \)**

\( \text{VF}_0 = \text{present value of UFCFF}_t \)’s and \( TV_T \) discounted at \( k_f^* \);

\( \text{VE}_0 = \text{present value of LFCFE}_t \)’s and \( TV_T \) discounted at \( ke \).

For each decision, the current \( t_0 \) cash flow \( \text{NCDE}_0 \) and the \( \Delta \text{VE}_0 \) must be determined by discounting the future cash flows available to equity suppliers \( \text{LFCFE}_t \)’s at the risk-adjusted cost of equity capital \( ke \), or by discounting the differential net after-tax operating cash flows \( \Delta \text{Cf}_t^* \) at the risk-adjusted weighted-average cost of capital \( k_f^* \), or by discounting the \( \text{UFCFF}_t \)’s at the risk-adjusted weighted-average cost of capital \( k_f^* \). \( \text{APWE}_0 = \text{NPV}_0 \).
forecasted first, followed by the pro-forma balance sheets, followed by the pro-forma cash flow statements.

The first step in forecasting the pro-forma income statements is to forecast the growth rate of sales in each future year up to the Terminus Year and then the perpetual growth rate beyond the Terminus Year. The next step in forecasting the pro-forma income statements is to forecast the expenses and their dependence on sales in each year; the most common expense forecasting methods are: 1) fixed + variable expense; 2) percentage of sales with zero fixed expense. Often, regression analysis is used to identify the fixed and variable components of an expense as it relates to sales in past years, and then used to forecast the expense as a function of forecasted sales for each future year. In any case, a specific assumed relationship between each expense and future sales must be stated explicitly, with the foundation provided explicitly. Interest expense, of course, must depend on the amount of debt outstanding on the balance sheet, so the balance sheet and income statement are interconnected through the debt balance and interest expense. The increase in retained earnings comes from the net income after tax minus dividends paid, so this is another income statement-balance sheet interaction.

The discount rate used to compute the Net Present Value is the risk-adjusted required rate on all the capital employed in the course of action, the rate pertaining to the beneficiaries of the cash flows to be earned and the risk they perceive or bear. If the capital employed is a combination of debt and equity, the weighted average cost of capital, $k_f^*$, is used as the discount rate; if the capital employed is only equity, the cost of equity capital, $k_e$, is used as the discount rate. If we are discounting the forecasted net after-tax differential (incremental) cash flows produced by a proposed asset acquisition, $\Delta CF_t^* = IVS_t + \Delta NWC_t + TV_T + (\Delta S_t - \Delta C_t - \Delta D_t) (1 - \tau) + \Delta D_t$, then we discount using $k_f^* = \Theta k_d (1 - \tau) + (1 - \Theta) k_e$. We generally assume that capital structure $\Theta$ will not change during the lifetime of this proposed asset. We have three alternative models to estimate the risk-adjusted cost of equity capital:

1) $k_e = k_d + \text{equity risk adjustment}$, from the “rule-of-thumb” model;

2) $k_e = \left[ \frac{d_1}{P_0} \right] + g_{\infty}$, from the Gordon model;

3) $k_e = R_f + \beta (E[R_M] - R_f) + \text{unique risk adjustment}$, from Capital Asset Pricing Model.

The larger the perceived risk borne by the capital supplier, the higher the discount rate he uses (and his agent the firm’s management must use) to discount forecasted future cash flows to present value. The larger the discount rate, the smaller the present value of the forecasted future cash flows.
SUSTAINABLE GROWTH

(See Higgins Chapter 4; recall duPont Equation: \( ROE = \frac{NI}{NW} = \left( \frac{S}{TA} \right) \left( \frac{NI}{S} \right) \left( \frac{TA}{NW} \right) = \frac{ROI}{1-\Theta}; \ ROE = \frac{NI}{TA} \); recall Financial Cash Flows \( TCC = IVS \))

The sustainable growth rate of sales, \( g^* \), is the rate of growth of sales (S)

\[
g^* = \Delta \% \ \text{Sales} = \left( \frac{S_2 - S_1}{S_1} \right)
\]

which the firm can sustain in the ordinary course of events:

\[
g^* = \text{sustainable growth rate of sales} \equiv P \ R \ A \ T^\wedge.
\]

\[
P = \text{profit margin on sales} = \frac{NI}{S}
\]

\[
R = \text{retention rate} = \text{cash retention of firm/net income} = \frac{CRF}{NI} = \frac{(NI - \text{Dividends})}{NI}
\]

\[
A = \text{total asset turnover} = \frac{S}{TA_{eoy}}
\]

\[
T^\wedge = \text{financial leverage increase this year} = \frac{TA_{eoy}}{NW_{bop}}
\]

(“eoy” = end of year; “bop” = beginning of this period; i.e., end of last year)

“sustain” means “achieve and support with internally-generated funds without selling new common stock and holding capital structure constant.” Capital Structure = \( VD/VF = TL/TA = \Theta \); also measured by \( TA/NW \).

The sustainable growth rate of sales is the growth rate in the value of equity; i.e., the rate of change in the value of equity per year; i.e., the return earned on equity divided by the beginning equity, achieved by operations and financing. The sustainable growth rate of sales is achieved by retaining cash from operations and investing that cash into new plant and equipment. The sustainable growth rate of sales achieved is equal to the cash retention of the firm from operations during the year as a portion of the beginning-of-period equity with which the firm began the year.

\[
g^* = \left( \frac{NI}{S} \right) \left( \frac{CRF}{NI} \right) \left( \frac{S}{TA_{eoy}} \right) \left( \frac{TA_{eoy}}{NW_{bop}} \right) = \frac{CRF}{NW_{bop}}
\]

If the firm adds more capital to its balance sheet than the CRF, then it will be able to purchase more new fixed assets, and it will be able to grow at a faster rate than the sustainable growth rate. The firm will get this additional capital either from New Debt Capital or New Equity Capital, so we can say that the firm can achieve a faster growth rate than its sustainable growth rate by selling new common stock or borrowing more new debt, so that \( IVS = TCC = CRF + NDC + NEC > CRF \). The firm could also add more capital by increasing the retention rate this year compared with last year’s retention rate. This increase in the quantity of productive new plant and equipment creates the faster growth rate in sales than the firm could have sustained using only internally-generated-at-the-same-prior-rate funds: \( g > g^* \). We see that the firm has achieved a greater-than-sustainable growth rate by absorbing cash.

If the firm adds less capital to its balance sheet than the CRF, then it must either get rid of some of the cash from operations not paid out as dividends (by paying a “special dividend” or by repurchasing stock from the market, or purchasing non-productive assets like the condo in Vail, CO or
the Rolls-Royce for the president). This payout of cash will allow the firm to purchase a smaller amount of new productive plant and equipment than it otherwise would have, and its growth rate actually achieved will be smaller than \( g^* \), the rate it is capable of sustaining: \( g < g^* \). We see that the firm has grown at a slower rate than it could have sustained by disgorging cash.

If the firm adds exactly the amount of the retained cash \( CRF \) to its balance sheet as new plant and equipment, it will grow at exactly the sustainable growth rate: \( g = g^* \).

Management has only three levers for controlling ROE: (1) the earnings squeezed out of each dollar of sales, the profit margin on sales \( P = \frac{NI}{S} \); (2) the sales generated from each dollar of assets employed, the total assets turnover, \( A = \frac{S}{TA} \); (3) the amount of equity used to finance the assets, the financial leverage across time \( T^\wedge = \frac{TA}{NW_{bop}} \). (4) To convert the return on equity to an increase in the amount of equity we need to know how much of the cash provided by operations is retained and reinvested, \( R \). The amount which the firm can add to new assets and equity each year is the amount of cash flow from operations retained and reinvested and not paid out as dividends: \( R = \) the retention rate = Earnings Retained / Net Income After Tax = \( R = \frac{NI - Dividends}{NI} = 1 - Dividend Payout Rate \). The sustainable growth rate of sales \( g^* \) is the only growth rate in sales that is consistent with stable values of these four ratios \( P, R, A, T^\wedge \). If sales increase at any other rate than \( g^* \), then at least one of these four ratios \( P, R, A, T^\wedge \) must change.

**Growth Faster than the Sustainable Rate**

\( g > g^* \): If the actual growth rate of sales \( g \) is greater than \( g^* \) this means that either: (1) the efficiency of operations must have improved (we see an increase in \( A = \frac{S}{TA} \) or an increase in \( P = \frac{NI}{S} \)), or (2) the quantity of assets used in operations has increased and financial policy has changed (we see an increase in \( R = \frac{NI - Div}{NI} \) or an increase in \( T^\wedge = \frac{TA}{NW_{bop}} \)). The company must either have: (1) increased operating efficiency or (2) absorbed more cash to purchase more assets. It is very difficult to increase operating efficiency, and we rarely see it in real firms. So most commonly, when we see \( g > g^* \) that rapid growth has been achieved by purchasing new assets, which required the absorption of new cash.

The company absorbs new cash from outside which it uses to purchase more capital assets which achieve the greater growth rate of sales, either from new borrowing (\( NDC = \) New Debt Capital) or newly sold common stock (\( NEC = \) New Equity Capital), or from retaining more cash from operations than it had previously (increasing \( CRF = \) Cash Retention of the Firm) which it does by reducing the payout ratio \( p \) as it increases the Retention Rate \( R = 1 - p \). Recall that \( NDC + NEC + CRF = TCC = IVS \).

If operations cannot become more efficient, then usually the company will absorb new cash by new borrowing, and we see \( NDC \) increase, and we usually see financial leverage \( \Phi \) increase as well. Firms that grow faster than their sustainable rate generally take in new cash through new borrowing. If they grow for many years at a rate faster than the sustainable rate, usually that means they have borrowed too much, and they fail when they can borrow no more. This is what Higgins means by “growing to disaster.”

To preclude failure, the firm must generate new equity by selling new common stock, or by retaining a larger portion of earnings each year. It might also have to increase selling prices, decrease production rates, or outsource some production activities. But it cannot continue to grow for many years at a rate exceeding its sustainable growth rate, without failing.
**Growth Slower than the Sustainable Rate**

If the actual growth rate of the firm $g$ is smaller than its sustainable growth rate $g^*$, the rate it could sustain if it wished, that must be because either: (1) a reduction has occurred in the operating efficiency of the firm’s assets (we see a reduction in $A = S/TA$ or a reduction of $P = NI/S$), or (2) a reduction in the quantity of assets used in production, compared with the normal increase in new fixed assets, has occurred, or an opposite change in financial policy has occurred (we see a decrease in the retention rate $R=(NI-D_{iv})/NI$ with a concomitant increase in the payout ratio $p$, or a decrease in the capital structure $\Theta = TL/TA$ and financial leverage $T^* = TA/N_{W_{bop}}$). The growth rate is smaller than the sustainable rate because the firm has purchased new plant and equipment in a quantity smaller than is necessary to achieve its sustainable growth rate: $IVS < CRF$. If the firm has reduced its purchases of new plant and equipment, it has unused cash available which it can pay out or disgorge. Generally, $g < g^*$ means that the firm disgorges excess cash which is available to repay outstanding debt, so financial leverage $\Theta$ can be reduced. A company growing at a rate smaller than its sustainable rate is often called a “cash cow” because it produces excess cash which an acquiring company can use for whatever it wishes.
The **ordinary course of events** is the following; notice the definitions of **P**, **R**, **A**, **T^**: 

1. **The firm's operating efficiency stays constant from year to year.**
   Return on Investment or Assets = ROA = NI/TA = (S/TA) X (NI/S) = constant
   \( \Lambda \) = Total asset turnover = \( S/TA \) = constant
   **P** = Profit margin on sales = return on sales = ROS = NI/Sales = constant.
   The constancy of operating efficiency means that the only way to make sales grow is to purchase more assets, because the firm cannot operate its existing assets so as to increase production.

2. **The firm's capital structure remains constant from year to year.**
   \( \theta \) = VD/VF = VD / (VD + VE) = constant
   \( T^\wedge \) = assets to equity leverage ratio = Assets/Equity = TA/NW_{bop} = constant
   We measure leverage using the end-of-period total assets divided by the **beginning-of-period** net worth.

   As a result of 1) and 2), the firm's return on equity remains constant:
   ROE = NI/NW = (NI/TA) X (TA/NW) = constant

3. **The firm does not sell any new equity capital.**
   NEC = 0

4. **The firm holds its "dividend policy" constant and its retention rate constant.**
   **R** = retention rate, the portion of income retained and reinvested = (NI – Div)/NI.
   The payout fraction, or payout ratio \( \rho \) = Dividends/NIAT = constant.
   This means that the firm holds its retention rate \( R = b = (NIAT – Dividends) / NIAT \) constant also, because \( b + p = R + p = 1.0 \).

5. **To counteract the effect of increases in owners' equity resulting from the acceptance of positive-NPV projects, which would otherwise tend to reduce \( \theta \), and the constancy of the retention rate, which also tends to reduce \( \theta \), the firm borrows new debt capital only in the quantity necessary to hold \( \theta \) constant.**

   \[ g^* = P \ R \ A \ T^\wedge = (NI/S) \ X [(NI – Div)/NI] \ X (S/TA) \ X (TA/NW_{bop}) \]

   By "sustain" we mean "support with funds likely to be generated in the normal course of business without selling new common stock". These funds consist of both the new debt capital borrowed plus the new equity capital generated from operations this year by positive-NPV projects, which is retained and reinvested. These funds will be used to purchase new assets to produce new units of product which will be sold, thereby creating the growth. That is, because we assume the operating efficiency to remain constant (i.e., NI/TA = (S/TA) X (NI/S) = constant), new sales require new assets, and we must finance the assets (that is, pay for them) using new debt and new equity constrained in amount by the constancy of the capital structure ratio \( \theta \) and the constant dividend payout ratio \( \rho \) and constant retention rate \( b \), and by the stipulation that the company will not sell new common stock; i.e., NEC = 0.
\( \text{ROE} = \frac{\text{Net Income}}{\text{Shareholders' Equity}} = \frac{\text{PAT}}{\text{ROA}/(1 - \Theta)} \)

Return on Equity = Profit Margin X Asset Turnover X Financial Leverage

\( \text{ROE} = \frac{\text{NI}}{\text{Equity}} = \frac{\text{NI/Sales}}{\text{Assets/Equity}} \)

\( \text{ROA} = \text{ROI} = \frac{\text{Return on Investment}}{\text{Return on Assets}} = \frac{\text{NIAT}}{\text{Total Assets}} \)

\( P = \text{Profit Margin} = \frac{\text{Net Income}}{\text{Sales}} \)

\( A = \text{Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}} \)

\( T^\wedge = \text{Financial Leverage} = \frac{\text{Total Assets}}{\text{Equity}_{bop}} ; \text{that is, we use the beginning-of-period equity} \)

Management has only three levers for controlling ROE: (1) the earnings squeezed out of each dollar of sales, the profit margin on sales \( P = \frac{\text{NI}}{\text{Sales}} \); (2) the sales generated from each dollar of assets employed, the total asset turnover \( A = \frac{S}{TA} \); (3) the amount of equity used to finance the assets, the financial leverage \( T^\wedge = \frac{\text{TA}}{\text{NW}_{bop}} \). Management can affect the growth rate of sales and the growth rate of the return on equity by changing the retention rate \( R = \frac{\text{NI} - \text{Div}}{\text{NI}} \), the portion of income retained and reinvested (Gordon's \( b = 1 - p \)). The larger the retention rate, the faster growth will be because the greater will be the value of assets acquired to produce more product.

\( R = \text{Retention Rate} = \frac{\text{Earnings Retained}}{\text{Net Income After Tax}} = \frac{(\text{NIAT} - \text{Dividends})}{\text{NIAT}} \)

\( R = b \) of the Gordon Model = \( 1 - d \)

\( d = \text{payout ratio} = \frac{\text{Dividends}}{\text{NIAT}} \)

\( d = \text{Dividend Payout Rate} = \frac{\text{Dividends}}{\text{NIAT}} = p = 1 - b \) of the Gordon Model, and \( p = 1 - R \).

In the Gordon Model, we also had \( r = \text{average rate of return on new investment} \), the weighted average of the Internal Rates of Return of all investment projects accepted. Recall that in the Gordon model, the constant perpetual growth rate \( g^\infty = b r \), the retention rate multiplied by the rate of return on new investment.

Investment \( I_t \) at time \( t \) produces a perpetual stream of new income \( \Delta E_{t+1} \) beginning at \( t+1 \) and continuing forever. This new income \( \Delta E_{t+1} \) at \( t+1 \) is added to the previous year's income to get the new income: \( E_{t+1} = E_t + \Delta E_{t+1} \). The amount of new income at \( t+1 \), \( E_{t+1} \), is equal to the product of the average rate of return on new investment, \( r \), multiplied by the amount of investment at time \( t \), \( I_t \): \( \Delta E_{t+1} = r I_t \).

\( g^* \) is the only growth rate in sales that is consistent with stable values of these four ratios, \( P, R, A, \) and \( T \). If sales increase at any other rate, then at least one of these four ratios must change.

To achieve \textit{growth in sales \( g \) faster than \( g^* \) (\( g > g^* \))}, the company must do at least one of the following:

1. increase its operating efficiency, either by improving the asset turnover \( A \) and generating more sales, or improving its control of expenses and increasing the portion of sales earned as income \( P \) and retaining this cash for investment;
2. increase its financial leverage by borrowing \( \text{NDC} \) at a faster rate and raising \( T \);
3. retain more cash from operations by increasing the retention rate \( R \) and reducing the payout ratio \( p \);
4. sell new equity capital \( \text{NEC} > 0 \).

\( g > g^* \) means that the company absorbs new cash from outside.
To achieve $g > g^*$ means that either operations must improve, or financial policy must change. The company generally must absorb new cash from outside to purchase the new assets required to increase sales. If operations cannot become more efficient, then financial leverage must increase or the firm must sell stock; firms that grow too fast must generally take in new cash through borrowing. Eventually, they can borrow no more, and they fail. To preclude failure, the firm must generate new equity by selling new common stock, or by retaining a larger portion of earnings each year. It might have to increase prices, decrease production rates, or outsource some production activities. But the firm cannot continue to grow for many years at a rate exceeding its sustainable growth rate, without failing.

To have growth in sales slower than $g^*$, the company must have at least one of the following conditions:

1. reduce its operating efficiency, either by reducing the asset turnover $A$ and generating fewer sales, or losing its control of expenses and reducing the portion of sales earned as income $P$, often by increasing salary payments or by purchasing non-operating assets such as skiing condominiums to be used by managers;
2. reduce its financial leverage by borrowing NDC at a slower rate and lowering $T$, or by paying off existing debt ahead of time and thereby reducing $T$ and $\theta$;
3. retain less cash from operations by reducing the retention rate $R$ and increasing the payout ratio $p$;
4. repurchase stock from the market: NEC < 0.

$g < g^*$ means that the firm disgorges cash: it generates excess cash which can be paid out as larger salaries, purchase of fun assets, repayments of debt, repurchases of stock, or larger dividends.
THE GORDON MODEL OF CONSTANT, PERPETUAL GROWTH AT THE RATE \( g_{\infty} \)
BEGINNING AT \( t_0 \) FOR ALL-EQUITY, UNLEVERED FIRMS AND GOING ON FOREVER:

\[ P_0 = \frac{d_1}{(k_e - g_{\infty})} = \frac{d_0(1+g_{\infty})}{(k_e - g_{\infty})} \]

\[ k_e = \frac{d_1}{P_0} + g_{\infty} \]

The dividends \( d_t \) begin at \( t_0 \) to grow at the constant rate \( g_{\infty} \) and they grow at that constant rate forever; hence the model is often called the "constant perpetual growth model." The dividend \( d_1 \) at \( t_1 \) is the first dividend determined by the constant perpetual growth rate \( g_{\infty} \).

If the dividends begin to grow at their constant perpetual growth rate at a different moment than \( t_0 \), then the model is different.

\( P_0 \) = the present value of the future dividends = the price now
\( d_0 \) = the current dividend payable this year
\( d_1 \) = the dividend payable one year from today
\( g_{\infty} \) = the constant perpetual growth rate of dividends and of all income items
\( b \) = retention rate, the portion of income retained and reinvested = CRF/NIAT
Cash Retention of Firm = CRF = NIAT - Dividends;
\( r \) = the average rate on new investment earned by the invested capital = \( \Delta \text{NIAT}_{t+1}/\text{IVS}_t \).
\( P_0 \) = the price now = \( V_0 = \frac{d_1}{(k_e - g_{\infty})} \)
\( V_T \) = general expression for present value of stock = \( d_{T+1}/(k_e - g_{\infty}) \)
\( k_e \) = cost of equity capital = \( \frac{d_1}{P_0} + g_{\infty} \)
\( g_{\infty} \) = br for all-equity firm
GORDON GROWTH MODEL:

CONSTANT PERPETUAL GROWTH OF CASH FLOWS AT \( g \), BEGINS AT T

\[ V_T = \sum_{t=1}^{\infty} \left[ \frac{CF_t}{(1 + k)^t} \right] = \frac{CF_{T+1}}{k - g} \]

All assets are valued by discounting back to the present (time “0”) the infinite future stream of cash benefits at each future year “t” the asset will provide to its owner from next year (the “ex-dividend assumption” of Finance) to the end of its existence. If the cash flows we discount are dividends per share \( (d_t) \) at each future year “t” the asset will provide to its owner from next year (the “ex-dividend assumption” of Finance) to the end of the firm, discounted at \( k \) back to T from wherever they occur in the future out to infinity:

\[ V_T = \sum_{t=1}^{\infty} \left[ \frac{CF_t}{(1 + k)^t} \right] = \frac{CF_{T+1}}{k - g} \]

It is inconvenient to evaluate an infinite series of future discounted cash flows. So we search for an approximate method which is more convenient; we transform the infinite series of terms into a finite “closed form” if we can. One type of infinite series which we can correctly convert into a closed form is a series in which each subsequent term is smaller than the preceding term. If the subsequent term is enough smaller than the preceding term, then the infinite series, even though it is infinite, will converge to a finite sum and will have a closed form. The series consists of discounted future cash flows, in which each cash flow is discounted at the discount rate \( k \) from the time point where it occurs back to the present, by dividing the cash flow by the discount factor \( (1 + k)^t \), where \( t \) is the number of years in the future when the cash flow occurs. If each year, the cash flow in the numerator of the term grows \( g \), larger than the previous year’s cash flow, and if \( k > g \), then the series will converge to a finite sum and we can find the closed form which is equivalent to the infinite series. Each year’s cash flow \( CF_t = CF_{t+1} \times (1 + g) \).

The closed form solution, the Gordon Model, is:

\[ V_T = \frac{CF_1}{k - g} \]

or in general, \( V_T = CF_{T+1} \times \frac{1}{k - g} \)

Time Points:
-1  0   1   2   3   ...  
Time Points:
1    2  3   4   5   ...  
Time Points:
T-1  T  T+1 T+2 T+3 ...  
Cash Flows:
\( CF_{T-1} \)  \( CF_T \)  \( CF_{T+1} \)  \( CF_{T+2} \)  \( CF_{T+3} \)  ...  
Cash Flows:
\( CF_{T-1} \)  \( CF_T \)  \( CF_T \times (1+g) \)  \( CF_{T+1} \times (1+g)^2 \)  \( CF_{T+2} \times (1+g)^3 \)  ...  
Cash Flows:
\( CF_{T-1} \)  \( CF_T \)  \( CF_T \times (1+g) \)  \( CF_T \times (1+g)^2 \)  \( CF_T \times (1+g)^3 \)  ...  
Cash Flows:
\( CF_0 \)  \( CF_0 \times (1+g) \)  \( CF_0 \times (1+g)^2 \)  \( CF_0 \times (1+g)^3 \)  ...  

Values:
\( V_T = \frac{CF_T}{(k-g)} \)

Values:
\( V_0 = \frac{CF_0}{(k-g)} = \frac{CF_0 \times (1+g)}{(k-g)} \)

Values:
\( V_2 = \frac{CF_2}{(k-g)} \)

Notice that \( CF_T \) is not determined by the constant growth rate \( g \); rather, \( CF_T \) is determined by some other process and generally, the growth rate between \( CF_T \) and \( CF_{T+1} \) is larger than \( g \). Notice that \( CF_{T+1} \) is the first cash flow determined by the constant growth rate \( g \), which began at \( T \). Notice that all subsequent cash flows following \( CF_T \) are determined by the constant growth rate \( g \). Notice the one-period gap between the time of valuation \( T \) and the \( T+1 \) identity of the cash flow in the numerator of the Gordon Equation.

The Gordon Growth Model is a very-widely-used model in estimating the value of common stock and in estimating the value of a business firm at time \( T \) when the cash flows grow forever beginning at time \( T \) at a constant rate \( g \). But the cash flow at time \( T \), \( CF_T \), the last cash flow not determined by the constant-growth process, is determined by some other, larger growth rate than \( g \), or by some explicit forecasting process. Time \( T \) is the “terminus” of the period of explicit forecast, the last time point for which an income statement or dividend is explicitly forecast. In the context of valuing a business firm, the Gordon Model is the most-commonly used model for the Terminal Value at time \( T \), the value the firm will have at time \( T \), the end of the period of explicit forecast. The Gordon Model estimates the value of the cash flow stream at
time $T$, the beginning of the infinitely-long period of constant growth, and it uses the amount of the cash flow one period later at $T+1$, the first cash flow determined by the constant-growth process, which is $\text{CF}_{T+1} = \text{CF}_T (1 + g_{\infty})$.

\[ V_T = \text{CF}_{T+1} / (k - g_{\infty}) \]

Because the Gordon Model assumes that the lifetime of the firm is infinite, and that the constant growth goes on forever, the Gordon model tends to overestimate the true value of the firm at any time point. The Gordon model is the closed-form solution to the convergence of the infinite series of discounted future cash flows. “Convergence” means that the infinite series of terms has a finite sum. During the entire infinitely-long process, the growth rate $g_{\infty}$ does not change, so each cash flow at time $t$ is the product of the first cash flow $\text{CF}_T$ which is itself not determined by the constant growth process, multiplied by the factor $(1 + g_{\infty})^n$, where $n$ is the number of periods between the cash flow’s time point and the initial time point $T$; that is, $n = t - T$.

The model is the same, whether we are valuing a share of stock paying a constantly-growing dividend per share, or valuing a firm generating a constantly-growing overall cash flow. We merely use the discount rate corresponding to the identity of the cash flow being valued, and we use the cash flow one period futureward from the moment we value.

If we are discounting dividends per share to get the current share price $P_0$, we use $ke$:

\[ P_0 = d_1 / (1 + ke) \]

If we are discounting Leveraged Free Cash Flows to Equity to get the current Value of Equity, $VE_0$, we also use $ke$:

\[ VE_0 = \text{LFCFE}_1 / (ke - g_{\infty}) \]

If we are discounting Unleveraged Free Cash Flows to the Firm to get the current Value of the Firm $VF_0$, we use $kf^* = \Theta kd^* + (1 - \Theta) ke$:

\[ VF_0 = \text{UFCFF}_1 / (kf^* - g_{\infty}) \]

The Gordon Model is useful in any context in which we believe the cash flows following the valuation moment will grow forever at a constant rate.

1. For example, suppose we are valuing a share of stock, and we believe that five years from now the dividends will begin to grow at a constant perpetual rate $g_{\infty}$, but between now and then they will grow at variable rates which are larger than $g_{\infty}$; then:

\[ P_0 = d_1/(1+ke)^1 + d_2/(1+ke)^2 + d_3/(1+ke)^3 + d_4/(1+ke)^4 + d_5/(1+ke)^5 + P_5/(1+ke)^5 \]

where $P_5$ is the price of the stock at time 5, and that depends on all of the subsequent dividends beyond time 5 beginning at time 6 and going on to infinity.

We note that the Gordon Model gives $P_5 = d_6/(ke - g_{\infty}) = d_5 (1 + g_{\infty}) / (ke - g_{\infty})$, so we get

\[ P_0 = d_1/(1+ke)^1 + d_2/(1+ke)^2 + d_3/(1+ke)^3 + d_4/(1+ke)^4 + d_5/(1+ke)^5 + \left[ d_5 (1 + g_{\infty}) / (ke - g_{\infty}) \right] / (1+ke)^5 \]

2. For example, suppose we are valuing an entire business firm now using the value of its equity $VE_0$, and we believe that five years from now, the LFCFE’s will begin growing at a constant rate $g_{\infty}$ forever, but that prior to then, the growth rates will be larger than $g_{\infty}$ and variable from year to year; then:

\[ VE_0 = \text{LFCFE}_1/(1+ke)^1 + \text{LFCFE}_2/(1+ke)^2 + \text{LFCFE}_3/(1+ke)^3 + \text{LFCFE}_4/(1+ke)^4 + \text{LFCFE}_5/(1+ke)^5 + VE_5/(1+ke)^5 \]
We note that the Gordon Model gives \( \text{VE}_5 = \frac{\text{LFCFE}_5}{(\text{ke} - g_x)} = \frac{\text{LFCFE}_5 (1+g_x)}{(\text{ke} - g_x)} \), so we get

\[
\text{VE}_0 = \frac{\text{LFCFE}_1}{(1+\text{ke})} + \frac{\text{LFCFE}_2}{(1+\text{ke})^2} + \frac{\text{LFCFE}_3}{(1+\text{ke})^3} + \frac{\text{LFCFE}_4}{(1+\text{ke})^4} + \\
\frac{\text{LFCFE}_5}{(1+\text{ke})^5} + \left[ \frac{\text{LFCFE}_5 (1+g_x)}{(\text{ke} - g_x)} \right]/(1+\text{ke})^5
\]

Note that the constant perpetual growth rate \( g_x \), which appears in the denominator of the Gordon Model as a subtraction from the cost of capital \( \text{ke} \), and which begins only at time T where the Gordon Model is applied, is DIFFERENT FROM the prior growth rate of cash flows between T-1 and T, and also different from the other growth rates prior to time T. In real life, the constant perpetual growth rate \( g_x \) cannot be larger than 8.0% in my opinion, because if it were, the company would in thirty-five years be larger than any other company in the world, and most national economies as well because of “the magic of compound growth”. If you use in the Gordon Model a higher growth rate than the actual constant perpetual growth rate which begins only when the firm reaches maturity, you will calculate an unrealistic and impossibly-large Terminal Value and your calculations will be extremely wrong.

**INNER WORKINGS OF THE GORDON MODEL: \( g_x = br \)**

We use small letters, such as “d” or “e” to represent –per share amounts, and we use capital letters, such as “D” or “E” to represent amounts for the entire firm, with \( D = Nd \) and \( E = Ne \), where \( N \) is the number of common shares outstanding. \( E = \text{NIAT} \), and \( D = \text{DIV} = \text{LFCFE} \). We term the amount of earnings not paid out as dividends the “cash retention of the firm”, or “crf” on a –per share basis, and “CRF” on a total firm basis. \( \text{crf}_t = e_t - d_t; \text{CRF}_t = \text{NIAT}_t - \text{DIV}_t \). The firm must either pay out or retain and reinvest all earnings: \( e_t = d_t + \text{crf}_t \); and \( \text{NIAT}_t = \text{CRF}_t + \text{DIV}_t \).

Whether we are valuing a single share of stock or the entire equity of the firm, the cash flow discounted in the Gordon Model is a dividend \( d_t \), or the amount of dividends paid by the firm \( \text{DIV}_t = Nd_t \) (where \( N \) is the number of shares outstanding), or the amount of dividends the firm could pay if it wished, \( \text{LFCFE}_t \). In the Gordon Model, \( \text{LFCFE}_t = \text{DIV}_t = Nd_t = N(e - \text{crf}) \).

Because the Gordon Model deals with the time when the firm is mature; i.e., following its rapid growth phase or its variable-rate growth phase and has now settled down to a stable growth rate, the market into which the firm sells during its maturity is also stable, and the market share the firm holds is constant. There are no more technological innovations to production during the stable lifetime, and the firm has learned all there is to know about the operation of its capital assets, so no further progress is made in generating sales with assets (S/TA) or in generating income from sales (NI/S), and we see that the operating efficiency of the firm is constant during its mature lifetime. Because the capital structure of the firm is also constant during its maturity, we can neglect further changes in the capital structure and consider the firm an “all equity” firm. The Gordon Model strictly can deal only with all-equity firms.

With all this stability during the phase described by the Gordon Model, we have a constant structure of the income statement. First, we assume that the dividends paid are a constant fraction of the income earned by the firm, or the “earnings.” This fraction is called \( p \), the “payout ratio,” the fraction of \( \text{NIAT} \) paid out in dividends, and it is the same whether we consider all dividends \( \text{DIV} = N \text{d} \) and all income \( \text{NIAT} = N \text{e} \), or the dividend per share \( d \) and the earnings per share \( e \), where \( N \) is the number of common shares outstanding.

\[ p = \text{payout ratio} = \frac{\text{DIV}}{\text{NIAT}} = \frac{d}{e}, \text{a constant across time}; \quad p = 1 - b; \quad b = 1 - p \]

Because we are in stable operating mode and we are neglecting debt, all income not paid out as dividends is retained and reinvested by the firm. \( \text{NIAT}_t - \text{DIV}_t = \text{CRF}_t \). The portion of income retained and reinvested is called \( b \) in the Gordon Model, the “retention rate” or the “plowback rate,” the same as the factor “R” in the Sustainable Growth Model.

\[ b = \frac{\text{CRF}}{\text{NIAT}} = \frac{\text{crf}}{e} = (1 - p) = (e - d)/e = \frac{(\text{NIAT} - \text{DIV})}{\text{NIAT}}, \text{a constant across time} \]

So \( p + b = 1.0 \). Also, \( p = 1 - b; \quad b = 1 - p \)

Since \( \text{TCC} = \text{IVS}, \text{IVS} = \text{CRF} \) and \( \text{ivs} = \text{crf} \), on either the total-firm or the “per share” basis.

Remember, the basic assumption of the Gordon Model is that dividends, either –per share or total, grow forever at the rate \( g_x \). But now we see that dividends are a constant fraction \( p \) of earnings, so we see that earnings must also grow forever at the constant rate \( g_x \). And the other constant portion of earnings, retained cash that is reinvested \( \text{crf}_t = e_t - d_t \), or
CRF = NIAT - DIV, must also grow at the constant rate \(g_\infty\). And since investments is the cash retained by the firm, \(ivs_t = crf_t\), and IVS = CRF, we see that the amount invested by the firm \(ivs_t\) grows also at the constant rate \(g_\infty\).

Now we ask: How does the firm cause its income and dividends to grow at the rate \(g_\infty\)? We are not issuing any new debt (NDC = 0), and we are not selling any new equity (NEC = 0), so the total cash available for investment is \(crf\) the cash retained from operations, and \(ivs = crf = e - d\). The growth in earnings, and the consequent growth in dividends, must come about from the return earned by the investments. Let us call this rate of return earned on the investments \(r\).

\[
r = \frac{\Delta e_t}{ivs_t}
\]

So, the additional income earned in each year \(t\) compared with the income earned in the prior year \(t-1\), is the return provided in year \(t\) by the investment outlays in the prior year, and the investment is a portion of income \(ivs = b e\):

\[
\Delta e_t = e_t - e_{t-1} = r (ivs_{t-1}) = r be_{t-1}
\]

and

\[
e_t = e_{t-1} (1 + r) = e_{t-1} + \Delta e_t = e_{t-1} + r be_{t-1}
\]

So \(g = br\)

The growth of earnings and dividends comes about because of the portion of income retained and reinvested to earn the rate of return \(r\). The larger the portion of income retained and reinvested, the larger is the rate of growth of dividends. The higher the rate of return earned by the investments, the faster the growth of the company.

Because \(r\) = the average rate of return earned by the entire set of investments, we see that some investments earn much higher rates of return than \(r\), and some investments earn smaller rates of return than \(r\). But remember the first rule of finance: seek to increase the wealth of the shareholders by investing to earn a rate of return no smaller than the rate of return required by the investors. This means that the least profitable investment project we invest in has a rate of return equal to \(ke\), the cost of capital required by the investors, the rate of return the investors require because of the risk they perceive in owning our stock. (If the firm has debt, then the minimum acceptable rate of return is \(kf^* = \Theta kd^* + (1 - \Theta) ke\), the weighted average cost of capital.) So \(r > ke\). It is the profitable investment of \(crf = ivs\) into projects all having \(IRR > ke\) (and remember if the \(IRR > k\), then \(NPV > 0\)) which causes the firm to grow. So the Gordon model is completely consistent (as far as we can see now) with correct Financial theory: profitable investments create more income next year than we had last year, and this larger income allows the payment of larger dividends year after year because each year we invest into a new set of profitable projects.
THE GORDON MODEL FOR LEVERED FIRMS USING DEBT-CAPITAL FINANCING

\( M = \text{the ratio of the market value of retained earnings to the dollar size or book value of retained earnings. If all investments have positive Net Present Values, then } M > 1.0. \)

If we relax the assumption that the firm is all-equity financed by allowing the firm to adopt a constant debt/equity ratio, \((VD/VE)\), it can be shown that, if \( M = 1.0 \):

\[
g = r b + b [ r - kd (1 - t c)] (VD/VE) .
\]

Using debt financing can (but will not always) increase the growth rate, when the rate of return on the assets purchased exceeds the interest rate paid on the debt. This situation is called “favorable financial leverage”. When financial leverage is favorable, use of debt will raise the return on equity above the return on assets. Financial leverage always increases the risk borne by the equity holders.

If some financial leverage is employed, then \( VD > 0, \) and \((VD/VE) > 0,\) and if \( M > 1.0, \) then

\[
g = \Delta E/E = r b + [ r - kd (1-t_c)] M b (VD/VE).
\]

The above is the general case.

This general case dissolves to the all-equity Gordon model if \( VD = 0 \) because then the second term vanishes and

\[ g = r b = b r . \]

If the least-profitable accepted project has \( IRR = kf^* \), then the average rate of return on new investment, \( r > kf^* \), and \( M > 1.0. \)

If \( M = 1.0 \), which is what occurs when the average rate of return on new investment \( r \) equals the cost of capital, meaning that some projects are accepted whose rate of return is less than \( kf^* \), then

\[ g = r b + b [ r - kd (1-t_c)] (VD/VE), \]  only when \( M=1.0 \)


Not only does Gordon over-estimate equity value because of its assumption of constant perpetual growth, because of its assumption of continuous improvement in the profitability of available investment projects year after year, but also because it assumes that larger firms will have more such superior investment opportunities because they are larger, so it is profitable to become large immediately by purchasing investment projects with negative Net Present Values which will add to firm size, even though each reduces its value: but the larger firm size creates more highly-profitable investment opportunities which would not be available if the firm were not so large, and these new high-profit opportunities overcome the loss due to the previously-accepted negative-NPV projects. The Gordon model values size for its own sake, and it recommends investment into projects with IRR’s down to the earnings-price ratio (E/V), which is smaller than the cost of capital ke. These projects with \( IRR < ke \) have NPV < 0, so these projects each lose value; but they make the firm larger, and the larger firm will have access next year to very-high-yielding new investment projects, which it would not have had available if it had not purchased these low-yielding projects this year. It is possible that the Gordon model causes up to a 30% over-valuation of the equity of the firm. You should multiply the value of the Gordon model by a factor such as 0.90 or even smaller to adjust for this over-valuation. This is especially true if you are using the Gordon model to estimate the Terminal Value \( T \) in a business valuation exercise.

To value stock: \( Pt = d_{t+1} / (ke - g_\infty) \)

To value equity: \( VE_0 = N_{shs} d_1 / (ke - g_\infty) ; \)  \( TV_T = CF_{T+1} / (k - g_\infty) \)

To estimate the cost of equity capital: \( ke = [ d_1 / P_0 ] + g_\infty \)
THE GORDON MODEL OF CONSTANT, PERPETUAL GROWTH AT THE RATE $g_\infty$ 
BEGINNING AT $t_0$ FOR ALL-EQUITY, UNLEVERED FIRMS:

\[
P_0 = \frac{d_1}{(ke - g_\infty)} = \frac{d_0(1+g_\infty)}{(ke - g_\infty)}
\]

\[
ke = \frac{(d_1 / P_0) + g_\infty}{(d_1 / P_0 + g_\infty)}
\]

The dividends $d_i$ begin at $t_0$ to grow at the constant rate $g_\infty$ and they grow at that constant rate forever; hence the model is often called the "constant perpetual growth model." The dividend $d_1$ at $t_1$ is the first dividend determined by the constant perpetual growth rate $g_\infty$.

If the dividends begin to grow at their constant perpetual growth rate at a different moment than $t_0$, then the model is different.

$P_0$ = the present value of the future dividends = the price now
$d_0$ = the current dividend payable this year
$d_1$ = the dividend payable after one year from today
$g_\infty$ = the constant perpetual growth rate of dividends and of all income items
$b$ = retention rate, the portion of income retained and reinvested = NIAT - Dividends;
$r$ = the average rate on new investment earned by the invested capital = $\Delta$NIAT/IVSt.

$V_T$ = general expression for present value of stock = $d_{T+1} / (ke - g_\infty)$
$ke$ = cost of equity capital = $(d_1 / P_0) + g_\infty$
$g_\infty = br$ for all-equity firm

THE GORDON MODEL FOR LEVERED FIRMS USING DEBT-CAPITAL FINANCING

$M$ = the ratio of the market value of retained earnings to the dollar size or book value of retained earnings. If all investments have positive Net Present Values, then $M > 1.0$.

If we relax the assumption that the firm is all-equity financed by allowing the firm to adopt a constant debt/equity ratio, $(VD/VE)$, it can be shown that, if $M = 1.0$:

\[
g = rb + b[ r - kd (1-t_c)] (VD/VE).
\]

Using debt financing can (but will not always) increase the growth rate, when the rate of return on the assets purchased exceeds the interest rate paid on the debt. This situation is called “favorable financial leverage”. When financial leverage is favorable, use of debt will raise the return on equity above the return on assets. Financial leverage always increases the risk borne by the equity holders.

If some financial leverage is employed, then $VD > 0$, and $(VD/VE) > 0$, and if $M > 1.0$, then

\[
g = \frac{\Delta E}{E} = r b + [r - kd (1-t_c)] M b (VD/VE).
\]

The above is the general case.

This general case dissolves to the all-equity Gordon model if $VD = 0$ because then the second term vanishes and

\[
g = rb = br.
\]

If the least-profitable accepted project has $\text{IRR} = kf*$, then the average rate of return on new investment, $r > kf*$, and $M > 1.0$.

If $M = 1.0$, which is what occurs when the average rate of return on new investment $r$ equals the cost of capital, meaning that some projects are accepted whose rate of return is less than $kf*$, then

\[
g = r
\]

$\ b + b [ r - kd (1-t_c)] (VD/VE), \text{ only when } M=1.0$
**Definitions of terms.** The time-subscript \( t \) indicates the moment in time at which a value is computed. The subscript \( 0 \) indicates the value at the present moment. Values are computed one period before the first cash flow under consideration.

- \( VD_t \) = the market value of debt at time \( t \), taking account of the current market interest rate,
- \( VE_t \) = the market value of equity at time \( t \) = Number of shares \( \times \) Price per share at time \( t \),
- \( VF_t = VD_t + VE_t \) = the value of the firm at time \( t \),
- \( \frac{VD_t}{VF_t} \) = the market structure ratio, or debt ratio, of the firm at time \( t \) = the portion of capital raised from debt = \( 1 - \frac{VE_t}{VF_t} \); to be held constant for now,
- \( \frac{VE_t}{VF_t} \) = the equity ratio, the portion of capital raised from equity = \( 1 - \frac{VD_t}{VF_t} \),
- \( \frac{VD_t}{VE_t} \) = the ratio of debt to equity of the firm, likewise to be held constant for now,
- \( t_c \) = the marginal corporate income tax rate,
- \( kd \) = the rate of return required by debt suppliers in the period beginning at time \( t \),
- \( kd^* = kd(1-t_c) \) = the cost of debt capital for the period beginning at time \( t \),
- \( ke \) = the rate of return required by equity suppliers for the period beginning at time \( t \) = the cost of equity capital beginning at time \( t \),
- \( kf^* \) = the firm’s weighted average cost of capital, used to compute the Net Present Value of each investment project = \( (VD/VF) kd^* + (VE/VF) ke \),
- \( CDE_t \) = the cash distributed to equity holders = total dividend paid by the firm at time \( t \),
- \( N \) = the number of shares outstanding,
- \( E_t \) = the total earnings of the firm after taxes during the period ending at time \( t \),
- \( \Delta E \) = change in earnings from one time period to the next,
- \( E_{t+1} = E_t + \Delta E \),
- \( e_t \) = the earnings per share of the firm after taxes during the period ending at time \( t \) = \( E_t / N \),
- \( d_t \) = the dividend per share being paid at time \( t \) = \( CDE_t / N \),
- \( IVS_t \) = the investment expenditure of the firm at time \( t \),
- \( i_t \) = the per-share portion of investment expenditures at time \( t \) = \( IVS_t / N \),
- \( P_0 \) = the current price of the stock, per share, at time 0,
- \( g \) = the growth rate of dividends across the entire future time; \( g = br \), if \( VD = 0 \);
- \( g \) = also the growth rate of earnings, investment expenditures, and market price of the stock from period to period; everything grows at the rate \( g \) because the retention rate \( b \) is constant,
- \( b \) = the earnings retention rate of the firm, the portion of earnings retained and reinvested = \( (IVS_t / E_t) \),
- \( b E_t \) = the amount of earnings retained and reinvested at time \( t \); \( b E_t = IVS_t \),
- \( p = (1-b) \) = the payout fraction of income, that portion of income paid out as a dividend at time \( t \);
- \( p = (1-b) = (CDE_t / E_t) \),
- \( r \) = the average rate of return after tax on the set of new accepted investment projects; because the least-profitable accepted project has an internal rate of return no smaller than \( kf^* \), the value of \( r > kf^* \).
- \( r \) is computed as the weighted-average of the internal rates of return of all the accepted projects, where each project’s internal rate of return is weighted by the fraction of its time-zero outlay to the total of all time-zero outlays, which is the ratio of the investment in the project divided by the total investment outlay in all the projects, assuming investment only at \( t_0 \).
- \( M \) = the ratio of the market value of retained earnings to the dollar size or book value of retained earnings. If all investments have positive Net Present Values, then \( M > 1.0 \).

The current market value of a share of common stock is equal to the present value of all future dividends, discounted at the cost of equity capital.

The cost of equity capital \( ke \) is that rate of return the stock market expects to receive in order to compensate it for the use of funds and the risk associated with the future dividend stream. The cost of
equity capital is the rate of discount that equates the present value of all future expected dividends per share to the present price of the common stock. The cost of equity capital is determined by the term structure of interest rates of risk-free loans (the time preferences of the market participants) and the risk borne by the equity holder of the stock due to the uncertainty of the future dividend stream. The variability of the future earnings of the firm, which affects the variability of the dividend stream, depends on the business risk of the firm and the degree of financial leverage employed. The variability of future earnings also depends on the rates of inflation during different periods of time in the future.

**Business risk** arises from fluctuations in sales magnified by the degree of operating leverage of the firm. Business risk is measured by fluctuations in the operating income of the firm, earnings before interest and taxes. Business risk is larger than the fluctuations in sales revenue.

Fluctuations in the firm’s operating income are magnified by financial leverage, which is caused by interest-bearing debt. Financial leverage causes the fluctuations in the returns to equity suppliers to be larger than the fluctuations of operating income. Fluctuations in the returns to equity suppliers cause equity risk. Because of financial leverage, equity risk is always larger than business risk if the firm has any debt. The cost of equity capital ke of a leveraged firm (which is caused by the equity risk) is larger than the firm’s overall required rate kf (which is caused by the business risk) whenever there is debt.

The anticipated growth rate of dividends for any firm depends on the opportunities for investment perceived by the managers and the financing strategies of the firm. The growth rate of dividends depends on the firm’s rate of return on investment and on its rate of reinvestment out of operating cash flows.

**THE GORDON MODEL OF CONSTANT-GROWTH OF AN ALL-EQUITY FIRM**

The Gordon constant-perpetual growth rate model applies only to unlevered (“all-equity”) firms, which have no debt and so are financed entirely by equity. The model computes the value of equity VE₀, or the price per share P₀, based on the next period’s total dividend CDE₁ or dividend per share d₁, the cost of equity capital ke, and the growth rate g.

\[ VE₀ = \frac{CDE₁}{ke - g} \]

\[ P₀ = \frac{d₁}{ke - g} \]

\[ P₀ \times \text{Number of shares} = VE₀ \]

or alternatively,

\[ P₀ = \left[ \frac{(1-b) E₁}{ke - b r} \right]. \]

The change in earnings \( E₂ - E₁ = E = g E \), that is, the increment to earnings is the growth rate multiplied by the previous earnings. Also, \( E₂ = E₁ + E = E₁ (1 + g) \).

In the Gordon model, the growth rate g is the product of the retention rate b and the average rate of return earned after taxes on new investment r. The growth rate is therefore given by:

\[ g = b r \]

because, if the firm is all-equity financed and sells no new equity shares, the only source of investment capital is the retained portion of cash provided by operations. The amount of earnings retained is \( b E \), and the average after-tax rate of return earned by the investment is r. Therefore,
\[ E = r \ b \quad E = g \ E \]

and

\[ E_2 = E_1 \ (1 + r \ b) \]

The growth rate of net income for a period \( g \) is equal to the product of the after-tax rate of return on new investment \( r \) times the rate of earnings retention \( b \). With the constant retention rate \( b \), the growth rate of dividends is equal to the growth rate of net income. If the rate of return on new investment \( r \) is constant from period to period, then the growth rate \( g \) is constant from period to period.

### ESTIMATING \( k_e \), THE COST OF EQUITY CAPITAL FROM THE GORDON MODEL

The Gordon model also provides a reasonable estimate of the cost of equity capital \( k_e \):

\[ k_e = \left( \frac{d_1}{P_0} \right) + g \]

in which we see that the cost of equity capital is larger than the dividend/price ratio by the expected growth rate \( g \) of dividends. Notice that there is a one-period gap between the dividend per share and the price: presumably \( d_1 > d_0 \) because of the growth of dividends at the rate \( g_\infty \), so this ratio is larger than it would be if the dividend contemporaneous with the price were used. Notice that the stockholders appropriate all of the value arising from the growth to themselves by incorporating the entire growth rate into the cost of equity capital. The growth therefore benefits only stockholders and cannot benefit bondholders, except by reducing their risk.

Often, people have considered that a good estimator of the cost of equity capital \( k_e \) is the earnings/price ratio \( (e_0 / P_0) \). You should first be uneasy about this because the earnings contemporaneous with the price are used. As you know, discounting a future cash flow to present value usually includes a gap of one period between the present value and the future cash flow. We should first consider modifying the earnings/price ratio to be \( (e_1 / P_0) \). Keep in mind this necessity of using the leading (i.e., future period) earnings in computing an earnings/price ratio. We know that the current price depends on future earnings, not at all upon current earnings, which already cannot be altered.

Sometimes, the Earnings/price ratio is a valid estimator of the cost of equity capital; but more often, it is not a good estimator at all because it ignores the investment outlays needed to bring about growth and the growth itself, which has, as we have seen above, an influence on \( k_e \).

\[ k_e = (e_1 / P_0) \] is a good estimator of the cost of equity capital if the firm does not retain any cash from operations, so that \( b = 0 \), and therefore the firm pays all its earnings out as dividends and therefore does not grow, so that \( g = 0 \). We know already, of course, that if the firm does not grow, then \( d_t = d_{t-1} \), and \( d_t = e_t \). The earnings/price ratio is also a good estimator of the cost of equity capital if the firm engages in expansion, not growth. Recall that expansion is the situation in which the firm retains some earnings \((b > 0)\) and reinvests them, but reinvests in too many projects, bringing the average rate of return on new investment \( r \) down to the value of the weighted-average cost of capital \( k_f^* \). So \( (e_1 / P_0) \) is a good estimator of \( k_e \) if \( r = k_f^* \). So long as \( r > k_f^* \), the earnings/price ratio under-estimates the cost of equity capital. Recall that expansion produces the same value of the firm as does no growth whatever. So only in the no-growth case is the earnings/price ratio a good estimator of the cost of equity capital.
LEVERED FIRMS USING DEBT-CAPITAL FINANCING

If we relax the assumption that the firm is all-equity financed by allowing the firm to adopt a constant debt/equity ratio, \( (VD/VE) \), it can be shown that:

\[ g = r b + b[r - kd (1 - t_c)] (VD/VE). \]

Using debt financing can (but will not always) increase the growth rate, when the rate of return on the assets purchased exceeds the interest rate paid on the debt. This situation is called “favorable financial leverage”. When financial leverage is favorable, use of debt will raise the return on equity above the return on assets. Financial leverage always increases the risk borne by the equity holders.

If some financial leverage is employed, then \( VD > 0 \), and \( (VD/VE) > 0 \), and for that degree of leverage, if \( r > kd (1 - t_c) \), then the second term of the above equation is positive, implying that the use of this degree of leverage increases the growth rate of earnings and dividends over that which would have occurred without the use of debt. This follows since the average rate of return on investment \( r \) has been assumed to be constant, independent of the amount invested. Assuming that \( r > kd (1 - t_c) \) is equivalent to assuming the marginal (which equals the average if the average is unchanging) return on investment is greater than the after-tax cost of debt capital, so that debt utilization creates residual equity earnings. Use of such favorable financial leverage increases the growth rate of earnings and dividends. This is because debt is inherently cheaper than equity due to its smaller risk and the deductibility of interest from taxable income. Use of debt allows purchase of more assets, and leaves greater residual earnings available after paying for the capital.

It is beneficial to the firm to borrow, for example, $1,000,000 at an 8.0% rate and then invest this million into a machine that earns an internal rate of return of 15%. The machine earns $150,000 income each year, and $80,000 of that is used to pay the interest on the debt, leaving $70,000 available for the increase in equity value that accompanies cash provided by operations. From this $70,000, the firm must pay the appropriate portion for dividends also.

If the firm employs debt and desires to maintain a constant debt/equity ratio of \( VD/VE \), where both debt and equity are measured at market value, a dollar of retained earnings may increase the market value of the common stock more or less than one dollar, depending on the yield of the investments being undertaken by the firm. If the investments earn a yield in excess of the weighted average cost of capital, the suppliers of equity capital will receive more than their required return (by a combination of dividends or capital gain), which is the cost of equity capital. They will therefore place a market value on the retained earnings in excess of the incremental book value: \( M \) dollars of market value for every dollar of retained earnings. If the investments earn a yield smaller than the weighted average cost of capital, the suppliers of equity capital will suffer a reduction in the combination of dividends or stock price, and their net receipt will be smaller than their required rate of return, and the value of \( M \) will be \( < 1.0 \), so that the increase in the market value of retained earnings will be smaller than the increase in book value.

We consider the situation in which the firm holds constant its debt ratio \( VD/VF \) and its debt/equity ratio \( VD/VE \). This is the usual situation. Changes in capital structure are complex and should not be combined with other decisions, but considered separately. We assume that the firm has already found its optimum capital structure (the value of \( VD/VF \) which minimizes the weighted-average cost of capital and maximizes the value of the firm). When the capital structure is held constant, and when we assume also that the firm does not sell new equity capital (which is also the more common situation), then the only source of additions to equity capital is cash retained from operations, or
“retained earnings”. So we are going to consider the cash added to the book value of equity in the form of retained earnings.

Remember that **the entire Net Present Value of the investment in new plant and equipment is added to the value of equity**. The Net Present Value is computed net of the need to pay interest (net of income tax effects) to the bondholders and the required rate of return to the equity holders, so the Net Present Value is a net gain to the equity holders above and beyond their required rate of return.

We are going to hold the capital structure constant. But we know that there will be an increase in the value of equity due to the Net Present Value of the new equipment purchased. To hold constant the capital structure means that new debt must be borrowed to increase the value of debt so that the ratio of the value of debt to the value of equity remains constant, and the ratio of the value of debt to the value of the firm (the capital structure ratio or the debt ratio) also remains constant.

Always keep in mind that, when capital structure is held constant, even when no new equity capital is issued, it is necessary to increase the total debt outstanding (that is, borrow more) to compensate for the increase in the value of equity occurring from successful operations which produce a new increment to the value of equity from newly-retained cash from operations (“new retained earnings”). This new borrowing is consistent with the maintained value of the capital structure ratio, so it should not be considered excessive. But if this new borrowing is not added to the value of debt, the capital structure ratio will decline to a more equity-heavy value than it should have.

Note also, please, that the accountant’s equity account “Retained Earnings” on the balance sheet is **different**: on the balance sheet the equity account Retained Earnings is the sum over the life of the firm (i.e., since its beginning) of Net Income After Taxes minus Dividends Paid, and subject to any adjustments made in the past.

We will have the same assumptions; i.e., constant capital structure, no new issuance of equity shares, etc. when we consider the Sustainable Growth Rate of the firm. Most of the time, of course, the firm does not issue new equity and does maintain its capital structure constant.

We need to consider the weighted-average cost of capital, “WACC”, or \( k_f^* \). Recall that

\[
k_f^* = \frac{VD}{VF} kd \left(1 - t_c\right) + \frac{VE}{VF} ke,
\]

where
- \( VD \) = the market value of debt, taking account of the current market interest rate,
- \( VE \) = the market value of equity = Number of shares \( \times \) Price per share,
- \( VF = VD + VE \),
- \( t_c \) = the marginal corporate income tax rate,
- \( kd \) = the rate of return required by debt suppliers,
- \( kd \left(1 - t_c\right) \) = the cost of debt capital,
- \( ke \) = the rate of return required by equity suppliers = the cost of equity capital,
- \( k_f^* \) = the firm’s weighted average cost of capital.

If the investments in new assets earn a yield or rate of return larger than the weighted average cost of capital (which automatically means that the assets earn a rate of return larger than the cost of debt to the firm because the cost of equity is larger than the cost of debt), then the suppliers of equity capital, the stockholders, will receive more than their required return, which is the cost of equity capital.
The equity suppliers will therefore place a market value on the retained earnings earned by the assets larger than the incremental book value of the retained earnings.

This means that the book value of the firm will, in the above example, increase by $57,200, but the market value of the firm will increase by a greater amount.

The ratio of the market value of retained earnings to the dollar size or book value of retained earnings is called $M$. For example, in the situation above, the assets produce a book value of retained earnings of $57,200. However, because the projects have a positive NPV, $M > 1.0$. Suppose $M = 1.20$ due to the conditions in the capital markets. Then the increase in the Value of Equity = $1.20 \times 57,200 = 68,640$.

\[ IVS = VD + bE = (VD/VE)(M)(b)(E) + bE. \]

If each dollar of investment earns $r$, the additional earnings are:

\[ E = (r)(IVS) - \text{Interest on Debt} \]

so

\[ E = r [ bE + (VD/VE)(M)(b)(E)] - kd(1-t_c)(VD/VE)(M)(b)(E) \]

and

\[ E = r b E + [r - kd(1-t_c) ] M b E (VD/VE). \]

The above is the incremental earnings $E$. This is related to the growth rate of earnings $g$.

\[ E (1+g) = E + E \]

and

\[ 1+g = 1 + \frac{E}{E} \]

so that

\[ g = \frac{E}{E} = r b + [r - kd (1-t_c)] M b (VD/VE). \]

The above is the general case.

This general case dissolves to the Gordon model if $VD = 0$ because then the second term vanishes and

\[ g = r b = b r. \]

If $M = 1.0$, which is what occurs when the average rate of return on new investment equals the cost of capital, meaning that some projects are accepted whose rate of return is less than $k_f^*$, then

\[ g = r b + b [r - kd (1-t_c)] (VD/VE), \text{ only when } M=1.0 \]

END OF GORDON MODEL
2. **The Solomon Model is more conservative and does not overstate value.**

\[ \text{VE}_0 = \frac{E - I}{k} + \frac{rI}{k^2} \]

- \( E \) = current earnings
- \( I \) = current investment
- \( k \) = cost of capital
- \( r \) = average rate of return on new investment

3. **Sustainable Growth Model: reasonably accurate, but valid for only one period at a time.**

Capital assets are heterogeneous; they can interact in different ways to achieve a given end. Different quantities of different assets can interact to improve performance. A plethora of alternatives is available, some of which are better than others. (Ludwig Lachmann)

The Sustainable Growth Model depicts the speed, \( g^* \), with which sales can grow with specified operating efficiency and present assets. To improve operating efficiency or to grow faster than the present resources can attain requires purchasing new assets which require financing. To grow faster with constant operating efficiency than the \( g^* \) (which is based on the present asset structure) rate requires also purchasing new assets which require financing. The financing is described as an “absorption of cash.”

\[ g^* = \text{PRAT}^\wedge = \text{growth rate of sales under normal circumstances} \]

- \( P \) = profit margin on sales = \( \text{NI/S} = \text{Net Income after Tax} / \text{Sales Revenue} \)
- \( R \) = retention rate = \( \text{CRF/NI} = \text{Cash retained by the firm} / \text{NIAT} = (\text{NI} – \text{Dividends}) / \text{NI} \)
- \( A \) = total asset turnover = \( S/TA = \text{Sales} / \text{Total Assets} \)
- \( T^\wedge = \text{assets to b-o-p equity leverage ratio} = \text{TA/NW}_{bop} = \text{Total Assets} / \text{Beginning-of-period equity} \)

If actual \( g > g^* \), the firm must have either improved its operating efficiency or absorbed cash. If actual \( g < g^* \), the firm must have reduced its operating efficiency or disgorged cash.
NOTES ABOUT GROWTH, RISK, AND INVESTMENT

It is only the successful and unregulated free market economy which makes higher return appear to be positively correlated with the risk borne.

Cost of Capital: the rate of return required to be earned by the capital suppliers to compensate for bearing the risk they perceive.

\[
\text{CAPM: } \quad \text{ke} = R_f + \beta (E[R_M] - R_f) + \varphi
\]

We use the cost of equity capital to discount cash flows received by equity suppliers, such as dividends, or the LFCFE’s.

\[
\text{LFCFE}_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \Delta\text{NWC}_t - \text{PP}_t + \text{NDC}_t + \text{NPS}_t - \text{Pfd Divs}_t
\]

\[
\text{WACC: } \quad \text{kf*} = \Theta \text{kd} (1-\tau) + (1-\Theta) \text{ke}
\]

We use the weighted-average cost of capital to discount cash flows received by all capital suppliers, debt suppliers and equity suppliers, such as differential net after-tax operating cash flows generated by an investment project, or the UFCFF’s.

\[
\text{Unleveraged Free Cash Flow to the Firm}_t = \text{UFCFF}_t = \\
\text{UFCFO}_t - \text{IVS}_t - \Delta\text{NWC}_t = \\
\text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t (1-\tau) - \text{IVS}_t - \Delta\text{NWC}_t
\]

Taking account of forecasting risk by simulation: taking account of multiple uncertainties in the forecast parameters. \( \text{E[NPV]} = \text{mean of the distribution of NPV’s} \).

Measurement of Economic Value Added and Economic Profit. We all want “superior performance”; but superior to what? Capital should be invested in the most profitable enterprise; we must take into account the alternative use for the capital which we used here. The cost of capital \( \text{kf*} \) is the rate of return required by the capital suppliers, based on the risk they perceive from our use, and based on the returns available elsewhere at equivalent risk.

\[
\$ \text{NPV}_0 = \Delta\$\text{PWE}_0 = -|\text{IVS}_0| + 0\text{PV}^T(\text{kf*}) \text{ of all differential net after-tax operating cash flows.}
\]

But cash flows are not tracked by accountants, so very few people comprehend NPV.

\[
\$ \text{EVA} = \text{income earned} - (\text{cost of capital X investment})
\]

\[
\$ \text{EP} = (\text{actual ROI} - \text{cost of capital}) \times \text{Capital Invested}
\]

Entrepreneurial financial management decision—changing financing to improve performance. Although financing is purchased in an efficient market and often has no effect on the value of the firm, financing can improve or degrade performance by changes in the quantity of financing, and by changes in the proportions of debt and equity used. The Limited finds that it must alter its financing plans by raising more debt capital than it had planned to do to support its investments which are necessary to achieve the growth it seeks within the constraints of its operating efficiency. It uses the mechanism of forecasting to discover (in the Kirznerian sense) how much new debt it needs.

The equity holders of the firm bear all of the business risk plus the financial risk created by any debt financing the firm has: Equity Risk = Business Risk + Financial Risk. The financial risk depends
on the ratio of debt to total assets $\Theta = VD/VF$. They bear this additional financial risk even if the financial leverage is “favorable” and the firm’s assets return a higher rate than the interest rate on the debt. Because of the additional risk borne by the equity holders due to the debt of the firm, the cost of equity capital, the rate of return the shareholders require because of the risk they bear, rises when $\Theta$ rises.

We use the Capital Asset Pricing Model

$$\text{CAPM: } ke = R_f + \beta \left( E[R_M] - R_f \right) + \varphi$$

to evaluate the return required by the shareholders due to the Systematic Risk they bear, as measured by the equity $\beta$ of the firm. The $\beta$ is called the “volatility” of the stock, the ratio of the change in excess stock return ($R_j - R_f$) when the market excess return ($R_M - R_f$) changes: $\beta_j = (R_j - R_f) / (R_M - R_f)$. The beta is measured by linear regression of the excess return of the stock against the excess return of the market. (If the shareholders do not hold the firm’s stock as part of a perfectly-well-diversified portfolio, then they bear additional risk, “unique non-systematic risk” which adds an additional risk premium $\varphi$ added to the systematic risk, so the cost of equity capital will be still higher.)

Because the additional debt added to the capital structure imposes greater risk on the stockholders causing them to increase their cost of equity capital, the additional debt and the addition to $\Theta$ must increase the $\beta$ of the firm in order to achieve a higher value of $ke$ from the Capital Asset Pricing Model: $\beta = a \text{ function of } \Theta$. Higher values of $\Theta$ reflecting more debt financing raise the value of $\beta$ of the equity of the firm, thereby raising the cost of equity capital. There may also be an increase in the non-systematic unique risk borne by non-perfectly-diversified equity holders of the stock due to the increase in $\Theta$, but we have no theory of measurement for the unique risk.

If the capital structure ($\Theta = VD/VF$, the portion of the firm financed by debt) is altered, the cost of capital [$kf^* = \Theta kd^* + (1-\Theta) ke$] will change, and this change in the cost of capital will change the Net Present Value of each newly-accepted project, and may also alter the identity of projects accepted because of the change in NPV across the zero border. The change in the capital structure alters the apportionment of risk between the debt holders and the equity holders, causing their respective costs of capital to change, and these changes in the individual costs of capital cause the overall weighted-average cost of capital to change, both by changes in individual $ke$ and $kd$, but also by a change in the weighting factor $\Theta$. The risk apportionment changes because debt and equity have different orders of payment of owed cash: the debt is always paid first, before any payment can be made to equity. Hence, debt is always less risky than equity. Increases in the capital structure ratio, caused by a relative increase in the portion of financing due to debt, tend therefore to reduce the weighted-average cost of capital. Also, because of the tax savings on cash paid out as interest, compared with the cash paid out as dividends, the net-after-tax cost of debt capital to the firm is always smaller than the net cost of equity capital to the firm. However, as the portion of debt in the capital structure rises, increasing the risk borne by the equity holders, the equity holders’ required rate increases very rapidly, so that even though the portion of equity decreases, the overall cost of equity rises greatly, and after a time, the overall weighted-average cost of capital will rise. At very high debt ratios, $kf^* > ku$.

But the attraction of debt is not only its relatively low cost, but also the magnification it accomplishes in the return to equity when financial leverage is “favorable”; i.e., when the interest rate on the debt is smaller than the pre-tax return on assets ($kd < EBIT/TA$). When financial leverage is favorable, debt in the capital structure raises ROE ($= NI/NW$) above the return on assets ROA ($= NI/TA$). (ROA is also called the “return on investment” ROI.) Remember the DuPont equation:

$$\text{ROE} = NI/NW = (S/TA) \times (NI/S) \times (TA/NW) = (NI/TA) \times (TA/NW) = \text{ROA}/(1-\Theta)$$
EFFECT OF CAPITAL STRUCTURE ON BETA AND ON ke


\[
\beta_{\text{observed}} = \beta_U \left[ 1 + (1 - \tau) \left( \frac{VD}{VE} \right) \right]
\]

The capital structure of the firm is thought to influence the numerical value of beta.

Hamada derived the expanded Capital Asset Pricing Model, which takes account of the tax-deductibility of interest on corporate debt and the capital structure of the firm:\(^1\)

\[
ke_j = R_f + \left\{ (E[R_M] - R_f) / \sigma_M^2 \right\} \left( \rho_{ju,M} \sigma_{ju} \sigma_M \right) \left\{ 1 + \frac{VD}{VE} \right\} (1 - \tau_c)
\]

where \( ke_j = \) the cost of equity capital of the \( j^{th} \) security, the rate required by the equity holders;
\( u \) indicates "unleveraged"; \( i.e., \) with debt = $0
\( R_f = \) the risk-free rate in the market;
\( E[R_M] = \) the expected rate of return on the market portfolio during the relevant period of time;
\( \sigma_M = \) the standard deviation of the probability distribution of possible market returns;
\( \rho_{ju,M} = \) the correlation coefficient between returns for security \( j \) in the absence of leverage and the market portfolio;
\( \sigma_{ju} = \) the standard deviation of the probability distribution of possible returns for security \( j \) in the absence of leverage;
\( VD/VE = \) ratio of value of debt to value of equity in market-value terms;
\( \tau_c = \) corporate income-tax rate.

The above equation can be simplified by using the ordinary definition of \( \beta = \rho_{Mj} \sigma_j / \sigma_M \)

\[
ke_j = R_f + (E[R_M] - R_f) \beta_{ju} \left\{ 1 + (VD/VE) (1 - \tau_c) \right\}
\]

where \( \beta_{ju} \) is the beta measuring the responsiveness of the excess return for the security in the absence of leverage to the excess return of the market portfolio. This value of beta, of course, cannot be observed if the firm has any debt. We must calculate the \( \beta_{ju} \) from the observed value of \( \beta_j \) using the equation below: \( \beta_{ju} = \beta_j / \left\{ 1 + (VD/VE) (1 - \tau_c) \right\} \)

In \( ke_j \), the premium for business risk is: \( (E[R_M] - R_f) \beta_{ju} \)

In \( ke_j \), The premium for financial risk is: \( (E[R_M] - R_f) \beta_{ju} \left\{ (VD/VE) (1 - \tau_c) \right\} \)

The measured, or observed, value of beta for the stock, \( \beta_j \), embodies both risks and is:

\[
\beta_j = \beta_{ju} \left\{ 1 + (VD/VE) (1 - \tau_c) \right\}
\]

---

DEALING WITH RISK

The “risk” we perceive in a proposed course of action is our perception of our ability to forecast accurately the outcome of the proposed course of action. If we believe that our forecasting ability is perfect, then we believe we know the outcome for certain, and we perceive no risk. This is true even if other people are perplexed about what will occur. If we believe we know, then we bear no risk, and our behavior is indistinguishable from that of a person who really does know.

If we believe that our forecasting ability is very weak, then we believe we do not know what might happen, and we perceive great risk. This is true even if other people know for sure what will happen. This is true even if the outcome is absolutely certain, but we do not perceive that certainty.

“Risk” is a second-order subjective perception, a second-order creation in our own mind. Risk is our opinion about our ability to forecast accurately. Risk is not merely about our actual ability to forecast accurately; risk is our opinion about that forecasting ability. Even if we cannot forecast accurately, if we believe we can forecast perfectly, we bear no risk and behave as we do in a situation of certainty.

The managers of the firm choose courses of action based on the effect on value of equity of the course of action. That choosing of a course of action is called a “decision.” The computation of the value of equity takes account of the alternative rates of return available to the equity suppliers of the firm on a risk-adjusted basis through the discounting of future expected cash flows at the cost of equity capital. The cost of equity capital is adjusted to take account of the differential risk of the different considered future courses of action. The computation of the value of equity takes account of the productivity of each alternative course of action by forecasting the stream of future cash flows which that action will achieve. This is a forecasting activity. We forecast the stream of future cash flows we expect and discount them at the risk-adjusted cost of capital to compute the present value. We choose the course of action to pursue by selecting the course with the highest present value.

But what if we make a mistake in our forecasts? We have still the problem of “forecasting risk”: the knowledge that the future is unknowable, and all we have done in our forecast is imagine it in our own minds in advance, using whatever forecasting expertise and intuition we have. But our imagining must be somewhat in error; i.e., particular forecasted parameters we have used may turn out to be different numbers than we have assumed, and this will cause the outcome to be different—so different that perhaps this course of action, which we had thought would create the greatest value, actually will not, and would be seen afterward as a mistake.

Risk, perceived ignorance of the future, must be taken into account both in the numerator and in the denominator of the valuation equation. In the denominator, it is taken into account in the numerical value of the risk-adjusted discount rate, the “cost of capital,” the rate of return available elsewhere to our capital suppliers on similar investments of similar risk. Both business risk and financial risk are taken into account in k^f and in ke; we must remember also that the size of the risk-adjusted discount rate depends on the perceptions of risk of our investors, and so those discount rates can also change with changes in our investors’ mental states and perceptions. The weighted-average cost of capital k^f also depends on the capital structure ratio Θ, and that can change as time passes, as the firm changes its capital structure, either deliberately or accidentally, as in response to higher- or lower-than-expected cash retentions from operations (which accrue only to the equity suppliers and therefore change the present value of equity).
In the numerator of the valuation equation, risk is taken into account in the numerical value of the cash flows forecasted for each future period and in the numerical value of the terminal value at the end of the explicit forecasting period. The risks within the cash flows are the variability possible in the various forecasting parameters which go into determining the cash flow: the possible variation in receipts, in expenses, in interest payments, in new financing needed, in the growth rates of various future cash flows, in the portions of sales which each expense comprises, in the inventory turnover ratio, in the average collection period of receivables, etc. Each of the possible changes in all of these internal parameters can and will change the size of the cash flow of a particular year, and the effects will be different in different years. We cannot know what will happen to each of the forecasted parameters: the future is unknowable; but we can estimate the likely range within which each of the parameters will vary: the future is not unimaginable.

There are three methods to try to deal with forecasting risk so as to make more accurate decisions (i.e., decisions which more accurately depict the actual future events and conditions which will occur; decisions which are less likely to be considered mistakes):

1) **sensitivity analysis**—looking at the effect on our present value of different numerical sizes of one important forecast parameter;

2) **scenario analysis**—looking at the effect on our present value of a few different forecast scenarios, different sets of alternative forecast parameters, such as “best case”, “most likely case”, and “worst case”, in which each “case” is a complete system of forecast parameters with different values; we then compute an expected present value by multiplying the result of each case analysis by its estimated probability of occurrence and adding the products of probability times case value to compute the expected value;

3) **simulation**—looking at the effect on our present value of changes in all forecast parameters within their possible ranges; this takes account of unspecified interactions among the forecast parameters. We compute a present value for each vector of forecast parameter amounts; change each forecast parameter amount and make a new vector and compute the present value for that vector. We repeat the process hundreds of times, taking account of all possible changes in each forecast parameter amount within the range of possible amounts of forecast parameters, and taking account of the shape of the distribution of amounts of forecast parameters within the range. We plot a frequency distribution of present value and choose the mean value or the most likely value as the risk-adjusted value of the course of action (see Figure 10.4 on page 256 of BMA). This takes into account the likelihood that different combinations of the forecast parameters can produce a similar present value.

The value of a business is the value now (i.e., the importance now, measured in dollars) of all of the future cash flows which the firm will generate during its entire future lifetime for the owners. Most commonly, those estimated and forecasted future cash flows are measured using the Leveraged Free Cash Flow to Equity method. Those future cash flows must be forecasted. Determining their value now depends on the rate of return now available for alternative investments of comparable risk borne by the owners if they should invest in other firms than this one; this estimate of the alternative rate of return available in other investments determines the discount rate used to value the forecasted cash flows of this business. This discount rate used to value the entire stream of future LFCFE’s is the cost of equity capital, ke, usually computed from the Capital Asset Pricing Model with an adjustment for unique risk in the situation; but instead of using the CAPM, an equity risk premium can be added to the required rate on debt.
Valuing a business is a delicate balance of capturing the actual growth of sales and dividends which will occur in the next few years of the future without over-estimating the long-term growth which can be achieved in the long run (which will cause the Gordon-Model computed Terminal Value to be too large) and thereby over-valuing the present value of the business because of the disproportionate share of present value of the firm contributed by the present value of the Terminal Value. Because they neglect to add the Terminal Value at the very end of the years of explicit forecast, many people underestimate the true value of the firm. You must always include the Terminal Value, and you must always discount it to the present. But be aware that the present value of the Terminal Value usually contributes about 80% or more of the total present value of the firm. This is especially true when using the Gordon Model to determine the Terminal Value. Because the Gordon Model tends to overstate the present value of a growing stream of cash flows, an arbitrary reduction factor (like “0.9”) may be used as a multiplier with the Gordon Model before the Terminal Value is discounted.

During those periods of time when there is a deep term structure of interest rates, you must remember to use a non-constant discount rate for cash flows expected in different future years to reflect the current term structure of rates. Most commonly, longer-term rates are larger than shorter-term rates; but that is not always the case.

The next issue to watch out for is changes in the risk of the firm, both the systematic risk (which will change the value of the beta factor in the Capital Asset Pricing Model for the cost of equity capital) and the non-systematic, or unique risk (which adds a premium for the unique non-systematic risk borne by the equity holder if the firm is not part of a well-diversified portfolio held by the owner). This is especially true if the issue is the embarking on a new line of business, such as that proposed for the Massachusetts Stove Company. With the Rocky Mountain Advanced Genome Company, as time passes, there may be changes in the riskiness of future cash flows as the company successfully develops technologies or products which are not now known firmly, or as the company’s competitive position changes, or as the company changes its future capital structure.
FINANCE PROCEEDS USING FINANCIAL CASH FLOWS
VALUATION IS THE CRUX OF FINANCE
SUCCESSFUL ENTREPRENEURSHIP CREATES VALUE

Economics is about people; finance is a portion of economics, concerned with transactions spread over a period of time. Economics is the science of human action: "action" is purposeful behavior intended to change the future into something better than it would have been, from the point of view of the actor. The future is unknowable, but not unimaginable; actors seek in the present to bring about a better future. Action seeks to achieve a situation superior to what otherwise would exist.

"Entrepreneurship" is the creation of a superior future state of existence. The firm straddles two markets: the flow market for goods and the capital market for assets. Entrepreneurship functions differently in the two markets. The firm makes internal decisions based on information gathered from the external financial market, which reveals the risk-return goals of its investors. Firm managers make decisions about consumers goods and capital goods, which are in the two markets; and about financial assets (stocks and bonds), which are in the asset market, using information conveyed by the asset market. Valuations of goods govern behavior in the flow market for goods.

Expectations about people's future behavior and future valuations govern behavior in the stock market for assets. Valuation is subjective: formed by choice in the mind of the appraising actor. Formation of expectations is also subjective, but more volatile than valuation. Risk perceived or borne is a subjective choice regarding confidence in the correctness of forecasts. The market is a process of creation, discovery, and adjustment.

In a goods market, valuations and plans are adjusted; in an asset market, expectations (which determine valuations) and plans are adjusted. The goal of the firm is to increase the wealth of the equity holders (PWE₀) as much as possible. PWE₀ = NCDE₀ + VE₀.

"Value" is the present value of future benefits to be received by the owner over the entire lifetime of the asset, equity, or firm; "benefits" are defined in CASH-FLOW terms. Financial decisions are made by choosing the course of action producing the greatest value of the asset, equity, or firm. Publicly-traded firms and privately-held firms are analyzed in the same way, but using different measurements. We compute the Net Present Value. We discount the dividends of publicly-traded firms by ke, or the free cash flows available to the unlevered firm (CAU – IVS) by kf*; or (CAC – IVS) by kf. We discount the free cash flows of privately-held firms by ke, or the free cash flows to the firm by kf*.

Discounting to Present Value gives us the value of equity or increases in that value: NPV₀ = Δ PWE₀.

Term Structure of Interest Rates: Treasury Strips in:


also in “http://screen.yahoo.com/bonds.html”

"Financial Cash Flows": Free Cash Flow--LFCFE, UFCFF
Forecasting Financial Free Cash Flows and Valuing Them.

Determining the Cost of Capital: kf* = θ kd* + ( 1 - θ ) ke.

kf* = (VD/VF) kd* + (VE/VF) ke + (VP/VF) kp.

A business is viewed as a system of cash flows extending through time. Valuation of the business is the central method of financial decisions, as the impact of alternative courses of action on firm value must be evaluated in order to choose among the alternatives.
Future cash flows of proposed capital assets form the basis of analysis. The riskiness inherent in these cash flows determines the size of the discount rate for computing the Net Present Value of each proposed asset, which allows selection of the best alternative.

Risk is viewed as the variability of return across time. Portfolio Theory shows that groups of assets can be less risky than any one of the component assets held individually because of the lack of perfect correlation between the time returns of pairs of assets. The Capital Asset Pricing Model is the first approximation to the required return on a risky asset arising from its contribution to the risk of a portfolio, and it allows estimation of a risk-adjusted required rate of return on an asset.

**WEIGHTED-AVERAGE MARGINAL COST OF CAPITAL**

For investments which do not alter the risk composition of the firm's assets, the appropriate discount rate is the firm's weighted-average cost of capital, which is derived from the financial-market performance of the firm's capital claims.

Capital structure is the ratio of debt to assets, or of debt to equity, which describes how the assets were financed. The tax-deductibility of interest payments makes debt an attractive financing method; but the great risk imposed by debt financing reduces that attractiveness. Higher-cost equity financing is much safer for the firm. The existence of an optimal capital structure is explored, and the impact of alterations of the capital structure on firm value are determined.

Firms alter the risks borne by investors by choices of investment and production processes which alter the degree of operating leverage, and by choices of financing methods which alter the degree of financial leverage. Financial ratio analysis, especially the duPont method, illuminates business policies which affect financial condition and performance. The efficacy of previous financial decisions is evaluated, and appropriate methods of management of accounts receivable and payable, inventory, capital asset acquisition, financing and capital structure, and acquisition and disbursement of capital are studied. Cash flow analysis shows what the firm has actually done, and pro-forma statement construction is central to financial forecasting and planning.

**Purpose of Finance 601 Course:**

TO TEACH YOU TO THINK, WRITE, AND SPEAK COMPREHENSIVELY, SYSTEMATICALLY, COHERENTLY, AND INTELLIGIBLY ABOUT THE ENTREPRENEURIAL CREATION OF VALUE AND ENTREPRENEURIAL FINANCIAL DECISIONS OF THE FIRM.

"Entrepreneurship is the alert discovery and pursuit of previously unsuspected opportunities."
--Israel Kirzner

"The future is unknowable but not unimaginable. We live in a world of unexpected surprise."
--Ludwig Lachmann

"With wings I have won for myself, in fervent love I shall soar to the Light which no eye has seen... What has battered you, my Soul, will bear you to God."
--Gustav Mahler
Finance 601 COURSE LEARNING OBJECTIVES:

This is a lecture/discussion class, combining assigned text readings and case solution submissions. Valuation is the crux of finance. Valuation is subjective. Valuation proceeds from the forecasted future free cash flows to equity derived from the forecast assumptions of the proposed course of action. Valuing the firm is the goal of this course: first, by forecasting the future pro-forma financial statements through the Terminus T; second, by forecasting the free cash flows through the Terminus T; third, by forecasting the Terminal Value at the Terminus T; and fourth, by discounting the stream of future forecasted cash flows and Terminal Value at the risk-adjusted cost of equity to determine the present value of equity. The present value of equity of the proposed future course of action is compared with the present value of equity of the existing situation, and the increase in value of equity if the proposed course of action is implemented, is determined. The correct decision in any situation is to choose the course of future action which most increases the value of equity of the firm, after explicitly forecasting the future cash flows which will result from each possible course of action identified at the decision moment.

Students completing this course successfully will be able to:

- Deal with the subjectivity of valuation through alternative sets of forecasts;
- Create pro-forma spreadsheets forecasting future financial statements to value the firm;
- See the true events which have happened and the true condition of the firm in the two dimensions of profitability and riskiness;
- Forecast the future growth of the firm’s sales using sustainable growth \( g^* = \text{PRAT}^\wedge \), and the Gordon constant growth model \( g_{\infty} = \beta r ; P_0 = \frac{d_1}{(ke - g_{\infty})} \);
- Analyze the fixed and variable costs of the firm using regression analysis;
- Build spreadsheet models in Excel;
- Forecast the pro-forma financial statements of the firm for several years into the future;
- Compute the Leveraged Free Cash Flows to Equity and compute the value of equity by discounting them and the Terminal Value at the risk-adjusted cost of equity capital \( ke = R_F + \beta (E[R_M] - R_F) + \varphi \);
- Form the Terminal Value at the end of forecast life using the Gordon Model \( TV_T = \frac{LFCFE_T (1 + g_{\infty})}{(ke - g_{\infty})} \);
- Value the firm and value the equity of the firm as the present value of future cash flows and Terminal Value discounted at the risk-adjusted cost of equity capital;
- Simulate the value of the firm by altering forecast parameters repeatedly;
- Choose the correct course of action as the Value-of-Equity-Maximizing Course;
- Evaluate the entrepreneurial alertness of firm management in creating profits;
- Make elegant, coherent, and convincing presentations of financial matters.

The Goal of the Firm is to increase the present wealth of the equity holders \( PWE_0 \) as much as possible; i.e., choose the course of action (as specified by the future forecast assumptions and parameters) which most increases the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends which could be paid by the firm without disrupting its future growth over its entire future life span, beginning with the current dividend at \( t_0 \) and including the Terminal Value at the end of the explicitly-forecasted period at \( t_T \). This future stream of potential dividends is called the series of Leveraged Free Cash Flows to Equity \( \{LFCFE_t\} \).

Maximize \( \Delta PWE_0 = PWE_0 \text{ (proposed course of action)} - PWE_0 \text{ (existing plans of action)} \)

\[
PWE_0 = CDE_0 + VE_0 = CDE_0 + \sum_{t=1}^{T} LFCFE_t / (1 + ke)^t + TV_T / (1 + ke)^T
\]

\[
TV_T = LFCFE_{T+1} / (ke - g_{\infty}) = LFCFE_T (1 + g_{\infty}) / (ke - g_{\infty})
\]
FINANCE 601: SUMMARY

Valuation is the crux of finance. Valuation is subjective. Valuation proceeds from the forecasted future free cash flows to equity. Valuing the firm and selecting the best course of action by means of that value, is the goal of this course: first, by forecasting the future pro-forma financial statements through the Terminus T which will occur under each possible course of action; second, by forecasting the free cash flows through the Terminus T for each course of potential action; third, by forecasting the Terminal Value at the Terminus T for each course of action; and fourth, by discounting each of the potential courses of action’s stream of future forecasted cash flows and Terminal Value at the risk-adjusted cost of equity to determine the value of equity which will result if that course of action is pursued; that course of action from the set of identified possibilities is chosen which leads to the largest value of equity.

A firm has an indefinite future lifetime; i.e., potentially "to infinity." Valuation of the firm is accomplished by discounting to present value at the appropriate risk-adjusted cost of capital rate the series of future free cash flows and Terminal Value at the terminus T, which capture the entire lifetime of the firm.

The free cash flows are derived from the forecasted future financial statements of the firm, and we must capture the entire future lifetime of the firm. If we have successfully analyzed the financial statements, we know the value of the firm under a particular set of forecasted parameters, and we can determine the value under other sets of forecasted parameters. We have forecasted the future financial statements based on our understanding of the past financial statements and the changes which we expect to occur in the future as a result of possible entrepreneurial action.

The goal of this course is forecasting the future financial statements and cash flows of the firm, based on the present and anticipated future conditions and operations of the firm in the environment of its product market and security market, and based on the entrepreneurial course of action sought by management, discounting the future cash flows at the appropriate risk-adjusted cost of capital to determine the value of each alternative future course of action, and then choosing the best course of action on the basis of its effect on firm value.

The relationships between and among the various financial and operating parameters and between the firm's parameters and future conditions must be understood so that we can forecast the precise structure and values of the future financial statements as a function of the forecasted future parameters and exogenous variables which can occur. Once we have forecasted the future financial statements, income statement, balance sheet, and funds flows through the terminus, we can compute the "leveraged free cash flow to equity" and the "unleveraged free cash flow to the firm" for each future time period, and we can forecast the "terminal value" of the firm at the end of our forecasted future period of time, the "terminus". We then compute the value of the equity by discounting, at an appropriate risk-adjusted discount rate, those forecasted future cash flows to equity plus the terminal value; or from the value of the firm, from which we subtract the value of debt.
Analysis of a proposed course of action consists in the computation of the value of the equity of the enterprise which will result from that course of action, and the consequent evaluation of the quality of the entrepreneurship of the firm's managers based on the increase of value which they have achieved or will achieve. Finance is a comprehensive process of thought which creates in the entrepreneur's mind an understanding of the potential future which is achievable.

The Goal of the Firm is to increase the present wealth of the equity holders $PWE_0$ as much as possible; i.e., choose the course of action (as specified by the future forecast assumptions and parameters) which most increases the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends which could be paid by the firm without disrupting its future growth over its entire future life span, beginning with the current dividend at $t_0$ and including the Terminal Value at the end of the explicitly-forecasted period at $t_T$. This future stream of potential dividends is called the series of Leveraged Free Cash Flows to Equity $\{LFCFE_t\}$.

Maximize $\Delta PWE_0 = PWE_0$ (proposed course of action) – $PWE_0$ (existing plans of action)

$$PWE_0 = CDE_0 + VE_0 = CDE_0 + \sum_{t=1}^{t=T} LFCFE_t / (1 + ke)^t + TV_T / (1 + ke)^T$$

$\{LFCFE_t\}$ are as defined in Finance 305.

$$TV_T = LFCFE_{T+1} / (ke - g_\infty) = LFCFE_T (1 + g_\infty) / (ke - g_\infty)$$
My goals for this course are the following:

1) to give Finance students practical experience in identifying and quickly solving financial problems facing real firms by recommending superior entrepreneurship which will increase equity value;

2) to teach you how to "discover" the future, to "discover" error, by creating alternative future pro-forma financial statements, each designed by different values of forecast parameters, or alternative forecasts, and then to make a choice identifying the best numerical values of forecast parameters, or the best of the alternative forecasts by means of selecting the best or most likely of the alternative future pro-forma financial statements; you will in this way learn "alertness to hitherto unperceived opportunities";

3) to give you training and practice in writing clear reports and making clear presentations; and

4) to teach you to manage your time and thought superlatively.

This course is designed to train you to think coherently and quickly in finance and to develop your personal capabilities extensively. It is designed to develop your writing and speaking abilities, so that you can impart information to others. It is designed to train you to function successfully as a financial analyst and manager; because of this goal, the practice of the course is an integral part of the course.

Each case is based on an actual situation at a real firm; sometimes the names have been changed. This course is designed to improve your analytical abilities in finance, your ability to make decisions and explain your reasons for them, and your ability to communicate your analysis, ideas, conclusions, and decisions regarding the solution of the problems in finance. You will learn to recognize and diagnose business financial problems plaguing firms and to be alert to financial opportunities which may exist. You will learn how to analyze alternative corrective strategies using pro-forma statements and cash flow projections and how to choose the best solution from among such alternatives, and how to present your analysis and conclusions to a client or management.

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2 Israel Kirzner uses the term "discover" to identify the entrepreneurial process of creation of a previously-unnoticed opportunity to achieve gain by improving the co-ordination of the market. The market is a process of creation, discovery, competition, and adjustment. The market is not merely a "dynamic entrepreneurial-competitive discovery process", in which "what is out there" is first "discovered" by the alert entrepreneur after having been missed by previous others who failed to see it. Rather, the alert entrepreneur first creates that which is discovered (which did not exist before his simultaneous creation and discovery of it), and chooses from the multiple alternative not-yet-existing possibilities (all of which he created in his own mind) the one which he will pursue: the one-among-many-alternatives which is both the best attainable and the one most likely to succeed in the world which presently exists. This multiple-stage mental process which precedes and is integral with action seeking to achieve a new profitable future state, is the entrepreneurial process. "In addition to the exploitation of perceived opportunities, purposive human action involves a posture of alertness toward the discovery of as yet unperceived opportunities and their exploitation. This element in human action—the alertness toward new valuations with respect to ends, new availability of means—may be termed the entrepreneurial element in the individual decision." In Israel M. Kirzner, "Entrepreneurship and the Market Approach to Development" p. 109, and "But, during the instant of an entrepreneurial leap of faith, the instant of daring the new line of production, there is scope for the discovery that, indeed, the ends achieved are more valuable than had hitherto been suspected. This is the discovery of pure...entrepreneurial profit." p. 163 in "Alertness, Luck, and Entrepreneurial Profit"; both in Israel M. Kirzner, Perception, Opportunity, and Profit, The University of Chicago Press, 1979. Also see: "Uncertainty, Discovery, and Human Action: A Study of the Entrepreneurial Profile in the Misesian System," in Kirzner, ed., Method, Process, and Austrian Economics: Essays in Honor of Ludwig von Mises, Lexington Books, 1982, pp. 146-148; Israel M. Kirzner, Discovery and the Capitalist Process, The University of Chicago Press, 1985; "...incomes under capitalism—especially pure economic profit—are discovered incomes....the aggregate national output of a capitalist economy...is a discovered pie." from p. 20 in Israel M. Kirzner, "The Meaning of Discovery," Chapter 2 in Discovery, Capitalism, and Distributive Justice, Basil Blackwell, 1989, pp. 20-44; Israel M. Kirzner, "Entrepreneurial Discovery and the Competitive Market Process, An Austrian approach," Journal of Economic Literature, March 1997, XXXV, pp. 60-85; p. 162-164

Value of Equity is the Core of Finance:

The basic and fundamental concept in Finance is the Value of the Equity of the Firm. We will constantly focus on the Value of Equity. Each decision you write about must be couched in terms of its effect on the Value of Equity. Value of Equity is the present discounted (at the risk-adjusted cost of equity capital) value of the entire stream of cash flows available to the equity suppliers over the remaining life of the firm; you must include the terminal value at the end of the stream of explicit annual cash flows in your valuation. The value of equity is a part of the wealth of equity holders: all except the current time-zero \( t_0 \) cash flow.

Entrepreneurial Financial Management:

The Goal of the Firm is to increase the present wealth of the equity holders \( PWE_0 \) as much as possible; i.e., choose the course of action (as specified by the future forecast assumptions and parameters) which most increases the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends which could be paid by the firm without disrupting its future growth over its entire future life span, beginning with the current dividend at \( t_0 \) and including the Terminal Value at the end of the explicitly-forecasted period at \( t_T \). This future stream of potential dividends is called the series of Leveraged Free Cash Flows to Equity \( \{LFCFE_t\} \).

Maximize \( \Delta PWE_0 = PWE_0 \) (proposed course of action) – \( PWE_0 \) (existing plans of action)

\[
PWE_0 = CDE_0 + VE_0 = CDE_0 + \sum_{t=1}^{t=T} LFCFE_t / (1 + ke)^t + TV_T / (1 + ke)^T
\]

\( \{LFCFE_t\} \) are defined below.

\[
TV_T = LFCFE_{T+1} / (ke - g_\infty) = LFCFE_T (1 + g_\infty) / (ke - g_\infty)
\]

Two lines of successful action are required to be implemented to increase the wealth of the equity holders, which is essentially the present value of the future cash flows to the equity holders: 1) superiority of operations, which produces positive net income and profit, which are manifested in higher dividends; and 2) superiority of financing matched to the operations and goods market of the firm, which produces the appropriate amount of risk to be borne by the stockholders and provides the appropriate rate of return to the stockholders. Both lines of action must be followed. We shall always analyze 1) the "operating profit" of the firm and also 2) the "financial profit" of the firm. Profit is achieved by successfully offering superior opportunities to 1) the consumers of the firm's products and 2) the consumers of the firm's capital claims. Both forms of profit create the increase in the value of the equity of the firm which is the Goal of the Firm. Profit in each line of action is achieved by superior entrepreneurship in each activity: entrepreneurship in operations offers customers superior opportunities to those offered by competing firms; entrepreneurship in finance offers capital suppliers superior opportunities to those offered by competing firms. Operations are carried out in the "goods market". Financing is carried out in the "asset market". Financial assets are intrinsically different from consumable goods, and the analysis of them is different because the market processes determining prices are different.
There are two markets we consider: the flow market for "goods" and the asset market for "stocks". The firm operates in the flow market by producing goods to be consumed by its customers. The firm operates in the asset market by buying and selling capital assets (capital goods: machinery and long-lived equipment, real estate, and buildings) and by issuing shares of stock and bonds to be purchased, held, and traded by its capital suppliers. Successful firm management must combine superiority and success in both the operations and financing of the firm, and the successful financing must be accurately matched to the operations. Superiority of the firm is compared to the success of other firms which compete with this firm, both in selling goods and in selling assets.

The basic and fundamental concept in Finance is the Value of the Equity of the Firm. We will constantly focus on the Value of Equity. Each decision you write about must be couched in terms of its effect on the Value of Equity. Value of Equity is the present discounted value of the entire stream of cash flows available to the equity suppliers over the remaining life of the firm; you must include the terminal value at the end of the stream of explicit annual cash flows in your valuation. Firms succeed through the exercise of superior entrepreneurship in the rivalously competitive market. Superior entrepreneurship is achieved in competition with other firms, which seek to offer opportunities to customers this firm wishes to attract and to keep, and which also seek to offer capital investment opportunities to capital suppliers this firm wishes to attract and to keep. We will always assess the quality of entrepreneurship displayed by each firm and within each firm, and we will always take account of the rivalrous competition faced by each firm. Successful entrepreneurship produces profit, which can be seen as an increase in the value of equity. Profit arises from two sources: 1) the offering of opportunities to customers which are superior to those offered by competing firms; and 2) the offering of opportunities to capital suppliers; i.e., lenders and stockholders, superior to those offered by competing firms. "Profit" means that the revenues exceed the costs. We speak of "operating profit" and "financial profit."

ENTREPRENEURSHIP AND FORWARD THINKING:

The goal of this course is forecasting the future financial statements and cash flows of the firm, based on the present and anticipated future conditions and operations of the firm; computing the value of the equity from those forecasted future cash flows to equity, noting changes reflecting profit, and evaluating the quality of the entrepreneurship of the firm's managers in comparison with competing firms, on both the operating and financial dimensions; and making a decision regarding the best course of action for the firm to pursue. Remember that "analysis of the financial statements" consists in the computation of the value of the equity of the enterprise and the evaluation of the quality of the entrepreneurship of the firm's managers.

Entrepreneurship is the animating force of the market economy; it is how human beings achieve the future by acting in the present; it requires creative thinking to foresee how alternative futures will be, depending upon what present actions are undertaken. Entrepreneurship is a creative and imaginative act of foresight and change; the action of the entrepreneur causes the future to be different than it would have been if he had acted differently. Entrepreneurship is carried on by every market participant, not merely by those business innovators or leaders we call "entrepreneurs" (although they certainly engage in entrepreneurship). Business activity is co-ordinated acts of entrepreneurship which we seek to understand through analysis of financial statements. "Understanding" refers to the past and to the future; i.e., learning what past entrepreneurial acts were carried out to achieve the present, and seeing what entrepreneurial acts are presently being carried out to change the future. Successful entrepreneurs forecast the future more accurately than do others, so their plans are more successful, and their revenues exceed their costs, allowing them to win profits. Unsuccessful entrepreneurs forecast the future less
accurately than do others, so their plans are less successful, and their costs exceed their revenues, so they incur losses.

We call a market participant an "actor" because he acts; i.e., purposefully seeks to change the future from what it would have been if he had not acted into what he hopes to make it become. For this reason Ludwig von Mises' treatise on Economics is titled *Human Action*. Action requires two anticipations and their comparison: the forecasting of what the future will be if the actor does not act, and the forecasting of what the future will be if the actor acts in the way he is considering. If the actor acts, we know that he considered the former perceived future (which he has obliterated by his action) to be less satisfactory to him than he considered the latter perceived future (which he has sought to achieve). The actor may not have succeeded by means of his action in bringing about the future which he sought. These anticipations precede the action of the entrepreneur. Entrepreneurship consists not merely of the anticipations or forecasting of alternative futures, but also and inextricably the action seeking to bring about and achieve the future state by taking particular actions in the present:

entrepreneurship is directed action associated with the forecasting of the future.

Profits are won by successfully anticipating and achieving the future—that is, by offering customers opportunities superior, from their point of view, to other opportunities offered by others or to opportunities which formerly existed—this is "successful entrepreneurship." Unsuccessful entrepreneurship creates a state of affairs less attractive to the consumers than that which was foregone or that which is offered by competitors, so unsuccessful entrepreneurship creates losses. Profits are won by successful entrepreneurship.

"Forward Thinking" is the process of considering the entire future of a business entity and collapsing that future lifetime into a present value: it consists in evaluating the business. Successful managements are those who always think forwardly and who are successful entrepreneurs. Nobody always forecasts perfectly, so sometimes even superior entrepreneurs are wrong, and sometimes even superior firms have losses. "Managerial performance" consists in successful entrepreneurship, which achieves profits, and accurate forward thinking, which values the profits.

Value is the present discounted value of all of the future cash flows which the owners of the firm can take out of the firm over its entire lifetime through the future without impeding its continuing operation and future (planned) growth.

Genuine managerial performance is understood by successful forecasting of the future achievements of the firm and the valuation of those future achievements. Genuine managerial performance wins profits for the entrepreneur and increases the value of the firm's equity.

We will concentrate on understanding the effect on firm value of the financial statements. Firm value is the present value of all the future actions of the firm: value is the result of forward thinking. The future actions of the firm are the measure of the success of the entrepreneurship of its owners, managers, and employees. Successful entrepreneurship wins profits and increases the value of the firm. Unsuccessful entrepreneurship creates losses and decreases the value of the firm.

This is a Finance course and not an Accounting course, so we are interested in learning the true financial condition of the firm from the financial statements, which may be accidentally or deliberately misleading or incomplete. We do not care what the accountants have said; we seek truth. *Finance* is the application of economic principles to decision making and decision analysis for inter-temporal action, just as engineering is the application of chemical and physical principles to solving problems. We will evaluate the success of entrepreneurship of the management and employees on both the operating dimension and the financial dimension.

We wish to understand how the value of the firm has been affected by the economic events portrayed in the financial statements, and how the future actions of the firm can be foreseen in the financial statements. It is the future actions which cause the present value which we observe and which cause changes in that value.

We shall seek to understand the hidden meaning of the statements. We shall not spend much time on alternative accounting treatments of various concepts, but shall try to see through the accounting
to the reality hidden beneath. You have already learned much about the accounting treatments of
revenues, expenses, inventories, long-term debt, equity, earnings per share, etc. A thorough review of
the accounting is contained in the Stickney textbook; a shorter review is in the Fraser and Ormiston
book. I shall presume you remember all of the accounting details. You must remember all accounting
you have been exposed to.

We will measure the implications of alternative proposed actions through our evaluation of the
firm; i.e., estimating the present value of all its future activities in the value of equity.

We will focus on the main topics of Finance theory: valuation, capital structure, cost of capital,
growth, capital acquisition and disbursement. Review these topics in your Finance 300 textbook and in
the thick handout "Principles of Finance" I give you.

Entrepreneurial activity is the successful anticipation (i.e., foreseeing) and achievement (i.e.,
bringing about) of the future through present activity. We always seek to understand the entrepreneurial
activity of the firm in analyzing the financial statements. This entrepreneurial activity, whether
successful or not, is interpreted by us on the basis of our evaluation (i.e., estimating the present value of
all future activities) of the future activities of the firm which we forecast on the basis of our analysis of
the financial statements. This is a different point of view from that of the accountant.

We know that the past decisions made by the firm, the results of which we see in the current
financial statements (for example the degree of financial leverage or changes in the inventory turnover
or the return on equity), were made in the past in an effort to improve the firm's present situation by
increasing its value. We will evaluate the quality of the firm's past entrepreneurial actions on the basis
of the present capital structure and the present business and economic conditions and the firm's current
value and changes in that value during the recent past, in response to the firm's decisions. We will form
a judgment regarding the entrepreneurial alertness and success of the management on the basis of this
analysis of the success of past actions. Based on our evaluation of the quality of the entrepreneurial
decisions of the firm, we will judge the likelihood of current and future entrepreneurial success in the
context of the competitive environment. We likewise know that present decisions the firm is making are
also aimed at improving future conditions by increasing the value of the firm forward from today, and
we will forecast those future conditions on the basis of our present observations. Our forecasting of the
future financial statements therefore focuses on how the value of the firm will be affected by current
decisions and what the implications of present decisions are for potential changes in the firm's value.

We value the firm based on our forecast of future financial statements and resulting cash flows to
equity which will occur in the future, for the remainder of the lifetime of the firm, with the future cash
flows to equity discounted at the cost of equity capital of the firm. The future cash flows to equity are
forecasted based on our understanding of the present condition of the firm and our understanding of the
entrepreneurial activities which we anticipate will be made. Evaluating the increase in the value of
equity resulting from the decision we recommend and the resulting forecasting of the future financial
statements and cash flows of the firm is the goal of this course.
GOAL OF THIS FINANCE 601 COURSE

Finance is about exchanges which are not instantaneously completed, but which have a finite time period elapsing between the beginning and the completion, during which time nothing happens. In a financial transaction, cash flows are separated by one or more periods of time.

Finance is the application of economic principles to decision making for inter-temporal action—action taken in the present to influence the future across time. We forecast a detailed sequence of future cash flows and value that sequence by discounting at a risk-adjusted rate. We choose the course of action to follow as the alternative with the highest Net Present Value. This involves intimately the process of entrepreneurship—the selection of the most valuable course of action to pursue now in order to create a future which does not now exist by, imagining what the future will be like if we pursue a particular course of action, and selecting the possible course of action from among all the possibilities we identify which we decide is best. We must take action now on the basis of our forecast of what the future will become if we act in a particular way. Because the future is unknown, we must forecast what the outcome of our action will be before we choose which action to pursue. We select the best course of action from among all of the many possibilities we imagine and enumerate. In Finance, we select the best course of action by means of the Net Present Value of the course of action: we choose that course of action which has the largest Net Present Value of all the alternative courses of action which we identify in advance.

All Finance is Entrepreneurship, and all Entrepreneurship is Finance.

The goal of this course is Valuation of the Equity of the Firm: first, by forecasting the future financial statements and cash flows of the firm through its termination; and second, by discounting the future cash flows, including the terminal value at a risk-adjusted discount rate. The correct course of action is the one which increases the value of the firm the most: that is the one with the highest Net Present Value.

We choose a course of action to pursue by forecasting the results of all of the possible alternative courses of action which we can imagine, and choosing the course of action we judge “best.” The goal of this course is forecasting the future financial statements and cash flows of the firm, which will result from each particular course of action which could be pursued, based on the present and anticipated future conditions and operations of the firm; computing the value of the equity from those forecasted future cash flows to equity, noting changes reflecting profit, and evaluating the quality of the entrepreneurship of the firm's managers in comparison with competing firms, on both the operating and financial dimensions; and making a decision regarding the best course of action for the firm to pursue. "Valuation" consists in the computation of the value of the equity of the enterprise and the evaluation of the quality of the entrepreneurship of the firm's managers.
There are several important principles we must always remember as we forecast a number of alternative possible future courses of action and select the best one of them on the basis of the largest Net Present Value:

1) valuation is subjective;
2) action seeks to change the future; the future is unknowable but not unimaginable;
3) time preference and the time dimension of profitability are subjective;
4) risk is subjective and the risk premium in discounting is subjective;
5) marginal analysis, not average analysis, is the correct thought process;
6) markets convey information to actors;
7) markets co-ordinate valuation, time preferences, and risk perceptions;
8) entrepreneurship is creative, and profit is created subjectively;
9) capital goods are heterogeneous and complementary;
10) clear and correct definitions of alternatives and changes in courses of activity;
11) the best course of action is selected on the basis of the largest value created.

The goal of this course is to teach you how to think in terms of present values of alternative future courses of action so that you can entrepreneurially forecast the future cash flow which will result from a particular course of action, and then entrepreneurially choose (that is, to select from all of the alternative possible forecasted courses of action) the proper course of action for the firm to follow, based on the present values of the alternative future courses of action. A course of action begins by identifying the outlay necessary to move onto its path from the present condition of the firm, which will remain the same unless action is taken. All decisions choose between alternative future courses of action, because only the future can be altered. All financial decisions are entrepreneurial in nature because of the need to forecast the outcomes which will result prior to the taking of action and then choosing the best course of action based on the present value of the future benefits it will bring about. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated. The numerical value of the Net Present Value of a course of action is the exact amount by which the wealth of the shareholders will be increased if the company follows that course of action. The future course of action is entrepreneurially specified in terms of future pro-forma financial statements and cash flow statements. You will learn in this course how to construct such pro-forma statements and value them.

Wealth of the shareholders is the present value of all the future cash flows which the shareholders will receive across the entire future life of the firm because of their ownership of the firm: either: 1) dividends plus the selling price of the stock; or 2) the sequence of free cash flows to equity plus the terminal value of the firm.

Valuation is the crux of finance. Valuation of the firm is accomplished by discounting at the risk-adjusted cost of capital the future cash flows derived from the forecasted future financial statements of the firm. The goal of this course is forecasting the future financial statements and cash flows of the firm, including the terminal value, based on the present and anticipated future conditions and operations of the firm in the environment of its product market and security market, and then estimating the risk-adjusted cost of capital, and then computing the discounted present value of the entire stream of forecasted cash flows.

Value is the present discounted value of the all of the future cash flows which the owners of the firm can take out of the firm over its entire lifetime through the future without impeding its continuing operation and future (planned) growth.
It is the planned future actions which cause the present value which we observe and which cause changes in that value. Evaluating the increase in the value of equity resulting from the decision we recommend is the goal of this course.

ACTION IS ENTREPRENEURSHIP, and ENTREPRENEURSHIP IS ACTION. FINANCE IS ENTREPRENEURSHIP, and ENTREPRENEURSHIP IS FINANCE.

Valuation is subjective, so it is based on forecast assumptions which create the future forecasted cash flows to equity. Financial statement analysis is a comprehensive process of thought which creates in the analyst's mind an understanding of the entrepreneurial capabilities and success of management and management's changes in the value of equity. Valuing the firm is the goal of this course: first, by forecasting the future pro-forma financial statements through the Terminus T; second, by forecasting the free cash flows through the Terminus T; third, by forecasting the Terminal Value at the Terminus T; and fourth, by discounting the stream of future forecasted cash flows and Terminal Value at the risk-adjusted cost of equity. The present value of equity of the proposed future course of action is compared with the present value of equity of the existing situation, and the increase in value of equity if the proposed course of action is implemented, is determined. The correct decision in any situation is to choose the course of future action which most increases the value of equity of the firm, after explicitly forecasting the future cash flows which will result from each possible course of action identified at the decision moment.

This course will teach you: (1) to forecast accurately the future parameters, cash flows, and Terminal Value of the firm in the anticipated future conditions; (2) to forecast the future pro-forma financial statements, cash flows, and Terminal Value of the firm, based on the present and anticipated future conditions and operations of the firm in the environments of its product market, supply market, and security market; (3) to compute the present value of the equity of the enterprise by discounting the future cash flows and Terminal Value at the risk-adjusted cost of capital; and (4) to evaluate the quality of the entrepreneurship of the firm's managers based on the changes in the value of equity which they achieve by creative thought, planning, and action.

The Goal of the Firm is to increase the present wealth of the equity holders $PWE_0$ as much as possible; i.e., choose the course of action (as specified by the future forecast assumptions and parameters) which most increases the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends which could be paid by the firm without disrupting its future growth over its entire future life span, beginning with the current dividend at $t_0$ and including the Terminal Value at the end of the explicitly-forecasted period at $t_T$. This future stream of potential dividends is called the series of Leveraged Free Cash Flows to Equity $\{LFCFE_t\}$.

Maximize $\Delta PWE_0 = PWE_0 \text{ (proposed course of action) } - PWE_0 \text{ (existing plans of action) }$

$$PWE_0 = CDE_0 + VE_0 = CDE_0 + \sum_{t=1}^{T} LFCFE_t / (1 + ke)^t + TV_T / (1 + ke)^T$$

$\{LFCFE_t\}$ are defined below

$$TV_T = LFCFE_{T+1} / (ke - g_\infty) = LFCFE_T (1 + g_\infty) / (ke - g_\infty)$$
Entrepreneurial Financial Management

At the present moment, the firm has a particular operating and financial condition; i.e., a line or lines of business, particular products under production, inventory policy and plans, new assets slated for purchase and existing assets slated for disposal, collection practices, payment practices, a line of credit, long-term debt, equity, a capital structure policy, a capital-acquisition-and-disbursement policy, an investment policy, current values of financial ratios and funds flows, particular values of the cost of debt, the cost of equity, and the weighted-average cost of capital.

Also at the present moment, the firm has a particular current plan for future operations and financing. This current plan may be either:

1) merely a continuation of the present policies and practices, so that no change is expected to occur in the future in the parameters that describe the firm (such as capital structure, costs of capital, payout ratio and retention rate, etc.), and the value of equity and the wealth of the shareholders is not expected to change; in this case, the future forecasted pro-forma financial statements will appear very similar to the actual statements of the most recent year; or

2) a planned change in some or all of the operating or finance parameters designed to achieve an improvement in the wealth of the shareholders or value of equity or earnings per share or profitability or risk; in this case, the future forecasted pro-forma financial statements will appear different in some respects compared with the actual statements of the most recent year.

Entrepreneurial financial management is the creation and implementation of a new plan of action for either operations or financing, or both, changed from the current plan and which is different from whatever the current plan is; i.e., either (1) or (2) above, and which will bring about changes in the forecasted future pro-forma financial statements compared with both the most recent actual financial statements and the forecasts of (2) above. This new plan of action did not previously exist, nor was it anticipated by anyone; it is a completely new imagination of the future and the relationship between immediate actions and the new future state. This new plan of action is intended to increase the wealth of the shareholders (or increase the value of equity or earnings per share or profitability or reduce risk) above whatever value it now has on the basis of the present existing plan and forecast. The new plan specifies particular actions which must be carried out to achieve the new forecast, and these particular actions must indeed be actually carried out, thereby changing the future, as reflected in the pro-forma financial statements and in the value of the stock. The value of the stock will change immediately once the new plans are implemented and the market learns of the new plans and assesses their likely success.
The new future state must be imagined and created, the plans which will achieve that new future state must be imagined, created, and implemented to be an act of entrepreneurship. The imagined future state is newly-created and did not before enter into anyone's thinking. The plans to achieve that newly-imagined future state could not have existed prior to the imagining of the new future state.

Prior to taking the action which will implement the new forecasted future state, the planned actions are evaluated by forecasting new pro-forma statements which will result from the planned actions and comparing the risk, return, value of equity, and wealth of shareholders implied by the new pro-forma statements with the existing parameters associated with the existing present plans of (1) or (2) above. Alternative imagined futures and their associated plans can be evaluated so that the best path from the present to the best (chosen) alternative future can be implemented.

The problem which must be solved is how to organize the firm so that these new plans—which are essentially entrepreneurial—are made in the best possible way; i.e., made more timely, more easily, and more effectively, and lead to larger increases in the wealth of equity holders than other plans which might have been made.

MISCELLANEOUS THINGS TO REMEMBER:

Profession (engineering, medicine, business administration, finance) vs. science (physics, chemistry, biology, economics):

Science is the study of how the world is; a profession seeks to change the world in accordance with man's purpose. Business school is a professional school.

The sciences of Human Action (economics, sociology, etc.) are highly complex, and valuation is subjective, so we cannot know fully in advance the outcomes of particular actions involving other people: business forecasting is imprecise.

Entrepreneurship is forecasting the future result of a chosen action in the present and implementing that course of action to achieve the future. Cost is subjective also. Profits, either past or forecasted future, are therefore always estimates.

Personal Analysis for the future ("I think" or "I estimate" instead of "it is") is done because we have incomplete scientific ability to analyze and forecast; hence, error is likely. Remember that historical financial statements may be incorrect also.

Comprehensive and Systematic Analysis: The "Spider-Web" analogy. Comprehensive analysis includes all relevant data and factors. Systematic analysis includes the correct relationships among factors. Think of the structure of a spider web: the nodes of intersection of strands of web represent facts, and the strands connecting nodes represent equations describing the relationship between facts. Sequences of strands connect together nodes which are far away from each other. Intersecting strands connect nodes from far away in different directions.
Complete Accuracy and Highest Precision is necessary in analysis. Your work should be the best work possible, given the information provided. Your name on a report should indicate the highest quality possible, completely reliable in all respects.

Absolute Truth must be stated in all reports and statements so that the recipient of your personal analysis may know what is factual and what is estimated. You must cite the source of all factual statements to contrast them with the estimations and forecasts you have made. If something you say is not known to be factual, you must state that you have estimated it.

Always identify each and every cash flow with its particular time point of occurrence and always show the time-index subscript on each cash flow; for example: $RCPT_3$ or $LFCFE_2$ or $IVS_4$

Absolutely correct grammar, diction, and syntax.
"Diction" is the selection of the correct word for the meaning you intend and its function in the sentence.
"Syntax" is the construction of proper, meaningful, and coherent sentences.

In the United States, we refer to the firm as a singular neuter entity: we use the pronoun "it" to refer to the firm. We do not use the pronoun "they" in referring to the firm, as do the British. It is true that the firm is composed of a number of individuals; nonetheless, we emphasize the unity of purpose of the firm in its actions. We say things such as: "The firm is changing its capital structure." "The firm is hiring more employees." "It is engaged in a modernization."

The possessive pronoun "its" has no apostrophe; this is different from the possessive of proper nouns, in which an apostrophe is added; for example: "Furtwaengler's interpretation of the Beethoven Fifth". Remember there is no apostrophe in: "The firm altered its investment plans."

If you write "it's" you must mean the contraction of "it is". There is no alternative.

Writing in active voice is stronger than in passive voice.

Dollar amounts require a Dollar Sign ("$") in front of each amount.

Specify the Units of Dollar Amounts; i.e., "thousands" or "millions", or "dollar amounts in thousands" or "dollar amounts in millions" at each occurrence in a sentence and at the top of each spreadsheet.

Despite the predations of political correctness on our society, I wish you to use the singular general (although it appears to the blind to be "male") pronoun when appropriate; do not use "he or she", "his or hers", "they", "theirs", "him or her", "himself or herself", or any other of the abominations foisted off on a careless world by the deliberately stupid when the referent is a singular individual, of whatever gender. "Each of you thinks for himself." "Each boy and girl had dressed in his finest clothes for the coronation."
FINANCIAL ANALYSIS vs. FINANCIAL MANAGEMENT

Finance is the systematic study of present and future actions which affect present value.
Valuation is subjective. Risk perception is subjective.
“Subjective” means the result of voluntary free choice in the mind of the actor.
Value now depends on the present discounted value of expected future cash flows.
All forecasts are necessarily approximate.
Discounting adjusts for subjective risk.

Financial Analysis—Finance 820

Financial Analysis is outsider-oriented; i.e., it is a non-management external analysis of the past and deduced-present decisions of management and the effects on firm value of those past and present decisions. It is not entrepreneurial, but analytical. The outside analyst attempts to deduce what the entrepreneurial decisions of the firm’s managers were or are. The value of the firm is computed as of the present moment based on the present inferred plans of management. The exterior analyst seeks to understand the plans of management, as they are revealed in the present and most likely future financial statements. The financial analyst does forecast future pro-forma financial statements and cash flows, based on the likely forecast of presently-planned management actions. The financial analyst then computes the value of the firm and the value of equity based on those future forecasts. If the analyst thinks there are alternative plans which management might implement, the analyst prepares alternative forecasts and valuations based on those alternative assumed plans. The analyst then deduces the likely course of action which management will take based on the value computed of the alternative plans: the analyst predicts that management will take those actions which will result in the largest present value of the firm.

Financial Management—Finance 601

Financial Management is insider-oriented entrepreneurial action; i.e., it is a management decision of what will be done now and in the future to increase the value of the firm now. It is an entrepreneurial action: a change in future plans to a superior plan for action than the existing plan; “superiority” means higher $V_E$ and $V_F$. Entrepreneurship is action consisting of the creation and implementation of a new plan of action which will bring about a future state superior to any which has previously been imagined by anyone. Entrepreneurial financial management is entrepreneurial action regarding superior future financial plans of investment, financing, or capital acquisition/disbursement actions, epitomized by future forecasted cash flows. Management asks, “What can we do now to change the future from what it will be under our present plans so that the future will become better and the present value of the firm will rise? That is, what new plans can we make now to improve the future?” This is an entrepreneurial action. The value of the firm is computed based on the new forecasts of financial statements and future cash flows under the newly-planned actions chosen, and this new value is compared with the value which had been inferred from the previous plans; if the new value is larger than the previous value, then the new plan is implemented; if the new value is smaller than the previous value, then the new plan is not implemented, but a new—yet another—entrepreneurial plan is made.

Management has three broad areas of decisions to make regarding financial affairs:

**Capital investment:** $NPV \geq 0$; $DOL = \Delta%EBIT/\Delta%SALES$; $g^* = R_f + \beta (E[R_M] - R_f)$; $ke = (d_1/P_0) + g_\infty$; $ke = kd + 0.05$; $g_\infty = br$; $g^* = PRAT$

**Capital structure:** $\Theta = VD/VF$; Hamada equation: $\Delta \Theta \rightarrow \Delta \beta$; $\Delta \Theta \rightarrow \Delta g_\infty$; $\Delta \Theta \rightarrow g^*$; $k_f^* = \Theta k_d^* + (1-\Theta) ke$; $DFL = \Delta%NIAT/\Delta%EBIT$

**Capital acquisition and disbursement:** $NDC, NEC, CDD, CDE$; $p, b, \rightarrow \Delta g^*$; $\rightarrow \Delta g_\infty$.
FINANCIAL MANAGEMENT

Capital investment determines the business risk of the firm, measured by fluctuations in EBIT; capital structure determines the financial risk of the firm, measured by fluctuations in NIAT compared with fluctuations in EBIT; the capital acquisition and disbursement decision determines the sources of financing used and the disposition of cash generated from the investments and operations of the firm.

The cost of capital, ke (the cost of equity) or kf* (the weighted-average cost of all capital), is determined by the business risk, the financial risk, and the capital structure Θ. The cash flows (UFCFF_t and LFCFE_t) which determine respectively the present values of the firm (VF_0) and of equity (VE_0) depend also on the capital acquisition and disbursement decisions. All of these processes affect the discount rates (ke and kf*) which transform future cash flows into present values: kf* discounts the UFCFF_t ‘s and ke discounts the LFCFE_t ‘s. To each stream of cash flows, however long it is forecasted to time point T, must be added a “terminal value” TV_T at the last time point forecasted (T), which captures the remaining future cash flows beyond time point T. We usually use the Gordon model to estimate the Terminal Value at time T.

We shall focus on the value of equity VE_0 and the value of the firm VF_0:
1. forecast pro-forma income statements and balance sheets;
2. compute Leveraged Free Cash Flows to Equity (LFCFE_t) and Unleveraged Free Cash Flows to the Firm (UFCFF_t);
3. Compute ke from the Capital Asset Pricing Model: ke = R_f + β (E[R_M] – R_f);
4. explore the Gordon model of constant perpetual growth: VE_0 = d_1 / (ke – g_∞); g_∞ = br;
5. study the Sustainable Growth Model: g* = PRAT^*;
6. value the equity VE_0 of the firm and the value of the entire firm, VF_0 = VD_0 + VE_0;

and then use the changes in the value of equity as the basis to study the effects of:
1. investment decisions, which affect operating leverage and the sustainable growth rate;
2. the computation of free cash flows to equity and to the firm, which are used to value equity and to value the firm;
3. the effects on ke and kf* of these decisions;
4. the effects of capital structure Θ and financing decisions on ke and kf*, on the Gordon constant-perpetual growth rate, and on the value of equity and the firm;
5. the Adjusted Present Value ("APV") method of valuing a levered firm;
6. the Hamada equation showing how Θ affects financial risk and β;
7. the effects of capital acquisition and disbursement decisions on the value of equity and the value of the firm.

We begin with financial cash flows and determining VE and VF.

\[
VE_0 = \sum_{t=1}^{T} \frac{LFCFE_t}{(1+ke)^t} + TV_T / (1+ke)^T
\]
\[
VF_0 = \sum_{t=1}^{T} \frac{UFCFF_t}{(1+kf*)^t} + TV_T / (1+kf*)^T
\]

We compute ke from one of the three models, emphasizing the CAPM:
ke = R_f + β (E[R_M] – R_f);
ke = (d_1/P_0) + g_∞; g_∞ = br;
ke = kd + 0.05.

We compute kf* = Θ kd* + (1-Θ) ke.
The valuation of the firm at first is based on the computation of VE₀ for the firm with Θ specified and ke specified, using the alternative cash flow forecasts, with TV’s added, and a choice of infinite growth rate in the Terminal Value.

Then, we alter the investment decision and extend the time frame of the forecast. We keep the capital structure at all-equity, but we have an adjustment to ke based on the change in business risk associated with the investment and higher operating leverage.

Next, we alter the financing and capital structure of the firm by adding debt. This increases the financial risk and adds an additional risk premium to ke. We study the change in the value of the firm caused by the change in Θ using the ordinary valuation method and also using the Adjusted Present Value method. We use the Hamada equation to alter the β factor of the firm to account for the change in Θ. Changes in capital structure also alter the rate of growth the firm can sustain and the constant perpetual rate of growth it can achieve. We must at the same time alter the capital acquisition and disbursement decision because of the new acquisition of debt capital and the payment of interest and principal which is associated with the change in capital structure. We have changes both to ke and to kf* through the effect of ΔΘ.

This is the entire range of financial decisions made within the firm.
DEFINITION OF FINANCE:
Finance is the study of exchanges which are extended over an interval of time; hence, risk and uncertainty play a role in every financial decision. Financial management is the rational selection and operation of assets, and the raising of the funds necessary to pay for them, so as to benefit shareholders, employees, and customers. Financial decisions are always made by comparing the present values of alternative courses of action: Net Present Value is a measure of profit. Business financial decisions are made within the environment of financial markets, so the structure and processes of the financial markets must be understood. In a free market, business financial decisions benefit all the people in the society by rationally allocating resources across time in accordance with the values of the inhabitants of the society. Financial markets co-ordinate the usage of resources across time in accordance with the values of the participants of a market economy; i.e., to benefit the consumers.

PURPOSE OF THIS COURSE:
To teach you how to think in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated. To teach you how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. To teach you how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. To teach you to analyze alternative courses of action in terms of the present value of a system of cash flows.

You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up. Action is choosing the most valuable alternative from among those available.

BRIEF DESCRIPTION OF FINANCIAL MANAGEMENT
Management is Choosing and Implementing a Course of Action. All decisions choose between alternative future courses of action, because only the future can be altered.

Financial decisions select one particular course of action from the many opportunities available. Financial decisions relate to future courses of action and future events and conditions: future sales and expenses, future dividends and interest, future repayments of debt. But these decisions relating only to the future must be made today in the present, before they come to pass. This means that we must evaluate alternative future courses of action before they can be tested. This is possible only in a market economy with a medium of exchange, through the mechanism of "present valuation of future money (cash) flows."

Valuation can be accomplished only in a free market; there can be no economic values in a command economy. Command economies cannot allocate capital goods efficiently because there can be no market in capital goods in a command economy. Command economies cannot efficiently, rationally, and coherently allocate consumers' goods across time because the time dimension of transactions is missing. Correct financial decisions choose the course of action with the greatest value from among the alternative courses of action available.

The free society vs. the command economy. Respect for and protection of property rights of individuals are basic to civilized society.
Economic Functions of Financial Markets: to reduce the risk borne by investors and increase the rates of return available to investors, and to increase the flow of capital into investment. Interest rates reflect the time preferences of the market participants and the investment opportunities they perceive. Interest rates are not an "exogenous" variable, an "ether" within which transactions occur; rather, interest rates are the results of ebullient competition among market participants. Rates of return of assets are not properties of the assets, but instead are perceptions and forecasts of the minds of the owners (actual and potential) of the assets, and rates of return depend upon the idea of the owner about how best to use the asset.

Inter-temporal Allocation of Goods. Co-ordination of time-spanning production processes is accomplished by competition in interest rates and competition in rates of return. Financial markets produce "Financial Intermediation" and "Asset Transmutation," which determine the nature of corporate structure: the separation of ownership from management, which makes possible the greater efficiency and productivity of the corporate form of organization, compared with more primitive forms of organization such as the individual proprietorship and the partnership. The effects of Financial Intermediation include risk reduction through the processes of diversification and use of expertise, and the combination of small portions of individual savings into large funds of capital, thereby increasing the efficiency of investment. The benefits of Asset Transmutation Effects are greater in magnitude than the benefits of intermediation, and they arise from specialization in entrepreneurship and separation of ownership from management. The goal of financial management in a free society is to benefit the owners of the capital which constitutes the firm.

Cash Flows are the data of Finance. The basic data of financial decisions are cash flows: the particular amounts of cash (money) received by the firm and expended (paid out) by the firm at particular times (called "moments" or "time points") in the future. We speak of the cash flow from an investment proposal for next year, the year after that, and the year after that; and so on. We indicate the dates of cash flows, and whether they are receipts or payments, on a time line. Accrual accounting concepts are not used in financial analysis or financial decisions, even though the accrual accounting data form the basis of the calculation of cash flow amounts.

Financial Analysis tells us what has happened to the firm in the past to bring it to its present state. We use several different techniques: Financial Ratio Analysis; Funds cycles and funds flows; Sources and Uses of Funds Analysis; Statement of Cash Flows; Financial Cash Flow Analysis; Pro-Forma Statement Forecasting by ratios and sustainable growth.

Financial Decisions are always made on the basis of Net Present Value. In order to evaluate future cash flows, we must find out how valuable these cash flows are today, when we make the decision. This procedure of determining the present value of future cash flows is called discounting the future cash flows. It consists of finding an amount of money which, if available today, would allow us to exactly duplicate the entire series of future cash flows, in the same amounts and on the same dates as they are expected to occur in the future. The opposite mathematical procedure, similar to computing how much the balance will be in a bank savings account on some date in the future, is called compounding. Consider a stream of several or many cash flows occurring at different dates across time; these cash flows can be receipts ("inflows") or disbursements ("outflows"). We can compute the value of this stream of cash flows at any single time point, past or future, as well as at the present moment; when we do that, we call it the "net value" of the cash flow stream at that particular single moment we have chosen to compute a lump sum (dollar value) which is entirely equivalent to the whole stream of many cash flows.

Rate of Return. A "rate of return" is just like an interest rate paid by a bank on a savings account. Rates of return are usually expressed as percentages on an annual basis: 6.5% per year of the principal amount is paid as income, while the principal amount is held constant.

Risk and Required Return. Since we cannot know the future, there is always an element of risk involved in choosing any course of action, since we cannot know for sure how it will turn out. Human
beings dislike risk: hence, they want to be paid for bearing it, and they want to be paid more for bearing more risk. We say that "the required return increases, the greater the risk borne."

Greater Risk Requires Greater Return. The basic relationship in finance is this: the greater the risk perceived in owning an asset during the future, the higher is the rate of return required by the owner of the asset. Unless the owner expects the future rate of return to be large enough, he will not purchase the asset. Risk therefore causes a required or expected rate of return, such that, if the rate of return offered by an asset is not large enough, the price of the asset must SPRING until the expected rate of return is large enough to justify bearing the risk.

Risk-Expected Return Relationships. The Security Market Line expresses this relationship between risk and required rate of return, showing that the larger the amount of risk borne by an investor, the larger is the required rate of return that investor requires on a single investment in order to be willing to bear the risk. The Capital Asset Pricing Model (CAPM) is a particular mathematical model approximating the security market line based on a set of simplifying assumptions. The Capital Market Line expresses the equilibrium relationship between expected return and risk of "efficient" portfolios of assets.

Financial Assets. Shares of stock and bonds are financial assets, or "securities", which offer the prospect of future receipt of cash to the holder. These securities have values commensurate with the amounts and timings of the future cash flows and the risk involved in the receipt of these prospective cash flows. The value of all the bonds (debt) which the firm has outstanding is called the value of debt (VD), and the value of all the shares of stock which the firm has outstanding is called the value of equity (VE).

Cost of Capital. The cost of capital is the rate of return the firm must pay to acquire investment capital. Note that the cost of capital is NOT a dollar amount; the cost of capital is a percentage amount, or a decimal fraction, since it is a rate of return, equivalent to an interest rate.

Value of Debt. When the firm borrows, it promises the lender first access ("prior claim") to the cash flows remaining after all employees and suppliers of materials and services used in production have been paid ("CAC" = cash available to all capital suppliers). The firm also promises to pay the lender particular amounts of money on particular dates, and this promise is written down. So the lender has first claim to the available cash and an enforceable contract (bond indenture) which guarantees payment: the lender bears little risk. On the other hand, the lender can stop the operation of the firm and gain ownership over the firm's assets through forced bankruptcy if the firm does not have enough cash to make good on this promise; hence, the risk borne by the firm is great, since borrowing can potentially destroy the firm. Because the bondholders (lenders) are so protected, they bear little risk, and therefore require a small rate of return on their investment: we say the "cost of debt capital" is low. (The cost of debt capital to the firm is further reduced by the tax-deductibility of interest payments made by the firm to the bond holders.)

Value of Equity. When the firm sells stock, on the other hand, it promises nothing to the equity investor except "best efforts", and the firm has the option of paying dividends to equity holders only if it chooses to, and then only if there is any cash at all ("CAE" = cash available to equity) remaining after everybody else associated with the firm has been paid in full. The equity holders have a "residual claim" to cash. Not only do equity holders receive dividends only after all the required payments are made to debt holders, but if the debt holders force bankruptcy on the firm, the debt holders take over the ownership of the assets, and the equity holders have no assets remaining under their ownership. Hence, the equity holders bear great risk, since they have no idea of the amounts and timings of any future cash flows (dividends) they may receive, and they can lose all of their investment in the firm. The equity holders have no recourse to the firm, so the firm bears little risk in issuing equity. Because the equity holders bear great risk, they require a high expected future rate of return on their investment in the firm's stock (higher than the rate of return required by the bond holders on their investment in the debt of the firm): we say that the "cost of equity capital" is higher than the cost of debt capital.
Capital Structure and Its Optimum. We see that there is a tradeoff to the firm in issuing debt and equity capital claims: debt is riskier to the firm but cheaper; equity is safer but more expensive. There is therefore an optimum combination of debt and equity which balances risk and cost of capital. The combination of debt and equity which a firm uses to finance itself is called the "capital structure ratio" or the "debt ratio". I use the capital Greek letter Θ (THETA) to denote the ratio of the value of debt to the sum of the value of debt plus the value of equity: \( \Theta = \frac{VD}{VD + VE} \).

Valuation Models. The firm is a system which produces future cash flows to the owners and creditors; hence, it has a value which is commensurate with the timings and amounts of these future cash flows and the risks involved in their receipt. We will study a couple of valuation models for the firm which approximate the value of the firm in a simplified way. These valuation models were suggested by Mike Gordon and Ezra Solomon, and carry their names.

Goal of the Firm. The goal of the firm is to benefit the owners of the firm, since it is their capital which the firm employs, and the economic and social system protects individuals' rights to their property. We call this "shareholder wealth maximization": the firm makes decisions which increase the "present wealth of equity holders" (PWE0) as much as possible.

Term Structure of Interest Rates. We find that securities of the same degree of default risk but of different terms to maturity generally offer different rates of return. This is called the "term structure of interest rates." You can see it in the Treasury Issues column of The Wall Street Journal.

Investment Achieves Growth. How firms grow: by re-investing earnings from operations. Gordon and Solomon Valuation Models both capture this relationship and show us how firms can support growth. Growth of sales requires financing of new assets: the Sustainable Growth Model for a Levered Firm shows how rapidly a firm can grow, and suggests the consequences of growth which is more rapid than the firm can support.

Operating and Financial Leverage: Fixed operating costs cause operating income to fluctuate more wildly than sales do from period to period (operating leverage); fixed financing costs (interest payments) cause returns to equity holders to fluctuate more wildly than does operating income (financial leverage). Risk can be viewed as the percentage fluctuation (change) in income or cash flow or return from period to period. Therefore, fixed costs of operations increase risk to the firm, and fixed financing costs (interest expenses) increase the risk borne by the equity holders. However, operating leverage increases the percentage return to the firm from increases in profitable sales, and financial leverage increases the percentage return to the stockholders from use of profitable borrowing ("favorable financial leverage").

Capital Investment Decisions (Capital Budgeting): How to choose whether or not to acquire new assets to perform new functions or replace existing assets. Assets are always selected on the basis of the Net Present Value (NPV) of the course of action involved. Note that an asset does not have a Net Present Value; use of that asset in a particular course of action has a Net Present Value. Assets should never be selected on the basis of the Internal Rate of Return (IRR) computed.

Calculating the NPV. The NPV is calculated from the future cash flows forecasted from a particular course of action. We will discuss forecasting future cash flows--net, after-tax, operating cash flows (CAUt-IVSt); discounting to Net Present Value using the Cost of Capital. The cost of capital is the opportunity cost of the capital: the highest available rate of return in another application, which the capital would earn if it were employed in that application instead of the one we are analyzing. The cost of capital also represents the re-investment rate: the rate of return which will be earned by future cash flows if they are re-invested by the firm in another project. The cost of capital represents the minimum acceptable rate of return which a project must earn in order to be acceptable. If the project just barely earns the cost of capital (has a zero NPV), the firm will just barely be able to pay to all capital suppliers their respective required rates of return. If the project earns more than the cost of capital (has a positive NPV), then the firm will be able to give stockholders a larger rate of return than they had required for bearing the risk of the stock: stockholders will make a profit. A "profit" is the additional cash over and above the amount of cash that was required to justify bearing the risk involved, net of all expenses;
profit is not merely what is left over out of revenues after payment of all expenses. This would be true only if risk were zero. Risk-bearing is an "expense" that must be compensated.

NPV Profile. We will always plot the NPV Profile of a proposed project. Changes in working capital and salvage value must be included. We will discuss the conflicts between the NPV and IRR selection criteria and show that use of the IRR in many situations is dangerous, in that it can give incorrect advice regarding which assets to acquire. We will specifically study accept-reject decisions, complex projects, size disparity of projects, projects with differences in the time-shape of the cash flow stream, and replacement decisions. We will carefully examine Mutually-exclusive investment proposals, and will briefly touch on the problems caused by capital rationing.

Business Cycles are Caused by Investment Mistakes. We will discuss the causes of business cycles: lowering of the apparent rate of interest increases the attractiveness of longer-run, more-capital-intensive projects compared to shorter-run and less-capital-intensive projects, so that firms invest in projects which appear profitable, but turn out not to be profitable; hence, these projects later cause losses (often to other firms) which cause the depression.

The Weighted Average, Marginal Cost of Capital: How the cost of capital changes with capital structure (degree of financial leverage) due to risk partitioning and how the cost of funds changes with the quantity of funds raised. How firms determine their annual capital budgets by the intersection of the Weighted-Average Marginal Cost of Capital Schedule with the Investment Opportunity Schedule.

Capital Structure and Financial Leverage: The tax-deductibility of interest expense makes debt an attractive financing tool and can (but may not) raise the rate of return which stockholders earn on their investment. Debt financing is cheaper than equity, both because the bondholders bear less risk and because of the tax-deductibility of interest. The "leverage" of debt can cause the returns to stockholders to rise by a greater percentage than does the operating income. But debt increases the risks borne by the stockholders: it always causes the returns to stockholders to SPRING by a larger percentage than the percentage decline in operating income. And bondholders can drive the firm to bankruptcy, thereby eliminating all value of equity. There is an optimal capital structure ratio determined by the offsetting costs and benefits, including bankruptcy costs.

Risk Analysis in Investment Decisions. Most people view “risk” as the variability of return across time. Portfolio Theory shows us that groups of assets can be less risky than any one of the assets held individually, so long as the returns of these assets are not perfectly positively correlated. An equilibrium argument developed by Sharpe, Lintner, and Mossin from a suggestion by Markowitz provides an approximate method of evaluating the contribution to portfolio risk of a single risky asset, taking account of the portfolio effect. This "Capital Asset Pricing Model" (CAPM) gives us the only method so far discovered of quantifying the tradeoff of Risk for Required Return of an asset, as described by the Security Market Line. The CAPM gives us a way of calculating the approximate risk-adjusted required rate of return of any asset, and this risk-adjusted required rate can be viewed as the cost of capital of an asset whose risk differs from that of the firm's existing assets. The capital budgeting analysis of such assets of varying risk is carried out by discounting the project's expected cash flows by the risk-adjusted required rate given by the CAPM to compute a risk-adjusted NPV.

To teach you how to think in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. "Action" is choosing the best course for the future.

Human action is purposeful behavior. Or we may say: Action is put into operation and transformed into an agency, is aiming at ends and goals, is the ego's meaningful response to stimuli and to the conditions of its environment, is a person's conscious adjustment to the state of the universe that determines his life.
Action is not simply giving preference....acting man chooses, determines, and tries to reach an end. Of two things both of which he cannot have together he selects one and gives up the other. Action therefore always involves both taking and renunciation....Action means the employment of means for the attainment of ends. As a rule one of the means employed is the acting man's labor. But this is not always the case. Under special conditions a word is all that is needed. He who gives orders or interdictions may act without any expenditure of labor....to do nothing and to be idle are also action, they too determine the course of events. Wherever the conditions for human interference are present, man acts no matter whether he interferes or refrains from interfering. He who endures what he could change acts no less than he who interferes in order to attain another result....Action is not only doing but no less omitting to do what possibly could be done.

We may say that action is the manifestation of a man's will. But this would not add anything to our knowledge. For the term will means nothing else than man's faculty to choose between different states of affairs, to prefer one, to set aside the other, and to behave according to the decision made in aiming at the chosen state and forsaking the other.

We call contentment or satisfaction that state of a human being which does not and cannot result in any action. Acting man is eager to substitute a more satisfactory state of affairs for a less satisfactory state. His mind imagines conditions which suit him better, and his action aims at bringing about this desired state. The incentive that impels a man to act is always some uneasiness. A man perfectly content with the state of his affairs would have no incentive to change things. He would have neither wishes nor desires; he would be perfectly happy. He would not act; he would simply live free from care.

But to make a man act, uneasiness and the image of a more satisfactory state alone are not sufficient. A third condition is required: the expectation that purposeful behavior has the power to remove or at least to alleviate the felt uneasiness. In the absence of this condition no action is feasible. Man must yield to the inevitable. He must submit to destiny.

The ultimate goal of human action is always the satisfaction of the acting man's desire. There is no standard of greater or lesser satisfaction other than individual judgments of value, different for various people and for the same people at various times. What makes a man feel uneasy and less uneasy is established by him for the standard of his own will and judgment, from his personal and subjective valuation. Nobody is in a position to decree what should make a fellow man happier.

...the incentive of human activity is always some uneasiness and its aim [is] always to remove such uneasiness as far as possible...

[Man] arranges his wishes and desires into a scale, he chooses; in short, he acts.

Action always aims at the removal of future uneasiness, be it only the future of the impending instant. Between the setting in of action and the attainment of the end sought there always elapses a fraction of time, viz, the maturing time in which the seed sown by the action grows to maturity....Acting man does not look at his condition with the eyes of a historian. He is not concerned with how the present situation originated. His only concern is to make the best use of the means available today for the best possible removal of future uneasiness. The past does not count for him. He has at his disposal a definite quantity of material factors of production....He values the available means exclusively from the aspect of the services they can render him in his endeavors to make future conditions more satisfactory. The period of production and the duration of
serviceableness are for him categories in planning future action, not concepts of academic retrospection and historical research. They play a role in so far as the actor has to choose between periods of production of different length and between the production of more durable and less durable goods. Action is not concerned with the future in general, but always with a definite and limited fraction of the future. This fraction is limited, on the one side, by the instant in which the action must take place [called the 'present moment']. Where its other [future] end lies depends on the actor's decision and choice....We may call the fraction of future time for which the actor in a definite action wants to provide in some way and to some extent, the period of provision. In the same way in which acting man chooses among various kinds of want-satisfaction within the same fraction of future time, he chooses also between want-satisfaction in the nearer and in the remoter future. Every choice implies also a choice of a period of provision. In making up his mind how to employ the various means available for the removal of uneasiness [during the period of production], man also determines implicitly the period of provision. In the market economy the demand of the consumers also determines the length of the period of provision.


All decisions choose between alternative future courses of action, because only the future can be altered.

Time Preference. Man, and all beings who live finite lives in time, possesses time preference: each man prefers to achieve a given end, value, satisfaction, or good, sooner rather than later. Other things being equal, we prefer to achieve a goal sooner rather than later. Therefore a particular good is more valuable to us now in the present than if we do not now possess it, but will surely possess it in the future, no matter how short the time during which we must wait to possess it. A present good is more valuable to each person than the same good in the future, because the future is not here yet, and the person does not now have the good. Having is better than wanting. (Dr. Barnett may disagree.) Therefore, each human being possesses a positive personal time-preference rate, or personal interest rate, and discounts the future good to a smaller present value. This is true for all goods and all events, and is not peculiar to money. All goods have "time value": they are more valuable the sooner we get them. This is a manifestation of human nature and the time-structure of Creation, not of the good. It is a manifestation of the necessity of the passage of time for each person as he lives his life.

(I believe that even a being with an infinite lifetime would possess a positive time-preference rate, for he would also prefer to have any value achieved sooner rather than later, so long as he lives in time. The really interesting question is whether God lives in time or transcends time, existing knowingly at each moment, and if so, whether God has positive time preference. There is some evidence provided if you contemplate whether there is an optimum time to send the Savior to Earth, or whether the timing is irrelevant; and if it is relevant, why is it?)

The future course of action is specified in terms of pro-forma financial statements and cash flow statements. You will learn in this course how to construct such pro-forma statements which forecast the course of the firm under one particular course of action. Each of the alternative courses of action which are under consideration for a decision each cause the creation of its own pro-forma forecast. The present value of the firm's cash flows under each alternative forecast is computed. The course of action providing the largest present value is the correct action to choose. All business decisions are made this way.

The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principal is violated. You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available
alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up. Action is choosing the most valuable alternative future course from among those available.

This course is the second finance course; it presumes you already understand and can apply the basic principles of financial analysis and decision-making. This means that you understand time preference, and the operations of compounding and discounting. You can compute present values of streams of future cash flows. You can compute the values of shares of stock and bonds. You know how to compute the value of the firm as the sum of the values of all securities outstanding, including non-market loans from banks. You can use the Gordon Constant Growth Model to estimate the value of the cost of equity. You can compute the realized rate of return from owning a bond for less than its full lifetime. You can compute the Net Present Values of alternative proposals for capital investment. You know the effects of capital structure on firm value, and you know that dividend policy affects the value of the firm through communication details and perceptions and expectations. You can construct a chart of EPS vs. EBIT and determine the superiority of the best proposal for financing.

I do not actually believe this about you. But please tell me if I am mistaken.

The goal of this course is to reinforce your thinking in terms of present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows.

We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders.

The value of the firm is the money price which is now equivalent to all the future cash flows which will benefit the owners through the remaining life of the firm.

You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up. Action is choosing the most valuable alternative from among those available. The most valuable alternative increases the present wealth of equity holders by the largest amount.
BRIEF DESCRIPTION OF FINANCIAL MANAGEMENT

DEFINITION OF FINANCE:

Finance is the study of exchanges which are extended over an interval of time. Finance makes decisions in the present regarding future forecasted events; hence, risk and uncertainty play a role in every financial decision. Financial management is the rational selection and operation of assets, and the raising of the funds necessary to pay for them, so as to benefit shareholders, the owners of the firm. The two dimensions of financial analysis are expected return and risk.

Goal of the Firm. The goal of the firm is to increase the wealth of the shareholders as much as possible with each decision.

"Benefit" means to provide to the shareholders a greater value than all other possible courses of action would.

Financial decisions are always made by comparing the present values of alternative courses of action: Net Present Value is a measure of profit. Business financial decisions are made within the environment of financial markets, so the structure and processes of the financial markets must be understood. In a free market, business financial decisions benefit all the people in the society by rationally allocating resources across time in accordance with the values of the inhabitants of the society. Financial markets co-ordinate the usage of resources across time in accordance with the values of the participants of a market economy; i.e., to benefit the consumers.

Management is Choosing and Implementing a Course of Action. All decisions choose between alternative future courses of action, because only the future can be altered.

Financial decisions select one particular course of action from the many opportunities available. Financial decisions relate to future courses of action and future events and conditions: future sales and expenses, future dividends and interest, future repayments of debt. But these decisions relating only to the future must be made today in the present, before they come to pass. This means that we must evaluate alternative future courses of action before they can be tested. This is possible only in a market economy with a medium of exchange, through the mechanism of "present valuation of future money (cash) flows."

The market interactions of the personal time-preference rates of market participants lead to the emergence of a system of market interest rates. The mathematics of compounding and discounting are taught. Computations of present values of streams of future cash flows are stressed.

Free Markets Provide Maximum Achievable Living Standards.

Freedom in economic transactions is essential to the allocative efficiency of markets because the market is the transmission system for information. It is the system of prices, as Hayek showed, that transmits the information necessary to rational decisions and actions in the world. It is the existence of the system of market interest rates within the structure of the private-property economy which allows the making of rational financial decisions within the firm and the allocation of goods within a society across time in accordance with the values of the people who compose the society. The relationship between risk and required return is explored, and the term structure of interest rates is investigated.

Using financial valuation models such as those by Gordon and Solomon, the causes of earnings and earnings growth are investigated. Re-investment of earnings is necessary to achieve growth of future earnings. Growth requires either a greater degree of operating efficiency or a greater quantity of assets creating sales.

Valuation can be accomplished only in a free market; there can be no economic values in a command economy. Command economies cannot allocate capital goods efficiently because there can be no market in capital goods in a command economy. Command economies cannot efficiently, rationally, and coherently allocate consumers' goods across time because the time dimension of transactions is missing, and there is no standard of value available to the decision-maker to allow him to know what is the most important use to which each available resource can be put. Correct financial decisions choose the course of action with the greatest value from among the alternative courses of action available.
The free society vs. the command economy. Respect for and protection of property rights of individuals are basic to civilized society. There can be no functioning markets for capital goods in a command economy; hence, profits cannot guide decisions and welfare cannot be enhanced. Moreover, regulation of the economy inevitably causes tyranny, as Hayek proved in The Road to Serfdom.

Economic Functions of Financial Markets: to reduce the risk borne by investors and increase the rates of return available to investors, and to increase the flow of capital into investment. Interest rates reflect the time preferences of the market participants and the investment opportunities they perceive. Interest rates are not an "exogenous" variable, an "ether" within which transactions occur; rather, interest rates are the results of ebullient competition among market participants. Rates of return of assets are not properties of the assets (that is, the rate of return is not created by the asset), but instead are perceptions and forecasts of the minds of the owners (actual and potential) of the assets, and rates of return depend upon the idea of the owner about how best to use the asset. Rates of return are created by the owners of assets choosing correctly how to employ the assets to provide better products and services to their customers.

Risk is viewed as the variability of return across time. Portfolio Theory shows that groups of assets can be less risky than any one of the component assets held individually because of the lack of perfect correlation between the time returns of pairs of assets. The Capital Asset Pricing Model is the first approximation to the required return on a risky asset arising from its contribution to the risk of a portfolio, and it allows estimation of a risk-adjusted required rate of return on an asset.

Inter-temporal Allocation of Goods. Co-ordination of time-spanning production processes is accomplished by competition in interest rates and competition in rates of return. Financial markets produce "Financial Intermediation" and "Asset Transmutation," which determine the nature of corporate structure: the separation of ownership from management, which makes possible the greater efficiency and productivity of the corporate form of organization, compared with more primitive forms of organization such as the individual proprietorship and the partnership. The effects of Financial Intermediation include risk reduction through the processes of diversification and use of expertise, and the combination of small portions of individual savings into large funds of capital, thereby increasing the efficiency of investment. The benefits of Asset Transmutation Effects are greater in magnitude than the benefits of intermediation, and they arise from specialization in entrepreneurship which can be achieved only as a result of the separation of ownership from management. The goal of financial management in a free society is to benefit the owners of the capital which constitutes the firm.

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Financial Analysis tells us what has happened to the firm in the past to bring it to its present state. We use several different techniques: Financial Ratio Analysis; Funds cycles and funds flows; Sources and Uses of Funds Analysis; Statement of Cash Flows; Financial Cash Flow Analysis; Pro-Forma Statement Forecasting by ratios and sustainable growth.

Firms alter the risks borne by investors by choices of investment and production processes which alter the degree of operating leverage, and by choices of financing methods which alter the degree of financial leverage. Financial ratio analysis, especially the duPont method, illuminates business policies which affect financial condition and performance. The efficacy of previous financial decisions is evaluated, and appropriate methods of management of accounts receivable and payable, inventory, capital asset acquisition, financing and capital structure, and acquisition and disbursement of capital are studied. Cash flow analysis shows what the firm has actually done, and pro-forma statement construction is central to financial forecasting and planning.
Financial Decisions are always made on the basis of Present Value. In order to evaluate future cash flows, we must find out how valuable these cash flows are today, when we make the decision. This procedure of determining the present value of future cash flows is called discounting the future cash flows. It consists of finding an amount of money which, if available today, would allow us to exactly duplicate the entire series of future cash flows, in the same amounts and on the same days as they are expected to occur in the future. The opposite mathematical procedure, similar to computing how much the balance will be in a bank savings account on some date in the future, is called compounding.

Consider a stream of several or many cash flows occurring at different dates across time; these cash flows can be receipts ("inflows") or disbursements ("outflows"). We can compute the value of this stream of cash flows at any single time point, past or future, as well as at the present moment; when we do that, we call it the "net value" of the cash flow stream at that particular single moment we have chosen to compute a lump sum (dollar value) which is entirely equivalent to the whole stream of many cash flows.

The present value of a particular series of cash flows depends crucially on the degree of risk of the series of cash flows because, although the size of each future cash flow may already have been determined, the size of the discount rate used to compute the present value depends on the risk of the future cash flows. Risk is essentially the possible volatility or degree of fluctuation of the size of each cash flow around the expected value which is being discounted. Risk is larger, the less we know about the size of each of the future forecasted cash flows.

The discount rate depends on two things: the current term structure of interest rates and the risk of the cash flows. There are usually at least two components of risk: business risk and financial risk, which are sometimes expressed together as "equity risk". There may be additional components of risk, such as industry risk and small-firm risk.

For investments which do not alter the risk composition of the firm's assets, the appropriate discount rate is the firm's weighted-average cost of capital (WACC), which is derived from the financial-market performance of the firm's capital claims. Alternatively, the Risk-Adjusted Discount Rate (RADR) can be used.

A business is viewed as a system of cash flows extending through time. Valuation of the business is the central method of financial decisions, as the impact of alternative courses of action on firm value must be evaluated in order to choose among the alternatives.

Future cash flows of proposed capital assets form the basis of analysis. The riskiness inherent in these cash flows determines the size of the discount rate for computing the Net Present Value of each proposed asset, which allows selection of the best alternative.

Rate of Return. A "rate of return" is just like an interest rate paid by a bank on a savings account. Rates of return are usually expressed as percentages on an annual basis: 6.5% per year of the principal amount is paid as income, while the principal amount is held constant. Be careful to distinguish between the real situation in which there is a set of different interest rates for each sub-period in a future interval; i.e., the term structure of interest rates, and the approximation of an assumed average constant rate for each sub-period.

Risk and Required Return. Since we cannot know the future, there is always an element of risk involved in choosing any course of action, since we cannot know for sure how it will turn out. Human beings dislike risk: hence, they want to be paid for bearing it, and they want to be paid more for bearing more risk. We say that "the required return increases, the greater the risk borne."

Greater Risk Requires Greater Return. The basic relationship in finance is this: the greater the risk perceived in owning an asset during the future, the higher is the rate of return required by the owner of the asset. Unless the owner expects the future rate of return to be large enough, he will not purchase the asset. Risk therefore causes a required or expected rate of return, such that, if the rate of return offered by an asset is not large enough, the price of the asset must SPRING-I until the expected rate of return is large enough to justify bearing the risk.
Risk-Expected Return Relationships. The Security Market Line expresses this relationship between risk and required rate of return, showing that the larger the amount of risk borne by an investor, the larger is the required rate of return that investor requires on a single investment in order to be willing to bear the risk. The Capital Asset Pricing Model (CAPM) is a particular mathematical model which gives the required return on an individual asset held in a diversified portfolio. The CAPM is the equation of the security market line based on a set of simplifying equilibrium assumptions. The Capital Market Line expresses the equilibrium relationship between expected return and risk of "efficient" portfolios of assets.

Financial Assets. Shares of stock and bonds are financial assets, or "securities", which offer the prospect of future receipt of cash to the holder. These securities have values commensurate with the amounts and timings of the future cash flows and the risk involved in the receipt of these prospective cash flows. The value of all the bonds (debt) which the firm has outstanding is called the value of debt (VD), and the value of all the shares of stock which the firm has outstanding is called the value of equity (VE).

Cost of Capital. The cost of capital is the rate of return the firm must pay to acquire investment capital. Note that the cost of capital is NOT a dollar amount; the cost of capital is a percentage amount, or a decimal fraction, since it is a rate of return, equivalent to an interest rate.

Value of Debt. When the firm borrows, it promises the lender first access ("prior claim") to the cash flows remaining after all employees and suppliers of materials and services used in production have been paid ("CAC" = cash available to all capital suppliers). The firm also promises to pay the lender particular amounts of money on particular dates, and this promise is written down. So the lender has first claim to the available cash and an enforceable contract (bond indenture) which guarantees payment: the lender bears little risk. On the other hand, the lender can stop the operation of the firm and gain ownership over the firm's assets through forced bankruptcy if the firm does not have enough cash to make good on this promise; hence, the risk borne by the firm is great, since borrowing can potentially destroy the firm. Because the bondholders (lenders) are so protected, they bear little risk, and therefore require a small rate of return on their investment: we say the "cost of debt capital" is low. (The cost of debt capital to the firm is further reduced by the tax-deductibility of interest payments made by the firm to the bond holders.)

Value of Equity. When the firm sells stock, on the other hand, it promises nothing to the equity investor except "best efforts", and the firm has the option of paying dividends to equity holders only if it chooses to, and then only if there is any cash at all ("CAE" = cash available to equity) remaining after everybody else associated with the firm has been paid in full. The equity holders have a "residual claim" to cash. Not only do equity holders receive dividends only after all the required payments are made to debt holders, but if the debt holders force bankruptcy on the firm, the debt holders take over the ownership of the assets, and the equity holders have no assets remaining under their ownership. Hence, the equity holders bear great risk, since they have no idea of the amounts and timings of any future cash flows (dividends) they may receive, and they can lose all of their investment in the firm. The equity holders have no recourse to the firm, so the firm bears little risk in issuing equity. Because the equity holders bear great risk, they require a high expected future rate of return on their investment in the firm's stock (higher than the rate of return required by the bond holders on their investment in the debt of the firm): we say that the "cost of equity capital" is higher than the cost of debt capital.

Capital Structure and Its Optimum. We see that there is a tradeoff to the firm in issuing debt and equity capital claims: debt is riskier to the firm but cheaper; equity is safer but more expensive. There is therefore an optimum combination of debt and equity which balances risk and cost of capital. The combination of debt and equity which a firm uses to finance itself is called the "capital structure ratio" or the "debt ratio". I use the capital Greek letter O (THETA) to denote the ratio of the value of debt to the sum of the value of debt plus the value of equity: \( O = \frac{VD}{VD + VE} \). The sum of the value of debt (VD) plus the value of equity (VE) is called the value of the firm (VF): \( VF = VD + VE \).
Capital structure is the ratio of debt to assets, or of debt to equity, which describes how the assets were financed. I use the symbol \( \theta \) the capital Greek "theta" to denote the ratio of total debt to total assets. "Risk" can be viewed as the variability over time of a cash-flow stream. The variability of the firm's Net Operating Income (Earnings Before Interest and Taxes, or "EBIT") is called the "Business Risk" of the firm. The variability of the cash flows to debt suppliers is the "debt risk", and the variability of the cash flows to equity suppliers (stockholders) is "equity risk".

The tax-deductibility of interest payments makes debt an attractive financing method of lower cost than the rate of return demanded by the bondholders; but the great risk imposed on the firm by debt financing (due to the contractual requirement to pay interest and principal or suffer bankruptcy) reduces that attractiveness.

Using debt financing causes "financial leverage": the fluctuations in returns to shareholders are larger than the fluctuations in operating income. This is good if income rises and dangerous if income SPRINGS. Financial leverage causes the risk borne by the equity holders to be larger than the overall risk of the firm. This larger equity risk causes the cost of equity to exceed the average required rate for the firm as a whole. Higher-cost equity financing is much safer for the firm because the firm need not pay a particular dollar volume of dividends to equity holders. But lower-cost debt is riskier to the firm because of the contractual requirement to pay a particular dollar volume of interest payments and principal repayments.

The "cost of capital to the firm" is the weighted average of the costs (required rates of return which the firm must pay out, net of income taxes) of each of the components of capital used by the firm in its financing, where the weights are the proportions of total capital held by each component.

The cost of a type of capital to the firm is the rate of return demanded by the supplier of a particular form of capital, based on the risk the supplier of capital perceives. Debt holders demand a small rate of return because they bear only a small amount of risk. Equity holders demand a higher rate of return because they bear significantly more risk. So the cost of debt is always smaller than the cost of equity. The debt holders bear less risk than do the equity holders because the debt holders are first recipients of cash distributions and they are promised particular dollar amounts at particular times, while the equity holders are "residual claimants" receiving dividends only if the firm has enough cash left over. Because of this risk differential, the debt holders charge a lower required rate of return and the equity holders charge a higher required rate of return. Debt is always lower-cost than is equity.

In addition, the cost of debt to the firm is reduced below the rate of return demanded by the bondholders because the firm can deduct the interest payments from taxable income, reducing the amount of income tax it must pay. So the firm does not bear the total cost of the debt. This tax-deductibility of interest payments further reduces the net cost of the debt to the firm to a rate smaller than the interest rate on the debt.

But the cost of each form of capital rises with the debt ratio. The larger the capital-structure ratio (the ratio of total liabilities to total assets), the larger are both the cost of debt and the cost of equity. The Weighted-Average Cost of Capital (WACC) is the average of the cost of debt and the cost of equity, where the cost of debt is weighted by the ratio of debt to total assets, and the cost of equity is weighted by the ratio of equity to total assets. As the capital structure varies, beginning at zero debt and increasing as debt replaces equity, first the WACC decreases, then after particular debt ratio is reached, the WACC increases. There is a minimum value of WACC occurring at some intermediate capital structure, and the firm seeks to operate at this minimum value of WACC, the "optimal capital structure". The existence of an optimal capital structure is explored, and the impact of alterations of the capital structure on firm value are determined.

Valuation Models. The firm is a system which produces future cash flows to the owners and creditors; hence, it has a value which is commensurate with the timings and amounts of these future cash flows and the risks involved in their receipt. We will study a couple of valuation models for the firm which approximate the value of the firm in a simplified way. These valuation models were suggested by Mike Gordon and Ezra Solomon, and carry their names. We will learn from these models how firms
prosper and grow. These valuation models are simplified by neglecting the capital structure, and assuming that the firm is composed only of equity capital. There are more complicated models which incorporate debt capital into the capital structure and improve the valuation accuracy somewhat.

The Growth Rate. By "growth rate", g, we mean the percentage or fractional change in sales revenues from one year to the next: \( g = \frac{(Sales_2 - Sales_1)}{Sales_1} \). The Gordon model forecasts growth of sales as \( g = br \), where \( b = \) the retention rate, the fraction of cash provided by operations retained and reinvested within the firm, and \( r = \) the average rate of return earned on new invested capital. The retention rate \( b \) is often expressed in terms of Net Income After Taxes by subtracting dividends from NIAT: \( b = 1 - \left( \frac{Dividends\ Paid}{NIAT} \right) \). The average rate of return on new investment is the average IRR of the most recent capital budget, with each project's IRR weighted by its time-zero outlay as a fraction of the total capital budget.

The Sustainable Growth Rate. The Sustainable Growth Rate, \( g^* \) is the rate of growth of sales which the firm can achieve without improving its operating efficiency, without selling new equity capital, without changing its dividend policy, and without changing its capital structure ratio. We use common financial ratios to compute the Sustainable Growth Rate. \( P = \frac{NIAT}{Sales} \), is a measure of operating efficiency. \( CAE = \frac{Cash\ Available\ to\ Equity}{Operating\ cash\ flow\ after\ taxes\ minus\ interest} \) and principal payments to debtholders. \( CRF = \frac{Cash\ Retained\ by\ the\ Firm}{NIAT - Dividends = CAE - Dividends} \). \( R = \frac{CRF}{NIAT} \) is the measure of dividend policy, giving the retention rate of the firm: the portion of net income retained and reinvested. \( R = \frac{NIAT - Dividends}{NIAT} \). \( A = \frac{Sales}{Total\ Assets} \), or Total Asset Turnover, is another measure of operating efficiency. \( T^\wedge = \frac{Total\ Assets}{Beginning\ of\ Period\ Equity} \), is a measure of the capital structure of the firm. These four factors, \( PRAT^\wedge \), are fixed at the balance sheet date, and they tell us the sustainable growth rate:

\[ g^* = PRAT^\wedge \]

Comparing the Sustainable Growth Rate to the Actual Growth Rate tells us whether the firm generates cash or requires infusion of cash from the outside. Compute the actual growth rate of sales, \( g = \frac{(S2 - S1)}{S1} \). Compare \( g \) with \( g^* \). If \( g^* > g \), the firm is actually growing slower than it could sustain, so it needs less cash for assets and the excess cash generated can flow out of the firm: so if \( g^* > g \), the firm generates cash

If \( g^* < g \), then the firm is growing faster than its internal financial sources can sustain it, and it needs to bring in more cash for new assets: so if \( g^* < g \), the firm absorbs cash.

If \( g^* < g \), or if \( g^* > g \), then one or more of the four ratios, \( PRA \) or \( T^\wedge \), must change. Only if \( g^* = g \) will the firm's ratios remain stable, because the firm is generating internally all the cash it needs to finance the growth.

Goal of the Firm. The goal of the firm is to benefit the owners of the firm, since it is their capital which the firm employs, and the economic and social system protects individuals' rights to their property. The firm benefits the shareholders by increasing their wealth as much as possible with each decision and each set of decisions. We call this "shareholder wealth maximization": the firm makes decisions which increase the "present wealth of equity holders" (PWE0) as much as possible. PWE0, the present wealth of the equity holders, consists of the sum of the present values of all the dividends equity holders will receive, beginning now and continuing into the future for the lifetime of the firm: \( PWE0 = VE0 + NCDE0 \). The "value of equity" is the present value of all the dividends beginning with the dividend one period from now in the future and continuing forever. \( NCDE0 = \) the net dividend paid in the current period; \( i.e., \) now. Therefore, the present wealth of equity holders consists of the sum of two components: 1) the value of equity, + 2) the current cash flow. In any decision, the numerical value of the Net Present Value of the course of action selected is the numerical value of the increase in the present wealth of the equity holders, after taking account of all capital structure and dividend implications.

Term Structure of Interest Rates. We find that securities of the same degree of default risk but of different terms to maturity generally offer different rates of return. This is called the "term structure of

interest rates." You can see it in the Treasury Issues column of The Wall Street Journal. The shape of this curve tells you of the inflation expectations of those who are trading Treasury securities, and lets you know also their forecasts of the flow of funds which will occur in the future.

Investment Achieves Growth. How firms grow: by re-investing earnings from operations. Gordon and Solomon Valuation Models both capture this relationship and show us how firms can support growth. Growth of sales requires financing of new assets: the Sustainable Growth Model for a Levered Firm shows how rapidly a firm can grow, and suggests the consequences of growth which is more rapid than the firm can support. See Higgins Chapter 4.

Operating and Financial Leverage: Fixed operating costs cause operating income to fluctuate more wildly than sales do from period to period (operating leverage); fixed financing costs (interest payments) cause returns to equity holders to fluctuate more wildly than does operating income (financial leverage). Risk can be viewed as the percentage fluctuation (change) in income or cash flow or return from period to period. Therefore, fixed costs of operations increase risk to the firm, called "business risk", and fixed financing costs (interest expenses) increase the risk borne by the equity holders, which is called "equity risk". Equity risk is always larger than business risk unless the firm has no debt. The increase in risk between business risk and equity risk is called "financial risk." However, operating leverage increases the percentage return to the firm from increases in profitable sales, and financial leverage increases the percentage return to the stockholders from use of profitable borrowing ("favorable financial leverage"). The existence of capital assets always increases the business risk of the firm. The existence of debt always increases the equity risk relative to the business risk. Debt always creates financial risk. This increase in risk causes the cost of equity capital to rise monotonically with financial leverage; that is, cost of equity capital is always larger with larger financial leverage, never smaller.

Capital Investment Decisions (Capital Budgeting): How to choose whether or not to acquire new assets to perform new functions or replace existing assets. Assets are always selected on the basis of the Net Present Value (NPV) of the course of action involved. Note that an asset does not have a Net Present Value; use of that asset in a particular course of action has a Net Present Value. Assets should never be selected on the basis of the Internal Rate of Return (IRR) computed.

Calculating the NPV. The NPV is calculated from the future cash flows forecasted from a particular course of action. We will discuss forecasting future cash flows--net, after-tax, operating cash flows (CAUt-IVSt); discounting to Net Present Value using the Cost of Capital. The cost of capital is the opportunity cost of the capital: the highest available rate of return in another application, which the capital would earn if it were employed in that application instead of the one we are analyzing. The cost of capital also represents the re-investment rate: the rate of return which will be earned by future cash flows if they are re-invested by the firm in another project.

The cost of capital represents the minimum acceptable rate of return which a project must earn in order to be acceptable. If the project just barely earns the cost of capital (has a zero NPV), the firm will just barely be able to pay to all capital suppliers their respective required rates of return. A project with a NPV of $0.00 should theoretically be accepted because it provides the required rate of return to justify accepting the risk. If the project earns more than the cost of capital (has a positive NPV), then the firm will be able to give stockholders a larger rate of return than they had required for bearing the risk of the stock: stockholders will make a profit.

A "profit" is the additional cash over and above the amount of cash that was required to justify bearing the risk involved, net of all expenses; profit is not merely what is left over out of revenues after payment of all expenses. This would be true only if risk were zero. Risk-bearing is an "expense" that must be compensated. Profit is a non-equilibrium phenomenon: profit is earned only if the project does better than expected.

The dollar value of the Net Present Value of an investment project flows directly to the equity suppliers of the firm, and it immediately raises the market value of equity, dollar for dollar: $NPV_0 = \text{Increase in PWE}_0$. 
Since generally there is no immediate change in the dividend paid per share, this increase in the present wealth of equity holders resulting from the decision to purchase an investment project with a positive Net Present Value is manifested as an increase in the market price of the stock: the NPV is divided equally among the outstanding shares of stock, and the price increase in the stock (in equilibrium) equals the NPV divided by the number of shares outstanding.

NPV Profile. The NPV Profile is a graph with the NPV of the project on the vertical axis and the discount rate on the horizontal axis. Generally, the NPV is smaller, the larger the discount rate, so most NPV Profiles are decreasing functions. We will always plot the NPV Profile of a proposed project. Changes in working capital and salvage value must be included. We will discuss the conflicts between the NPV and IRR selection criteria and show that use of the IRR in many situations is dangerous, in that it can give incorrect advice regarding which assets to acquire. We will specifically study accept-reject decisions, complex projects, size disparity of projects, projects with differences in the time-shape of the cash flow stream, and replacement decisions. We will carefully examine Mutually-exclusive investment proposals, and will briefly touch on the problems caused by capital rationing.

Business Cycles are Caused by Investment Mistakes. The cause of business cycles is the lowering of the apparent rate of interest brought about by Monetary Policy. This apparent lowering of the market interest rate increases the attractiveness of longer-run, more-capital-intensive projects compared to shorter-run and less-capital-intensive projects, so that firms invest in projects which appear profitable. However, if the speed of expansion of the quantity of money slows, the market interest rate tends to return to its correct and higher height. This causes the longer-term investment projects to turn out not to be profitable; hence, these projects later cause losses (often to other firms) which cause the depression.

The Weighted Average, Marginal Cost of Capital: The cost of capital of the firm changes with the firm's capital structure (degree of financial leverage) due to risk partitioning and also, the cost of funds changes with the quantity of funds raised. Firms determine their annual capital budgets by the intersection of the Weighted-Average Marginal Cost of Capital Schedule with the Investment Opportunity Schedule.

Capital Structure and Financial Leverage: The tax-deductibility of interest expense makes debt an attractive financing tool and can (but may not) raise the rate of return which stockholders earn on their investment. Debt financing is cheaper than equity, both because the bondholders bear less risk and because of the tax-deductibility of interest. The "leverage" of debt can cause the returns to stockholders to rise by a greater percentage than does the operating income. But debt increases the risks borne by the stockholders: if operating income SPRINGs, debt always causes the returns to stockholders to SPRING by a larger percentage than the percentage decline in operating income. And bondholders can drive the firm to bankruptcy, thereby eliminating all value of equity. There is an optimal capital structure ratio determined by the offsetting costs and benefits, including bankruptcy costs.

Risk Analysis in Investment Decisions. We view risk as the variability of return across time. Portfolio Theory shows us that groups of assets can be less risky than any one of the assets held individually, so long as the returns of these assets are not perfectly positively correlated. An equilibrium argument developed by Sharpe, Lintner, and Mossin from a suggestion by Markowitz provides an approximate method of evaluating the contribution to portfolio risk of a single risky asset, taking account of the portfolio effect. This "Capital Asset Pricing Model" (CAPM) gives us the only method so far discovered of quantifying the tradeoff of Risk for Required Return of an asset, as described by the Security Market Line. The CAPM gives us a way of calculating the approximate risk-adjusted required rate of return of any asset, and this risk-adjusted required rate can be viewed as the cost of capital of an asset whose risk differs from that of the firm's existing assets. The capital budgeting analysis of such assets of varying risk is carried out by discounting the project's expected cash flows by the risk-adjusted required rate given by the CAPM to compute a risk-adjusted NPV.
DESCRIPTION OF FINANCE:
VALUATION IS SUBJECTIVE;
VALUATION IS ACCOMPLISHED BY FORECASTING FUTURE FINANCIAL CASH FLOWS, AND THEN BY VALUING THEM AT THE PRESENT MOMENT;
THE COURSE OF ACTION WITH THE LARGEST PRESENT VALUE IS CHOSEN.

Financial Cash Flows:

Accounting proceeds using the accrual concept of economic reality; Finance proceeds using only the actual physical cash expected to flow at each future instant to the equity owners, called the "LEVERAGED FREE CASH FLOWS TO EQUITY", and then by subjectively (discounting for time and for perceived risk) valuing those future physical cash flows at the present moment. Financial Cash Flows, the "LEVERAGED FREE CASH FLOWS TO EQUITY," are the basis of all financial analysis.

Entrepreneurial Financial Management:

The Goal of the Firm to is increase the wealth of the equity holders; i.e., the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends which could be paid by the firm, called the "LEVERAGED FREE CASH FLOWS TO EQUITY".

Two lines of successful entrepreneurial action are required to be implemented to increase the wealth of the equity holders, which is essentially the present value of the future cash flows to the equity holders: 1) superiority of operations, which produces positive net income and profit, which are manifested in higher dividends; and 2) superiority of financing matched to the operations and goods market of the firm, which produces the appropriate amount of risk to be borne by the stockholders and provides the appropriate rate of return to the stockholders. Both lines of action must be followed. We shall always analyze 1) the "operating profit" of the firm and also 2) the "financial profit" of the firm. Profit is achieved by successfully offering superior opportunities to 1) the consumers of the firm's products and 2) the consumers of the firm's capital claims. Both forms of profit create the increase in the value of the equity of the firm which is the Goal of the Firm. Profit in each line of action is achieved by superior entrepreneurship in each activity: entrepreneurship in operations offers customers superior opportunities to those offered by competing firms; entrepreneurship in finance offers capital suppliers superior opportunities to those offered by competing firms.

Operations are carried out in the "goods market". Financing is carried out in the "asset market". Financial assets are intrinsically different from consumable goods, and the analysis of them is different because the market processes determining prices are different.

There are two markets we consider: the flow market for "goods" and the asset market for "stocks". The firm operates in the flow market by producing goods to be consumed by its customers. The firm operates in the asset market by issuing shares of stock and bonds to be purchased, held, and traded by its capital suppliers. Successful firm management must combine superiority and success in both the operations and financing of the firm, and the successful financing must be accurately matched to the operations. Superiority of the firm is compared to the success of other firms which compete with this firm, both in selling goods and in selling assets.

The basic and fundamental concept in Finance is the Value of the Equity of the Firm. We will constantly focus on the Value of Equity. Each decision you write about must be couched in terms of its effect on the Value of Equity. Value of Equity is the present discounted value of the entire stream of cash flows available to the equity suppliers over the future remaining life of the firm; you must include the terminal value at the end of the stream of explicit annual cash flows in your valuation. Firms succeed through the exercise of superior entrepreneurship in the rivalrously competitive market. Superior entrepreneurship is achieved in competition with other firms, which seek to offer opportunities to customers this firm wishes to attract and to keep, and which also seek to offer capital investment
opportunities to capital suppliers this firm wishes to attract and to keep. We will always assess the quality of entrepreneurship displayed by each firm and within each firm, and we will always take account of the rivalrous competition faced by each firm. Successful entrepreneurship produces profit, which can be seen as an increase in the value of equity. Profit arises from two sources: 1) the offering of opportunities to customers which are superior to those offered by competing firms; and 2) the offering of opportunities to capital suppliers; i.e., lenders and stockholders, superior to those offered by competing firms. "Profit" means that the revenues exceed the costs. We speak of "operating profit" and "financial profit."

This course is the first finance course; it teaches you to can apply the basic principles of financial analysis and decision-making. This requires that you understand time preference, and the operations of compounding and discounting. You can compute present values of streams of future cash flows. You can compute the values of shares of stock and bonds. You know how to compute the value of the firm as the sum of the values of all securities outstanding, including non-market loans from banks. You can use the Gordon Constant Growth Model to estimate the value of the cost of equity. You can compute the realized rate of return from owning a bond for less than its full lifetime. You can compute the Net Present Values of alternative proposals for capital investment. You know the effects of capital structure on firm value, and you know that dividend policy affects the value of the firm through communication details and perceptions and expectations. You can construct a chart of EPS vs. EBIT and determine the superiority of the best proposal for financing.

To study Finance, you must learn how to perform calculations and reach conclusions about which alternative is the best course of action. You must identify the situation; you must identify the alternative courses of action available; you must choose the best course of action; you must implement it. You must not merely “understand”; you must know. This means that you must memorize facts and equations, and you must know (without looking up) what input data are required by each equation, and what the result of the equation is. You must know the dimensions and units of each term in each equation, and of input data and output results. You must never omit the proper dimensions or units from anything you write. A naked number unclothed in dimensions cannot be correct. There is a great deal of information that you must memorize and be able to recite when necessary. I am greatly frustrated by silence when I ask the class for something I think you should know, like the Gordon growth model or the Capital Asset Pricing Model. You must also memorize the sequence of steps to work problems and conduct analyses. Finance is a subdivision of economics, and it proceeds by means of chains of reasoning and logic, using facts and factual relationships (equations) at each step. You must learn and know these perfectly.

The best way to work finance problems is backwards: identify what is the ultimate output asked and how that can be calculated; then identify what input data are needed to make that ultimate calculation; then identify how those ultimate input data can be calculated; then identify how the prior data can be calculated; continue until you are back to the given data. At that point, you know what equations to put the given data into and how the result of that first calculation will be used. Then solve the problem.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows.

We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders.

The value of the firm is the money price which is now equivalent to all the future cash flows which will benefit the suppliers of capital through the remaining life of the firm.
The value of the equity is the money price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm, including its terminal value.

The goal of this course is to teach you how to think in terms of present values of alternative courses of action so that you can entrepreneurially forecast the future cash flow which will result from a particular course of action, and then entrepreneurially choose (that is, to select from all of the alternative possible courses of action) the proper course of action for the firm to follow, based on the present values of the alternative future courses of action. All decisions choose between alternative future courses of action, because only the future can be altered. All financial decisions are entrepreneurial in nature because of the need to forecast the outcomes which will result prior to the taking of action and then choosing the best course of action based on the future benefits it will bring about. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated. The numerical value of the Net Present Value of a course of action is the exact amount by which the wealth of the shareholders will be increased if the company follows that course of action. The future course of action is entrepreneurially specified in terms of future pro-forma financial statements and cash flow statements. You will learn in this course how to construct such pro-forma statements and value them.

You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost; that is called a "trade" or "exchange". People always seek to improve their positions by acting by exchanging that which they value less for that which they value more. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up; if a person would give up what he values more to receive something he values less, that would be a "sacrifice"; but such is not possible: whatever a person chooses to do, he must value more than alternatives. Note that this usage is different from the use which says, for example, "he sacrificed his life to save hers" this latter is merely a trade. It is not possible to find examples of actual sacrifices made by sentient human beings. Action is choosing the most valuable alternative from among those available; once the choice is made, it is implemented. But we focus on the act of forecasting the results of particular actions we take and on the choosing of the outcomes pursued and the methods of pursuing the chosen outcome in the definition of "action."

Wealth of the shareholders is the present value of all the future cash flows which the shareholders will receive across the entire future life of the firm because of their ownership of the firm: either: 1) dividends plus the selling price of the stock; or 2) the sequence of free cash flows to equity plus the terminal value of the firm.
FINANCIAL MANAGEMENT

DEFINITION OF FINANCE:

Finance is the study of exchanges which are extended over an interval of time; hence, entrepreneurship, risk, and uncertainty play a role in every financial decision.

Finance is about transactions or exchanges which are not completed instantaneously, but are extended across an interval of time, with cash flows separated from one another by passing time. Finance examines how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. All finance decisions involve some benefits to be received in the future, or payments to be made in the future; because these prospective cash flows are expected to occur in the future, their values are uncertain; i.e., we do not know exactly how large they will be or exactly when they will occur. Finance is the analytical method of taking account of these differences in the timing of cash flows and the associated uncertainty of the cash flows. When we think we can quantify the uncertainty to some extent, we rename the uncertainty "risk." In my opinion, however, the quantification of "risk" is inaccurate and unrealistic because there will be only one outcome. What we are really attempting to quantify is our opinion about our ignorance of the future.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets, "investment," and the raising of funds for asset purchases, "financing". Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

Financial management is entrepreneurially making decisions about:

1) INVESTMENT, or VALUATION OF ASSETS OR THE ENTIRE FIRM:
   the entrepreneurial creation of possibilities, the rational selection from the set of possibilities identified, and the successful operation of assets;

2) FINANCING, or CAPITAL STRUCTURE:
   the entrepreneurially-focused raising of the relative amounts of the kinds of funds necessary to pay for them, so as to benefit shareholders, the owners of the firm; and

3) CAPITAL ACQUISITION AND DISBURSEMENT, or DIVIDEND POLICY:
   the entrepreneurial determination of the appropriate portion of cash from operations to pay to stockholders and the entrepreneurial determination of how much new capital must be raised.

"Benefit" means to provide to the shareholders a greater value than all other possible courses of action would.

All financial decisions must explicitly consider three issues with entrepreneurial alertness:

1) Time,
2) Risk,
3) Return:
   Together they determine Value.
   These are often stated as "risk and expected return."

   Financial decisions are always made by comparing the Net Present Values of alternative courses of action: Net Present Value is a measure of profit. Positive Net Present Value reveals successful entrepreneurship; negative Net Present Value reveals unsuccessful entrepreneurship. The increase in value brought about by an expenditure is the "Net Present Value". It is the market economy that translates subjective utility into dollar prices. However, mistakes can be made, such that afterward,
one realizes that the previously-anticipated positive Net Present Value was in fact mistakenly appraised and the true Net Present Value was actually negative, although that was not recognized at the time.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets, "investment," and the raising of funds for asset purchases, "financing". Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

The most valuable alternative increases the present wealth of equity holders by the largest amount. The amount of the increase in wealth is the Net Present Value of the course of action selected and implemented.

We will focus on **valuation of the firm** because **valuation is the central concept in finance**: the best course of action is the one that **increases the value of the firm most**, as measured by the present wealth of equity holders. The value of the firm is the present value, discounted at the weighted-average cost of capital, of all of the annual cash flows to the firm.

The **value of the firm** is the cash (present money) price which is now equivalent to all the future cash flows which will benefit all the suppliers of capital (both equity and debt--stockholders and bondholders) through the remaining life of the firm. The "VALUE OF THE FIRM" is the present value of all of the future benefits to be received by both groups, debtholders and equityholders, during the total remaining life of the firm. The "**Wealth of the Shareholders**" is the "VALUE OF THE EQUITY" of the firm: it is the present value of all of the benefits which only the shareholders will receive during the total remaining life of the firm. Each financial action seeks to increase the wealth of the shareholders as much as possible.

The **value of the equity** is the cash (present money) price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm. The value of equity is the present value, discounted at the cost of equity capital, of all of the annual cash flows to equity.

**The Value of Equity = The Value of the Firm – The Value of Debt.**

**The Value of the Firm = The Value of Equity + The Value of Debt.**

*The proper course of action increases the wealth of the existing (i.e., not new this moment) equity holders more than any of the alternative courses of action will. The goal of the firm is to increase the wealth of existing equity holders as much as possible with each action. Successful entrepreneurship increases the wealth of equity holders; unsuccessful entrepreneurship reduces the wealth of equity holders.*

**Wealth** is the present value of all future benefits to be received, with the discount rate appropriately adjusted for the risk involved, plus the value of benefits now held. The only future benefits we can consider quantitatively are **cash** receipts. Finance is concerned only with **cash flows and their value**.

**The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principal is violated.**

**The Goal of the Firm to is increase the wealth of the equity holders as much as possible.**

The **Wealth of the Equity Holders** is the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends to be paid by the firm. The **Wealth of the shareholders** is the present value of all the cash flows which the shareholders will receive because of their ownership of the firm: dividends plus the selling price of the stock. The current price of the stock is the present value of all the dividends which the firm will pay throughout its lifetime in the future, where the discount rate is adjusted appropriately for the risk borne by the equity holders.
This discount rate is called the “cost of equity capital”; the cost of equity capital is the rate of return which the equity holders require on their investment due to the risk they believe they bear, and which they think they could earn on the best alternative opportunities for investment of equivalent risk which they have available in the financial market.

Two lines of successful action are required to be implemented to increase the wealth of the equity holders, which is essentially the present value of the future cash flows to the equity holders: 1) superiority of operations, which produces positive net income and profit, which are manifested in higher dividends; and 2) superiority of financing matched to the operations and goods market of the firm, which produces the appropriate amount of risk to be borne by the stockholders and provides the appropriate rate of return to the stockholders. Both lines of action must be followed.

We shall always analyze 1) the "operating profit" of the firm and also 2) the "financial profit" of the firm. Profit is achieved by successfully offering superior opportunities to 1) the consumers of the firm's products and 2) the consumers of the firm's capital claims. Both forms of profit create the increase in the value of the equity of the firm which is the Goal of the Firm. Profit in each line of action is achieved by superior entrepreneurship in each activity: entrepreneurship in operations offers customers superior opportunities to those offered by competing firms; entrepreneurship in finance offers capital suppliers superior opportunities to those offered by competing firms. Operations are carried out in the "goods market". Financing is carried out in the "asset market". Financial assets are intrinsically different from consumable goods, and the analysis of them is different because the market processes determining prices are different.

Cash Flows are the data of Finance. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. The basic data of financial decisions are cash flows: the particular amounts of cash (money) received by the firm and expended (paid out) by the firm at particular times (called "moments" or "time points") in the future. We speak of the cash flow from an investment proposal for next year, the year after that, and the year after that; and so on. We indicate the dates of cash flows, and whether they are receipts or payments, on a time line. Accrual accounting concepts are not used in financial analysis or financial decisions, even though the accrual accounting data form the basis of the calculation of cash flow amounts.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers by affecting the financial decisions within the firm. The firm’s financial managers can increase shareholder wealth only by making decisions which correctly incorporate the facts and valuations of the market participants outside the firm. Firm financial decisions are made using information regarding the valuations of shareholders, lenders, and customers which is gathered from the context of the market economy within which the firm operates. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. The values are determined by the conditions in the financial and capital markets, specifically the rates of return available on other investment opportunities of equivalent degree of risk to the one under consideration. So the decisions made by financial managers take into explicit account not only the situation within the firm, but also the financial market environment within which the firm operates. Both sets of facts—the internal facts of the firm and the external facts of the market—must be taken into account in making correct financial decisions.

The "value of the firm" is the cash price which is now equivalent to all the future cash flows which will benefit the all the suppliers of capital (both debt and equity) through the remaining life of the firm. The "VALUE OF THE FIRM" is the present value of all of the future benefits to be received by both groups, debtholders and equityholders, during the total remaining life of the firm. The value of the equity is the money price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm. The "Wealth of the Shareholders" is the "VALUE OF THE EQUITY" of the firm: it is the present value of all of the benefits which only the shareholders will receive during the total remaining life of the firm.
Each financial action seeks to increase the wealth of the shareholders as much as possible.

There are two markets we consider: the flow market for "goods" and the asset market for "stocks". The firm operates in the flow market by producing goods to be consumed by its customers. The firm operates in the asset market by issuing shares of stock and bonds to be purchased, held, and traded by its capital suppliers. Successful firm management must combine superiority and success in both the operations and financing of the firm, and the successful financing must be accurately matched to the operations. Superiority of the firm is compared to the success of other firms which compete with this firm, both in selling goods and in selling assets.

The basic and fundamental concept in Finance is the Value of the Equity of the Firm. We will constantly focus on the Value of Equity. Each decision you write about must be couched in terms of its effect on the Value of Equity. Value of Equity is the present discounted value of the entire stream of cash flows available to the equity suppliers over the remaining life of the firm; you must include the terminal value at the end of the stream of explicit annual cash flows in your valuation.

Firms succeed through the exercise of superior entrepreneurship in the rivalrously competitive market. Superior entrepreneurship is achieved in competition with other firms, which seek to offer opportunities to customers this firm wishes to attract and to keep, and which also seek to offer capital investment opportunities to capital suppliers this firm wishes to attract and to keep. We will always assess the quality of entrepreneurship displayed by each firm and within each firm, and we will always take account of the rivalrous competition faced by each firm. Successful entrepreneurship produces profit, which can be seen as an increase in the value of equity. Profit arises from two sources: 1) the offering of opportunities to customers which are superior to those offered by competing firms; and 2) the offering of opportunities to capital suppliers; i.e., lenders and stockholders, superior to those offered by competing firms. Profit means that the revenues exceed the costs. We speak of "operating profit" and "financial profit."

Business financial decisions are made within the environment of financial markets, so the structure and processes of the financial markets must be understood. In a free market, business financial decisions benefit all the people in the society by rationally allocating resources across time in accordance with the values of the inhabitants of the society. Financial markets co-ordinate the usage of resources across time in accordance with the values of the participants of a market economy; i.e., to benefit the consumers.

The most valuable alternative increases the present wealth of equity holders by the largest amount. The amount of the increase in wealth is the Net Present Value of the course of action selected and implemented. The current price of the stock is the present value of all the dividends which the firm will pay throughout its lifetime in the future, where the discount rate is adjusted appropriately for the risk borne by the equity holders.

Financial decisions select one particular course of action from the many opportunities creatively imagined by the entrepreneurial process and thought therefore to be available. Financial decisions relate to future courses of action and future events and conditions: future sales and expenses, future dividends and interest, future repayments of debt. But these decisions relating only to the future must be made today in the present, before they come to pass. This means that we must evaluate alternative future courses of action before they can be tested. This is possible only in a market economy with a medium of exchange, through the mechanism of "present valuation of future money (cash) flows."

The market interactions of the personal time-preference rates of market participants lead to the emergence of a system of market interest rates. The mathematics of compounding and discounting are taught. Computations of present values of streams of future cash flows are stressed.

This discount rate is called the “cost of equity capital”; the cost of equity capital is the rate of return which the equity holders require on their investment due to the risk they think they bear, and is the rate of return which they think they could earn on the best alternative opportunities for investment of equivalent perceived risk which they have in the financial market.
The unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers by affecting the financial decisions within the firm. The firm’s financial managers can increase shareholder wealth only by making decisions which correctly incorporate the facts and valuations of the market participants outside the firm. Firm financial decisions are made using information regarding the valuations of shareholders, lenders, and customers which is gathered from the context of the market economy within which the firm operates. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. The values are determined by the conditions in the financial and capital markets, specifically the rates of return available on other investment opportunities of equivalent degree of risk to the one under consideration. So the decisions made by financial managers take into explicit account not only the situation within the firm, but also the financial market environment within which the firm operates. Both sets of facts—the internal facts of the firm and the external facts of the market—must be taken into account in making correct financial decisions.

The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost; that is called a "trade" or "exchange". People always seek to improve their positions by acting by exchanging that which they value less for that which they value more. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up; if a person does give up what he values more to receive something he values less, that is a "sacrifice". Note that this usage is different from the use which says, for example, "he sacrificed his life to save hers" this latter is merely a trade. It is very difficult to find examples of actual sacrifices made by sentient human beings. Action is choosing the most valuable alternative from among those available; once the choice is made, it is implemented. But we focus on the act of choosing in the definition of "action."

Using financial valuation models such as those by Gordon and Solomon and the Sustainable Growth Rate formula, the causes of earnings and earnings growth are investigated. Re-investment of earnings is necessary to achieve growth of future earnings. Growth requires either a greater degree of operating efficiency or a greater quantity of assets creating sales. We often compute the Sustainable growth rate \( g^* \) to determine whether or not a firm needs greater inflow of cash from more borrowing to accomplish a particular rate of growth.

During class, I shall lecture and work problems. Please ask at any time any and all questions you have, as I assume that if there are no questions, then everybody understands perfectly. Do not hesitate to interrupt; I love to answer questions. I love to answer the same question repeatedly. Not everything in Finance is understandable the first time. Do not let us proceed to another topic until you understand perfectly all elements of the previous topic. Finance is a cumulative science with artistic elements, and each topic depends on prior topics for understanding.

Finance is an abstract science. You must be able to apply the appropriate principles to actual situations in the world of action. You must know both theory and practice. You must be able to work complicated problems because that is how life is. You must be able to put together into the proper sequence the relevant individual elements to move from the data given to the conclusion.

To study Finance, you must learn how to perform calculations and reach conclusions about which alternative is the best course of action. You must identify the situation; you must identify the alternative courses of action available; you must choose the best course of action; you must implement it. You must not merely “understand”; you must know. This means that you must memorize facts and
equations, and you must know (without looking up) what input data are required by each equation, and what the result of the equation is. You must know the dimensions and units of each term in each equation, and of input data and output results. You must never omit the proper dimensions or units from anything you write. A naked number unclothed in dimensions cannot be correct. There is a great deal of information that you must memorize and be able to recite when necessary. I am greatly frustrated by silence when I ask the class for something I think you should know, like the Gordon growth model or the Capital Asset Pricing Model. You must also memorize the sequence of steps to work problems and conduct analyses. Finance is a subdivision of economics, and it proceeds by means of chains of reasoning and logic, using facts and factual relationships (equations) at each step. You must learn and know these perfectly.

The best way to work finance problems is backwards: identify what is the ultimate output asked and how that can be calculated; then identify what input data are needed to make that ultimate calculation; then identify how those ultimate input data can be calculated; then identify how the prior data can be calculated; continue until you are back to the given data. At that point, you know what equations to put the given data into and how the result of that first calculation will be used. Then solve the problem.
PURPOSE OF THIS COURSE;  
BRIEF DESCRIPTION OF FINANCIAL MANAGEMENT

DEFINITION OF FINANCE:
Finance is the study of exchanges which are extended over an interval of time; hence, entrepreneurship, risk, and uncertainty play a role in every financial decision.

We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders. The value of the firm is the present value, discounted at the weighted-average cost of capital, of all of the annual cash flows to the firm.

The value of the firm is the money price which is now equivalent to all the future cash flows which will benefit the suppliers of capital through the remaining life of the firm. The value of the equity is the money price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm. The value of equity is the present value, discounted at the cost of equity capital, of all of the annual cash flows to equity.

The Value of Equity = The Value of the Firm – The Value of Debt.

The Goal of the Firm to is increase the wealth of the equity holders; i.e., the present value (discounted at the risk-adjusted cost of equity capital) of the future stream of dividends to be paid by the firm. Two lines of successful action are required to be implemented to increase the wealth of the equity holders, which is essentially the present value of the future cash flows to the equity holders: 1) superiority of operations, which produces positive net income and profit, which are manifested in higher dividends; and 2) superiority of financing matched to the operations and goods market of the firm, which produces the appropriate amount of risk to be borne by the stockholders and provides the appropriate rate of return to the stockholders. Both lines of action must be followed. We shall always analyze 1) the "operating profit" of the firm and also 2) the "financial profit" of the firm. Profit is achieved by successfully offering superior opportunities to 1) the consumers of the firm's products and 2) the consumers of the firm's capital claims. Both forms of profit create the increase in the value of the equity of the firm which is the Goal of the Firm. Profit in each line of action is achieved by superior entrepreneurship in each activity: entrepreneurship in operations offers customers superior opportunities to those offered by competing firms; entrepreneurship in finance offers capital suppliers superior opportunities to those offered by competing firms. Operations are carried out in the "goods market". Financing is carried out in the "asset market". Financial assets are intrinsically different from consumable goods, and the analysis of them is different because the market processes determining prices are different.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows.

We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders.
The value of the firm is the money price which is now equivalent to all the future cash flows which will benefit the suppliers of capital through the remaining life of the firm. The value of the equity is the money price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm.

There are two markets we consider: the flow market for "goods" and the asset market for "stocks". The firm operates in the flow market by producing goods to be consumed by its customers. The firm operates in the asset market by issuing shares of stock and bonds to be purchased, held, and traded by its capital suppliers. Successful firm management must combine superiority and success in both the operations and financing of the firm, and the successful financing must be accurately matched to the operations. Superiority of the firm is compared to the success of other firms which compete with this firm, both in selling goods and in selling assets.

The basic and fundamental concept in Finance is the Value of the Equity of the Firm. We will constantly focus on the Value of Equity. Each decision you write about must be couched in terms of its effect on the Value of Equity. Value of Equity is the present discounted value of the entire stream of cash flows available to the equity suppliers over the remaining life of the firm; you must include the terminal value at the end of the stream of explicit annual cash flows in your valuation. Firms succeed through the exercise of superior entrepreneurship in the rivalrously competitive market. Superior entrepreneurship is achieved in competition with other firms, which seek to offer opportunities to customers this firm wishes to attract and to keep, and which also seek to offer capital investment opportunities to capital suppliers this firm wishes to attract and to keep. We will always assess the quality of entrepreneurship displayed by each firm and within each firm, and we will always take account of the rivalrous competition faced by each firm. Successful entrepreneurship produces profit, which can be seen as an increase in the value of equity. Profit arises from two sources: 1) the offering of opportunities to customers which are superior to those offered by competing firms; and 2) the offering of opportunities to capital suppliers; i.e., lenders and stockholders, superior to those offered by competing firms. Profit means that the revenues exceed the costs. We speak of "operating profit" and "financial profit."

Finance is about transactions or exchanges which are not completed instantaneously, but are extended across an interval of time, with cash flows separated from one another by passing time. Finance examines how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. All finance decisions involve some benefits to be received in the future, or payments to be made in the future; because these prospective cash flows are expected to occur in the future, their values are uncertain; i.e., we do not know exactly how large they will be or exactly when they will occur. Finance is the analytical method of taking account of these differences in the timing of cash flows and the associated uncertainty of the cash flows. When we think we can quantify the uncertainty to some extent, we rename the uncertainty "risk." In my opinion, however, the quantification of "risk" is inaccurate and unrealistic because there will be only one outcome. What we are really attempting to quantify is our opinion about our ignorance of the future.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets, "investment," and the raising of funds for asset purchases, "financing". Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

All financial decisions must explicitly consider three issues: 1) Time, 2) Risk, and 3) Value. These are often stated as "risk and expected return." The increase in value brought about by an expenditure is the "Net Present Value". It is the market economy that translates utility into dollar prices.
The goal of this course is to teach you how to think in terms of present values of alternative courses of action so that you can choose (that is, to select from all of the alternative possible courses of action) the proper course of action for the firm to follow. All decisions choose between alternative future courses of action, because only the future can be altered. All financial decisions are entrepreneurial in nature because of the need to forecast the outcomes which will result prior to the taking of action. The future course of action is specified in terms of pro-forma financial statements and cash flow statements. You will learn in this course how to construct such pro-forma statements.

The proper course of action increases the wealth of the existing equity holders more than any of the alternative courses of action will. The goal of the firm is to increase the wealth of existing equity holders as much as possible with each action. Successful entrepreneurship increases the wealth of equity holders; unsuccessful entrepreneurship reduces the wealth of equity holders.

Wealth is the present value of all future benefits to be received, appropriately adjusted for the risk involved, plus the value of benefits now held. The only future benefits we can consider quantitatively are cash receipts. Finance is concerned only with cash flows and their value.

The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principal is violated. You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up. Action is choosing the most valuable alternative from among those available.

Cash Flows are the data of Finance. The basic data of financial decisions are cash flows: the particular amounts of cash (money) received by the firm and expended (paid out) by the firm at particular times (called "moments" or "time points") in the future. We speak of the cash flow from an investment proposal for next year, the year after that, and the year after that; and so on. We indicate the dates of cash flows, and whether they are receipts or payments, on a time line. Accrual accounting concepts are not used in financial analysis or financial decisions, even though the accrual accounting data form the basis of the calculation of cash flow amounts.
ENTREPRENEURSHIP AND FORWARD THINKING:

Entrepreneurship is the animating force of the market economy; it is how human beings achieve the future by acting in the present; it requires creative thinking to foresee how alternative futures will be, depending upon what present actions are undertaken. Entrepreneurship is a creative and imaginative act of foresight and change; the action of the entrepreneur causes the future to be different than it would have been if he had acted differently. Entrepreneurship is carried on by every market participant, not merely by those business innovators or leaders we call "entrepreneurs" (although they certainly engage in entrepreneurship). Business activity is coordinated acts of entrepreneurship which we seek to understand through analysis of financial statements. "Understanding" refers to the past and to the future; i.e., learning what past entrepreneurial acts were carried out to achieve the present, and seeing what entrepreneurial acts are presently being carried out to change the future. Successful entrepreneurs forecast the future more accurately than do others, so their plans are more successful, and their revenues exceed their costs, allowing them to win profits. Unsuccessful entrepreneurs forecast the future less accurately than do others, so their plans are less successful, and their costs exceed their revenues, so they incur losses.

We call a market participant an "actor" because he acts; i.e., purposefully seeks to change the future from what it would have been if he had not acted into what he hopes to make it become. For this reason Ludwig von Mises' treatise on Economics is titled Human Action. Action requires two anticipations and their comparison: the forecasting of what the future will be if the actor does not act, and the forecasting of what the future will be if the actor acts in the way he is considering. If the actor acts, we know that he considered the former perceived future (which he has obliterated by his action) to be less satisfactory to him than he considered the latter perceived future (which he has sought to achieve). The actor may not have succeeded by means of his action in bringing about the future which he sought. These anticipations precede the action of the entrepreneur. Entrepreneurship consists not merely of the anticipations or forecasting of alternative futures, but also and inextricably the action seeking to bring about and achieve the future state by taking particular actions in the present: entrepreneurship is directed action associated with the forecasting of the future.

Profits are won by successfully anticipating and achieving the future—that is, by offering customers opportunities superior, from their point of view, to other opportunities offered by others or to opportunities which formerly existed—this is "successful entrepreneurship." Unsuccessful entrepreneurship creates a state of affairs less attractive to the consumers than that which was foregone or that which is offered by competitors, so unsuccessful entrepreneurship creates losses. Profits are won by successful entrepreneurship.

"Forward Thinking" is the process of considering the entire future of a business entity and collapsing that future lifetime into a present value: it consists in evaluating the business. Successful managements are those who always think forwardly and who are successful entrepreneurs. Nobody always forecasts perfectly, so sometimes even superior entrepreneurs are wrong, and sometimes even superior firms have losses. "Managerial performance" consists in successful entrepreneurship, which achieves profits, and accurate forward thinking, which values the profits.

Value is the present discounted value of the all of the future cash flows which the owners of the firm can take out of the firm over its entire lifetime through the future without impeding its continuing operation and future (planned) growth.

Genuine managerial performance is understood by successful forecasting of the future achievements of the firm and the valuation of those future achievements. Genuine managerial performance wins profits for the entrepreneur and increases the value of the firm's equity.
We will concentrate on understanding the effect on firm value of the financial statements. Firm value is the present value of all the future actions of the firm: value is the result of forward thinking. The future actions of the firm are the measure of the success of the entrepreneurship of its owners, managers, and employees. Successful entrepreneurship wins profits and increases the value of the firm. Unsuccessful entrepreneurship creates losses and decreases the value of the firm.

*Finance* is the application of economic principles to decision making and decision analysis for *inter-temporal* action, just as engineering is the application of chemical and physical principles to solving problems. We will evaluate the success of the entrepreneurship of the management and employees on both the operating dimension and the financial dimension.

It is the future actions which cause the present value which we observe and which cause changes in that value.

We will measure the implications of alternative proposed actions through our *evaluation* of the firm; *i.e.*, estimating the present value of all its future activities in the value of equity.

We will focus on the main topics of Finance theory: valuation, capital structure, cost of capital, growth, capital acquisition and disbursement. Review these topics in your textbook and in the thick handout "Principles of Finance" I give you.

Entrepreneurial activity is the successful anticipation (*i.e.*, foreseeing) and achievement (*i.e.*, bringing about) of the future through present activity. We always seek to understand the entrepreneurial activity of the firm. This entrepreneurial activity, whether successful or not, is interpreted by us on the basis of our *evaluation* (*i.e.*, estimating the present value of all future activities) of the future activities of the firm which we forecast. This is a different point of view from that of the accountant.

We know that the past decisions made by the firm, the results of which we see in the current financial statements (for example the degree of financial leverage or changes in the inventory turnover or the return on equity), were made in the past in an effort to improve the firm's present situation by increasing its value. We will evaluate the quality of the firm's past entrepreneurial actions on the basis of the present capital structure and the present business and economic conditions and the firm's current value and changes in that value during the recent past, in response to the firm's decisions. We will form a judgment regarding the entrepreneurial alertness and success of the management on the basis of this analysis of the success of past actions. Based on our evaluation of the quality of the entrepreneurial decisions of the firm, we will judge the likelihood of current and future entrepreneurial success in the context of the competitive environment. We likewise know that present decisions the firm is making are also aimed at improving future conditions by increasing the value of the firm forward from today, and we will forecast those future conditions on the basis of our present observations. Our forecasting of the future financial statements therefore focuses on how the value of the firm will be affected by current decisions and what the implications of present decisions are for potential changes in the firm's value.

We value the firm based on our forecast of future financial statements and resulting cash flows to equity which will occur in the future, for the remainder of the lifetime of the firm, with the future cash flows to equity discounted at the cost of equity capital of the firm. The future cash flows to equity are forecasted based on our understanding of the present condition of the firm and our understanding of the entrepreneurial activities which we anticipate will be made. Evaluating the increase in the value of equity resulting from the decision we recommend is the goal of this course.

*Valuation* is the crux of finance. Valuation of the firm is accomplished by discounting at the risk-adjusted cost of capital the future cash flows derived from the forecasted future financial statements of the firm. The goal of this course is forecasting the future financial statements and cash flows of the
firm, based on the present and anticipated future conditions and operations of the firm in the environment of its product market and security market, and then estimating the risk-adjusted cost of capital, and then computing the discounted present value of the entire stream of forecasted cash flows. Accounting information must be of high "quality" to accomplish this: "quality of accounting information" refers to the accuracy of the information in reflecting truth and the ability to forecast accurately on the basis of the information. If the reported information is not of high quality, we must first re-state the information so it becomes of high quality. We then compute the value of the equity from those forecasted future cash flows to equity. Analysis of the financial statements consists in the computation of the value of the equity of the enterprise and the evaluation of the quality of the entrepreneurship of the firm's managers. Financial statement analysis is a comprehensive process of thought which creates an understanding of the entrepreneurial capabilities and success of management.

Entrepreneurship is the animating force of the market economy; it is how human beings achieve the future by acting in the present; it requires creative thinking to foresee how alternative futures will be, depending upon what present actions are undertaken. Entrepreneurship is a creative and imaginative act of foresight and change; the action of the entrepreneur causes the future to be different than it would have been if he had acted differently. Entrepreneurship is carried on by every market participant, not merely by those business innovators or leaders we call "entrepreneurs" (although they certainly engage in entrepreneurship). Business activity is co-ordinated acts of entrepreneurship which we seek to understand through analysis of financial statements. "Understanding" refers to the past and to the future; i.e., learning what past entrepreneurial acts were carried out to achieve the present, and seeing what entrepreneurial acts are presently being carried out to change the future. Successful entrepreneurs forecast the future more accurately than do others, so their plans are more successful, and their revenues exceed their costs, allowing them to win profits. Unsuccessful entrepreneurs forecast the future less accurately than do others, so their plans are less successful, and their costs exceed their revenues, so they incur losses. Entrepreneurship is competitive action: action taken to provide to customers a better opportunity—from their own point of view—then those provided by other firms.

ACTION IS ENTREPRENEURSHIP, and ENTREPRENEURSHIP IS ACTION

We call a market participant an "actor" because he acts; i.e., purposefully seeks to change the future from what it would have been if he had not acted into what he hopes to make it become: the actor foresees the future state which will occur if he does not change it, and compares with that the value he perceives in the future state which he can bring about; if he values the changed future more than the "existing future", then he acts to change the future. Action is bringing about a better future state for the actor; entrepreneurship is bringing about a better future state by competitive market action. ACTION IS ENTREPRENEURSHIP, and ENTREPRENEURSHIP IS ACTION.

For this reason Ludwig von Mises' treatise on Economics is titled Human Action, and Israel Kirzner's major book is titled Competition and Entrepreneurship. Action requires two anticipations and their comparison: the forecasting of what the future will be if the actor does not act, and the forecasting of what the future will be if the actor acts in the way he is considering. If the actor acts, we know that he considered the former perceived future (which he has obliterated by his action) to be less satisfactory to him than he considered the latter perceived future (which he has sought to achieve). The actor may not have succeeded by means of his action in bringing about the future which he sought. These anticipations precede the action of the entrepreneur. Entrepreneurship consists not merely of the anticipations or forecasting of alternative futures, but also and inextricably the action seeking to bring about and achieve the future state by taking particular actions in the present: entrepreneurship is directed action associated with the forecasting of the future.

Profits are won by successfully anticipating and achieving the future—that is, by offering customers opportunities superior, from their point of view, to other opportunities offered by others or to
opportunities which formerly existed—this is "successful entrepreneurship." Unsuccessful entrepreneurship creates a state of affairs less attractive to the consumers than that which was foregone or that which is offered by competitors, so unsuccessful entrepreneurship creates losses.

**Profits are won by successful entrepreneurship.**

"Forward Thinking" is the process of considering the entire future of a business entity and collapsing that future lifetime into a present value: it consists in evaluating the business. Successful managements are those who always think forwardly and who are successful entrepreneurs. Nobody always forecasts perfectly, so sometimes even superior entrepreneurs are wrong, and sometimes even superior firms have losses. "Managerial performance" consists in successful entrepreneurship, which achieves profits, and accurate forward thinking, which values the profits.

*Value is the present discounted value of the all of the future cash flows which the owners of the firm can take out of the firm over its entire lifetime through the future without impeding its continuing operation and future (planned) growth.*

Firm value is the present value of all the future actions of the firm: value is the result of forward thinking. The future actions of the firm are the measure of the success of the entrepreneurship of its owners, managers, and employees. Successful entrepreneurship wins profits and increases the value of the firm. Unsuccessful entrepreneurship creates losses and decreases the value of the firm.

*Finance is the application of economic principles to decision making and decision analysis for inter-temporal action, just as engineering is the application of chemical and physical principles to solving problems. It is the future actions which cause the present value which we observe. We will evaluate the success of entrepreneurship of the management and employees on both the operating dimension and the financial dimension.*

We will focus on the main topics of Finance theory: valuation, capital structure, cost of capital, growth, capital acquisition and disbursement.

Entrepreneurial activity is the successful anticipation or creation (i.e., foreseeing or imagining) and achievement (i.e., bringing about) of the future through present activity. We always seek to understand the entrepreneurial activity of the firm in analyzing the financial statements. This entrepreneurial activity, whether successful or not, is interpreted by us on the basis of our evaluation (i.e., estimating the present value of all future activities) of the future activities of the firm which we forecast on the basis of our analysis of the financial statements. This is a different point of view from that of the accountant.

We know that the past decisions made by the firm, the results of which we see in the current financial statements (for example the degree of financial leverage or changes in the inventory turnover or the return on equity), were made in the past in an effort to improve the firm's present situation by increasing its value. We evaluate the quality of the firm's entrepreneurial actions on the basis of the present capital structure and the present business and economic conditions and the firm's current value and changes in that value during the recent past, in response to the firm's decisions. We form a judgment regarding the entrepreneurial alertness and success of the management on the basis of this analysis of the success of past actions. Based on our evaluation of the quality of the entrepreneurial decisions of the firm, we judge the likelihood of current and future entrepreneurial success. We likewise know that present decisions the firm is making are also aimed at improving future conditions by increasing the value of the firm forward from today, and we forecast those future conditions on the basis of our present observations.

We value the firm based on our forecast of future financial statements and resulting cash flows to equity which will occur in the future, for the remainder of the lifetime of the firm, with the future cash flows to equity discounted at the cost of equity capital of the firm. The future cash flows to equity are forecasted based on our understanding of the present condition of the firm and our understanding of the entrepreneurial activities which we anticipate will be made.

*Valuation of the firm first, by forecasting the future financial statements and cash flows of the firm, and second, by discounting the future cash flows, is the goal of this course.*
The **goal of this course** is forecasting the future financial statements and cash flows of the firm, based on the present and anticipated future conditions and operations of the firm; computing the value of the equity from those forecasted future cash flows to equity, noting changes reflecting profit, and evaluating the quality of the entrepreneurship of the firm's managers in comparison with competing firms, on both the operating and financial dimensions; and **making a decision** regarding the best course of action for the firm to pursue. "Valuation" consists in the computation of the value of the equity of the enterprise and the evaluation of the quality of the entrepreneurship of the firm's managers.

Genuine managerial performance is understood by successful forecasting of the future achievements of the firm and the valuation of those future achievements. Genuine managerial performance wins profits for the entrepreneur and increases the value of the firm's equity.

Firm value is the present value of all the future actions of the firm: value is the result of forward thinking. The future actions of the firm are the measure of the success of the entrepreneurship of its owners, managers, and employees. Successful entrepreneurship wins profits and increases the value of the firm. Unsuccessful entrepreneurship creates losses and decreases the value of the firm.

We will measure the implications of alternative proposed actions through our **evaluation** of the firm; *i.e.*, estimating the present value of all its future activities in the value of equity.

Entrepreneurial activity is the successful anticipation (*i.e.*, foreseeing), creation (*i.e.*, imagining), and achievement (*i.e.*, bringing about) of the future through present activity. We always seek to understand the entrepreneurial activity of the firm in analyzing the financial statements. This entrepreneurial activity, whether successful or not, is interpreted by us on the basis of our **evaluation** (*i.e.*, estimating the present value of all future activities) of the future activities of the firm which we forecast on the basis of our analysis of the financial statements. This is a different point of view from that of the accountant.

We know that present decisions the firm is making are aimed at improving future conditions by increasing the value of the firm forward from today, and we will forecast those future conditions on the basis of our present observations. Our forecasting of the future financial statements therefore focuses on how the value of the firm will be affected by current decisions and what the implications of present decisions are for potential changes in the firm's value.

We value the firm based on our forecast of future financial statements and resulting cash flows to equity which will occur in the future, for the remainder of the lifetime of the firm, with the future cash flows to equity discounted at the cost of equity capital of the firm. The future cash flows to equity are forecasted based on our understanding of the present condition of the firm and our understanding of the entrepreneurial activities which we anticipate will be made. Evaluating the increase in the value of equity resulting from the decision we recommend and the resulting forecasting of the future financial statements and cash flows of the firm is the goal of this course.

It is the future actions which cause the present value which we observe and which cause changes in that value.

Evaluating the increase in the value of equity resulting from the decision we recommend is the goal of this course.
CORRECT FINANCIAL DECISION-MAKING

The goal of this course is to reinforce your thinking in terms of **net present values of alternative courses of action** so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm’s owners by the greatest amount, presuming no law or ethical principle is violated. **The numerical value of the Net Present Value of a course of action is the exact amount by which the wealth of the shareholders will be increased if the company follows that course of action.**

Wealth of the shareholders is the present value of all the cash flows which the shareholders will receive because of their ownership of the firm: dividends plus the selling price of the stock.

The current price of the stock is the present value of all the dividends which the firm will pay throughout its lifetime in the future, where the discount rate is adjusted appropriately for the risk borne by the equity holders.

This discount rate is called the “**cost of equity capital**”; **the cost of equity capital is the rate of return which the equity holders require on their investment due to the risk they bear, and which they could earn on the best alternative opportunities for investment of equivalent risk which they have in the financial market.**

We will discuss how the unencumbered system of financial markets within which firms operate allocate scarce resources to benefit consumers by affecting the financial decisions within the firm. The firm’s financial managers can increase shareholder wealth only by making decisions which correctly incorporate the facts and valuations of the market participants outside the firm. Firm financial decisions are made using information regarding the valuations of shareholders, lenders, and customers which is gathered from the context of the market economy within which the firm operates. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. The values are determined by the conditions in the financial and capital markets, specifically the rates of return available on other investment opportunities of equivalent degree of risk to the one under consideration. So the decisions made by financial managers take into explicit account not only the situation within the firm, but also the financial market environment within which the firm operates. Both sets of facts—the internal facts of the firm and the external facts of the market—must be taken into account in making correct financial decisions.

<table>
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<th>The &quot;value of the firm&quot; is the cash price which is now equivalent to all the future cash flows which will benefit the all the suppliers of capital (both debt and equity) through the remaining life of the firm. The &quot;VALUE OF THE FIRM&quot; is the present value of all of the future benefits to be received by both groups, debtholders and equityholders, during the total remaining life of the firm. The &quot;Wealth of the Shareholders&quot; is the &quot;VALUE OF THE EQUITY&quot; of the firm: it is the present value of all of the benefits which only the shareholders will receive during the total remaining life of the firm. Each financial action seeks to increase the wealth of the shareholders as much as possible.</th>
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You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. **The focus is on the action recommendation: selecting and recommending the best course of action.** All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly
valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost; that is called a "trade" or "exchange". People always seek to improve their positions by acting by exchanging that which they value less for that which they value more. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up; if a person does give up what he values more to receive something he values less, that is a "sacrifice". Note that this usage is different from the use which says, for example, "he sacrificed his life to save hers" this latter is merely a trade. It is very difficult to find examples of actual sacrifices made by sentient human beings. Action is choosing the most valuable alternative from among those available; once the choice is made, it is implemented. But we focus on the act of choosing in the definition of "action."

The most valuable alternative increases the present wealth of equity holders by the largest amount. The amount of the increase in wealth is the Net Present Value of the course of action selected and implemented.

DEFINITION OF FINANCE:

Finance is the study of exchanges which are extended over an interval of time; hence, entrepreneurship, risk, and uncertainty play a role in every financial decision.

Financial management is the rational selection and operation of assets ("INVESTMENT"), and the raising of the funds necessary to pay for them ("FINANCING"), so as to benefit shareholders, the owners of the firm ("CAPITAL ACQUISITION AND DISBURSEMENT POLICY").

"Benefit" means to provide to the shareholders a greater value than all other possible courses of action would.

Financial decisions are always made by comparing the present values of alternative courses of action: Net Present Value is a measure of profit. Positive Net Present Value reveals successful entrepreneurship; negative Net Present Value reveals unsuccessful entrepreneurship. However, mistakes can be made, such that afterward, one realizes that the anticipated positive Net Present Value was in fact mistakenly appraised and was actually negative.

Business financial decisions are made within the environment of financial markets, so the structure and processes of the financial markets must be understood. In a free market, business financial decisions benefit all the people in the society by rationally allocating resources across time in accordance with the values of the inhabitants of the society. Financial markets co-ordinate the usage of resources across time in accordance with the values of the participants of a market economy; i.e., to benefit the consumers.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows.

We will focus on valuation of the firm because valuation is the central concept in finance: the best course of action is the one that increases the value of the firm most, as measured by the present wealth of equity holders.

The value of the firm is the money price which is now equivalent to all the future cash flows which will benefit the suppliers of capital through the remaining life of the firm. The value of the equity is the money price which is now equivalent to all the future cash flows which will benefit the owners (equity suppliers) through the remaining life of the firm.
Finance is about transactions or exchanges which are not completed instantaneously, but are extended across an interval of time, with cash flows separated from one another by passing time. Finance examines how time and uncertainty affect business decisions, especially in the selection of assets and the raising of funds for asset purchases. All finance decisions involve some benefits to be received in the future, or payments to be made in the future; because these prospective cash flows are expected to occur in the future, their values are uncertain; i.e., we do not know exactly how large they will be or exactly when they will occur. Finance is the analytical method of taking account of these differences in the timing of cash flows and the associated uncertainty of the cash flows. When we think we can quantify the uncertainty to some extent, we rename the uncertainty "risk." In my opinion, however, the quantification of "risk" is inaccurate and unrealistic because there will be only one outcome. What we are really attempting to quantify is our opinion about our ignorance of the future.

We will examine how time and uncertainty affect business decisions, especially in the selection of assets, "investment," and the raising of funds for asset purchases, "financing." Because action aims at changing future events, and the future has not yet been attained, there is always uncertainty or risk involved, that things will not turn out exactly as we expect, forecast, or hope.

All financial decisions must explicitly consider three issues: 1) time, 2) risk, and 3) expected return or Net Present Value. These are often stated as "risk and expected return." It is the market economy that translates utility into dollar prices.

The goal of this course is to teach you how to think in terms of present values of alternative courses of action so that you can choose (that is, to select from all of the alternative possible courses of action) the proper course of action for the firm to follow. All decisions choose between alternative future courses of action, because only the future can be altered. The future course of action is specified in terms of pro-forma financial statements and cash flow statements. You will learn in this course how to construct such pro-forma statements.

The proper course of action increases the wealth of the existing equity holders more than any of the alternative courses of action will. The goal of the firm is to increase the wealth of existing equity holders as much as possible with each action.

Wealth is the present value of all future benefits to be received, appropriately adjusted for the risk involved, plus the value of benefits now held. The only future benefits we can consider quantitatively are cash receipts. Finance is concerned only with cash flows and their value.

The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principal is violated. You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost. People never select a goal which is less valuable than what would thereby be given up. Action is choosing the most valuable alternative from among those available.
Cash Flows are the data of Finance. The basic data of financial decisions are cash flows: the particular amounts of cash (money) received by the firm and expended (paid out) by the firm at particular times (called "moments" or "time points") in the future. We speak of the cash flow from an investment proposal for next year, the year after that, and the year after that; and so on. We indicate the dates of cash flows, and whether they are receipts or payments, on a time line. Accrual accounting concepts are not used in financial analysis or financial decisions, even though the accrual accounting data form the basis of the calculation of cash flow amounts.

The goal of this course is to reinforce your thinking in terms of net present values of alternative courses of action so that you can choose the proper course of action for the firm to follow. The proper course of action is the one that increases the wealth of the firm's owners by the greatest amount, presuming no law or ethical principle is violated. The numerical value of the Net Present Value of a course of action is the exact amount by which the wealth of the shareholders will be increased if the company follows that course of action.

Wealth of the shareholders is the present value of all the cash flows which the shareholders will receive because of their ownership of the firm: dividends plus the selling price of the stock.

The current price of the stock is the present value of all the dividends which the firm will pay throughout its lifetime in the future, where the discount rate is adjusted appropriately for the risk borne by the equity holders.

This discount rate is called the "cost of equity capital"; the cost of equity capital is the rate of return which the equity holders require on their investment due to the risk they think they bear, and is the rate of return which they think they could earn on the best alternative opportunities for investment of equivalent perceived risk which they have in the financial market.

We will discuss how the unencumbered system of financial markets within which firms operate allocates scarce resources to benefit consumers by affecting the financial decisions within the firm. The firm’s financial managers can increase shareholder wealth only by making decisions which correctly incorporate the facts and valuations of the market participants outside the firm. Firm financial decisions are made using information regarding the valuations of shareholders, lenders, and customers which is gathered from the context of the market economy within which the firm operates. Every finance decision must be understood in terms of the alternative courses of action available and the present value of each based on a system of cash flows. The values are determined by the conditions in the financial and capital markets, specifically the rates of return available on other investment opportunities of equivalent degree of risk to the one under consideration. So the decisions made by financial managers take into explicit account not only the situation within the firm, but also the financial market environment within which the firm operates. Both sets of facts—the internal facts of the firm and the external facts of the market—must be taken into account in making correct financial decisions.

The "value of the firm" is the cash price which is now equivalent to all the future cash flows which will benefit all the suppliers of capital (both debt and equity) through the remaining life of the firm. The "VALUE OF THE FIRM" is the present value of all of the future benefits to be received by both groups, debtholders and equityholders, during the total remaining life of the firm. The "Wealth of the Shareholders" is the "VALUE OF THE EQUITY" of the firm: it is the present value of all of the benefits which only the shareholders will receive during the total remaining life of the firm.

Each financial action seeks to increase the wealth of the shareholders as much as possible.
You will learn how to identify problems, how to choose the proper tools for analysis, how to imagine and project the available alternatives, and how to choose the best course of action. The focus is on the action recommendation: selecting and recommending the best course of action. All analysis is aimed at choosing a course of action from among the many available. Integral to the proper analysis of alternatives is the analysis of the cost of each alternative: the cost of an action is the one most highly valued alternative action which is given up (out of the many which are given up, all the rest of which are less important than the one which is most highly valued) to achieve the chosen action or goal. People always choose a goal which is more valuable than its cost; that is called a "trade" or "exchange". People always seek to improve their positions by acting by exchanging that which they value less for that which they value more. People never select a goal which is less valuable than its cost; i.e., less valuable than what would thereby be given up; if a person does give up what he values more to receive something he values less, that is a "sacrifice". Note that this usage is different from the use which says, for example, "he sacrificed his life to save hers" this latter is merely a trade. It is very difficult to find examples of actual sacrifices made by sentient human beings. Action is choosing the most valuable alternative from among those available; once the choice is made, it is implemented. But we focus on the act of choosing in the definition of "action."

The most valuable alternative increases the present wealth of equity holders by the largest amount. The amount of the increase in wealth is the Net Present Value of the course of action selected and implemented.

IMPORTANT CONCEPTS IN FINANCE

Management is Choosing and Implementing a Future Course of Action. All decisions choose between alternative future courses of action, because only the future can be altered. All decisions are entrepreneurial in nature, because first, the future events flowing from the action must be forecasted. The most valuable alternative increases the present wealth of equity holders by the largest amount. The amount of the increase in wealth is the Net Present Value of the course of action selected and implemented.

Financial decisions select one particular course of action from the many opportunities available. Financial decisions relate to future courses of action and future events and conditions: future sales and expenses, future dividends and interest, future repayments of debt. But these decisions relating only to the future must be made today in the present, before they come to pass. This means that we must evaluate alternative future courses of action before they can be tested. This is possible only in a market economy with a medium of exchange, through the mechanism of "present valuation of future money (cash) flows."

The market interactions of the personal time-preference rates of market participants lead to the emergence of a system of market interest rates. The mathematics of compounding and discounting are taught. Computations of present values of streams of future cash flows are stressed.

Freedom in economic transactions is essential to the allocative efficiency of markets. It is the existence of the system of market interest rates within the structure of the private-property economy which allows the making of rational financial decisions within the firm and the allocation of goods within a society across time in accordance with the values of the people who compose the society. The relationship between risk and required return is explored, and the term structure of interest rates is investigated.

Using financial valuation models such as those by Gordon and Solomon, the causes of earnings and earnings growth are investigated. Re-investment of earnings is necessary to achieve growth of future earnings. Growth requires either a greater degree of operating efficiency or a greater quantity of assets creating sales. We often compute the Sustainable growth rate \( g^* \) to determine whether or not a firm needs greater inflow of cash from more borrowing to accomplish a particular rate of growth.
Valuation can be accomplished only in a free market; there can be no economic values in a command economy. Command economies cannot allocate capital goods efficiently because there can be no market in capital goods in a command economy. Command economies cannot efficiently, rationally, and coherently allocate consumers' goods across time because the time dimension of transactions is missing. Correct financial decisions choose the course of action with the greatest value from among the alternative courses of action available.

The free society vs. the command economy. Respect for and protection of property rights of individuals are basic to civilized society. There can be no functioning markets for capital goods in a command economy; hence, profits cannot guide decisions and welfare cannot be enhanced. Moreover, regulation of the economy inevitably causes tyranny, as Hayek proved in *The Road to Serfdom*.

Economic Functions of Financial Markets: to reduce the risk borne by investors and increase the rates of return available to investors, and to increase the flow of capital into investment. Interest rates reflect the time preferences of the market participants and the investment opportunities they perceive. Interest rates are not an "exogenous" variable, an "ether" within which transactions occur; rather, interest rates are the results of ebullient competition among market participants. Rates of return of assets are not properties of the assets, but instead are perceptions and forecasts of the minds of the owners (actual and potential) of the assets, and rates of return depend upon the idea of the owner about how best to use the asset. Rates of return are created by the owners of assets choosing correctly how to employ the assets to provide better products and services to their customers.

Freedom in economic transactions is essential to the allocative efficiency of markets. It is the existence of the system of market interest rates within the structure of the private-property economy which allows the making of rational financial decisions within the firm and the allocation of goods within a society across time in accordance with the values of the people who compose the society. The relationship between risk and required return is explored, and the term structure of interest rates is investigated.

Valuation can be accomplished only in a free market; there can be no economic values in a command economy. Command economies cannot allocate capital goods efficiently because there can be no market in capital goods in a command economy. Command economies cannot efficiently, rationally, and coherently allocate consumers' goods across time because the time dimension of transactions is missing. Correct financial decisions choose the course of action with the greatest value from among the alternative courses of action which have been created by entrepreneurial thought and thereby made "available".

"Risk" is often viewed as the variability of return across a span of time. **Risk is a subjective perception of the actor**: the actor chooses how much risk he perceives or bears. Risk is a person's opinion about his own ability to forecast the future: if the person believes he has made a forecast which is perfectly correct, then he bears no risk. If he believes he does not know what will happen, then he bears great risk. Portfolio Theory shows that groups of assets can be less risky than any one of the component assets held individually because of the lack of perfect correlation between the time returns of pairs of assets. The Capital Asset Pricing Model is the first approximation to the required return on a risky asset arising from its contribution to the risk of a portfolio in equilibrium (which never exists), and it allows estimation of the equilibrium risk-adjusted required rate of return on an asset in a well-diversified portfolio.
**Inter-temporal Allocation of Goods.** Co-ordination of time-spanning production processes is accomplished by competition in interest rates and competition in rates of return. Financial markets produce "Financial Intermediation" and "Asset Transmutation," which determine the nature of corporate structure: the separation of ownership from management, which makes possible the greater efficiency and productivity of the corporate form of organization, compared with more primitive forms of organization such as the individual proprietorship and the partnership. The effects of Financial Intermediation include risk reduction through the processes of diversification and use of expertise, and the combination of small portions of individual savings into large funds of capital, thereby increasing the efficiency of investment. The benefits of Asset Transmutation Effects are greater in magnitude than the benefits of intermediation, and they arise from specialization in entrepreneurship and separation of ownership from management. The goal of financial management in a free society is to benefit the owners of the capital which constitutes the firm.

**Cash Flows are the data of Finance.** The basic data of financial decisions are cash flows: the particular amounts of cash (money) received by the firm and expended (paid out) by the firm at particular times (called "moments" or "time points") in the future. We speak of the cash flow from an investment proposal for next year, the year after that, and the year after that; and so on. We indicate the dates of cash flows, and whether they are receipts or payments, on a time line. Accrual accounting concepts are not used in financial analysis or financial decisions, even though the accrual accounting data form the basis of the calculation of cash flow amounts.

**Financial Analysis** tells us what has happened to the firm in the past to bring it to its present state. We use several different techniques: Financial Ratio Analysis; Funds cycles and funds flows; Sources and Uses of Funds Analysis; Statement of Cash Flows; Financial Cash Flow Analysis; Pro-Forma Statement Forecasting by ratios and sustainable growth.

Firms alter the risks borne by investors by choices of investment and production processes which alter the degree of operating leverage, and by choices of financing methods which alter the degree of financial leverage. Financial ratio analysis, especially the duPont method, illuminates business policies which affect financial condition and performance. The efficacy of previous financial decisions is evaluated, and appropriate methods of management of accounts receivable and payable, inventory, capital asset acquisition, financing and capital structure, and acquisition and disbursement of capital are studied. Cash flow analysis shows what the firm has actually done, and pro-forma statement construction is central to financial forecasting and planning.

**Financial Decisions are always made on the basis of Net Present Value,** the combined present value of all cash inflows and all cash outflows involved in an opportunity. In order to evaluate future cash flows, we must find out how valuable these cash flows are today, when we make the decision. This procedure of determining the present value of future cash flows is called discounting the future cash flows. It consists of finding an amount of money which, if available today, would allow us to exactly duplicate the entire series of future cash flows, in the same amounts and on the same days as they are expected to occur in the future. The opposite mathematical procedure, similar to computing how much the balance will be in a bank savings account on some date in the future, is called compounding. Consider a stream of several or many cash flows occurring at different dates across time; these cash flows can be receipts ("inflows") or disbursements ("outflows"). We can compute the value of this stream of cash flows at any single time point, past or future, as well as at the present moment; when we do that, we call it the "net value" of the cash flow stream at that particular single moment we have chosen to compute a lump sum (dollar value) which is entirely equivalent to the whole stream of many cash flows.
For investments which do not alter the risk composition of the firm's assets, the appropriate
discount rate is $k_f^* = \theta kd (1 - \tau) + (1 - \theta) ke$, the firm's weighted-average cost of capital ($WACC = k_f^*$), which is derived from the financial-market performance of the firm's capital claims. Alternatively, the Risk-Adjusted Discount Rate (RADR) can be used.

A business is viewed as a system of cash flows extending through time. Valuation of the
business is the central method of financial decisions, as the impact of alternative courses of action on firm value must be evaluated in order to choose among the alternatives.

**Future cash flows** of proposed capital assets form the basis of analysis. The riskiness inherent
in these cash flows determines the size of the discount rate for computing the Net Present Value of each proposed asset, which allows selection of the best alternative.

**Rate of Return.** A "rate of return" is just like an interest rate paid by a bank on a savings
account. Rates of return are usually expressed as percentages on an annual basis: 6.5% per year of the principal amount is paid as income, while the principal amount is held constant. The required rate of return of the equity suppliers, $ke$, is called the "cost of equity capital". $kd$ is the required rate of return of the debt suppliers.

**Risk and Required Return.** Since we cannot know the future, there is always an element of risk involved in choosing any course of action, since we cannot know for sure how it will turn out. Human beings dislike risk: hence, they want to be paid for bearing it, and they want to be paid more for bearing more risk. We say that "the required return increases, the greater the risk borne."

**Greater Risk Requires Greater Expected Return.** The basic relationship in finance is this: the greater the risk perceived in owning an asset during the future, the higher is the rate of return required by the owner of the asset. Unless the owner expects the future rate of return to be large enough, he will not purchase the asset. Risk therefore causes a required or expected rate of return, such that, if the rate of return offered by an asset is not large enough, the price of the asset must SPRING until the expected rate of return is large enough to justify bearing the risk. This required larger expected return (across the future span of time when the asset will be held) with larger perceived risk DOES NOT MEAN that bearing greater risk means that you will receive a larger realized return. Bearing more risk means that you may experience a lower realized return or a loss, while holding the risky security.

**Risk-Expected Return Relationships.** The Security Market Line expresses this relationship
between risk and required rate of return, showing that the larger the amount of risk borne by an investor, the larger is the required rate of return that investor requires on a single investment in order to be willing to bear the risk. The **Capital Asset Pricing Model (CAPM)** is a particular mathematical model approximating the security market line based on a set of simplifying assumptions. The equation of the Capital Asset Pricing Model is: $ke_i = E[R_i] = R_F + \beta (E[R_M] - R_F )$. $ke_i$ is the required rate of return of the equity suppliers for the $i$th security, also called the "cost of equity capital of the $i$th firm". This is, in equilibrium, equal to the expected rate of return on the equity of the $i$th firm, which is $E[R_i]$. $E[R_M]$ is the expected rate of return on the market portfolio of risky stocks (say, the Standard & Poor's 500-stock index) during the relevant future time period, and $R_F$ is the risk-free rate during the relevant future time period, the rate of return on United States Treasury Securities for that period until their maturity.

The **graph of the Capital Asset Pricing Model** is called the "Security Market Line". The Security Market Line is a straight line because the Capital Asset Pricing Model is a linear model. The **Capital Market Line** expresses the equilibrium relationship between expected return and risk of "efficient" portfolios of assets; it is also a straight line. The Capital Market Line shows different things
than the Security Market Line does: the Capital Market Line shows only efficient portfolios; *i.e.*, portfolios that are highly diversified and perfectly correlated with the Market portfolio.

**Financial Assets.** Shares of stock and bonds are financial assets, or "securities", which offer the prospect of future receipt of cash to the holder. These securities have values commensurate with the amounts and timings of the future cash flows and the risk involved in the receipt of these prospective cash flows. The value of all the bonds (debt) which the firm has outstanding is called the value of debt (VD), and the value of all the shares of stock which the firm has outstanding is called the value of equity (VE).

**Cost of Capital, \( kf^* = \theta \cdot kd^* + (1 - \theta) \cdot ke \).** The cost of capital of the firm is the rate of return the firm must pay to acquire investment capital; "investment capital" is a cash amount which the firm can spend on new physical assets. Note that the cost of capital is NOT a dollar amount; the cost of capital is a percentage amount, or a decimal fraction, since it is a required rate of return, equivalent to an interest rate.

**Value of Debt, VD.** When the firm borrows, it promises the lender first access ("prior claim") to the cash flows remaining after all employees and suppliers of materials and services used in production have been paid ("CAC" = cash available to all capital suppliers). The firm also promises to pay the lender particular amounts of money on particular dates, and this promise is written down—the written contract is called a "bond indenture". So the lender has first claim to the available cash and an enforceable contract (bond indenture) which guarantees payment: the lender bears little risk. On the other hand, the lender can stop the operation of the firm and gain ownership over the firm's assets through forced bankruptcy if the firm does not have enough cash to make good on this promise; hence, the risk borne by the firm is great, since borrowing can potentially destroy the firm. Because the bondholders (lenders) are so protected, they bear little risk, and therefore require a small rate of return on their investment: we say the "cost of debt capital" is low. (The cost of debt capital to the firm is further reduced by the tax-deductibility of interest payments made by the firm to the bond holders.)

**Value of Equity, VE.** When the firm sells stock, on the other hand, it promises nothing to the equity investor except "best efforts", and the firm has the option of paying dividends to equity holders only if it chooses to, and then only if there is any cash at all ("CAE" = cash available to equity) remaining after everybody else associated with the firm has been paid in full. The equity holders have a "residual claim" to cash. Not only do equity holders receive dividends only after all the required payments are made to debt holders, but if the debt holders force bankruptcy on the firm, the debt holders take over the ownership of the assets, and the equity holders have no assets remaining under their ownership. Hence, the equity holders bear great risk, since they have no idea of the amounts and timings of any future cash flows (dividends) they may receive, and they can lose all of their investment in the firm. The equity holders have no recourse to the firm, so the firm bears little risk in issuing equity. Because the equity holders bear great risk, they require a high expected future rate of return on their investment in the firm's stock (higher than the rate of return required by the bond holders on their investment in the debt of the firm): we say that the "cost of equity capital" is higher than the cost of debt capital.

**Capital Structure, \( \theta = VD / (VD + VE) \), and Its Optimum Value, which minimizes \( kf^* \).** We see that there is a tradeoff to the firm in issuing debt and equity capital claims: debt is riskier to the firm but cheaper; equity is safer but more expensive. There is therefore an optimum combination of debt and equity which balances risk and cost of capital. The combination of debt and equity which a firm uses to finance itself is called the "capital structure ratio" or the "debt ratio". I use the capital Greek letter \( \theta \) (THETA) to denote the ratio of the value of debt to the sum of the value of debt plus the value of equity:
\[ \theta = \frac{VD}{VD + VE}. \]  The sum of the value of debt (VD) plus the value of equity (VE) is called the value of the firm (VF): \[ VF = VD + VE. \]

**Capital structure**, \( \theta \) is the ratio of debt to assets, or of debt to equity, which describes how the assets were financed. I use the symbol \( \theta \) the capital Greek "theta" also to denote the ratio of total debt to total assets—market values are used to define capital structure; we use book values taken from the balance sheet only if the debt and equity of the firm do not trade in a market. "Risk" can be viewed as the variability over time of a cash-flow stream. The variability of the firm's Net Operating Income (Earnings Before Interest and Taxes, or "EBIT") is called the "Business Risk" of the firm. The variability of the cash flows to debt suppliers is the "debt risk", and the variability of the cash flows to equity suppliers (stockholders) is "equity risk".

The **tax-deductibility of interest payments** makes debt an attractive financing method of lower cost than the rate of return demanded by the bondholders; but the great risk imposed on the firm by debt financing (due to the contractual requirement to pay interest and principal or suffer bankruptcy) reduces that attractiveness.

Using debt financing causes "financial leverage": the fluctuations in returns to shareholders are larger than the fluctuations operating income. This is good if income rises and dangerous if income falls. Financial leverage causes the risk borne by the equity holders to be larger than the overall risk of the firm. This larger equity risk causes the cost of equity to exceed the average required rate for the firm as a whole. Higher-cost equity financing is much safer for the firm because the firm need not pay a particular dollar volume of dividends to equity holders. But lower-cost debt is riskier to the firm because of the contractual requirement to pay a particular dollar volume of interest payments and principal repayments.

**The cost of capital to the firm**, \( kf^* \) is the rate of return which must be paid by the firm to the supplier of a particular form of capital because of the risk which the capital supplier perceives he bears from supplying that capital to the firm. Debt holders demand a small rate of return because they bear only a small amount of risk. Equity holders demand a higher rate of return because they bear significantly more risk. So the cost of debt is always smaller than the cost of equity. The debt holders bear less risk than do the equity holders because the debt holders are first recipients of cash distributions and they are promised particular dollar amounts at particular times (both of which reduce the risk they bear), while the equity holders are "residual claimants" receiving dividends only if the firm has enough cash left over after paying the debt suppliers on schedule. Because of this risk differential, the debt holders charge a lower required rate of return and the equity holders charge a higher required rate of return. Debt is always lower-cost than is equity. When we talk about debt, we distinguish the "required rate of return of the debt suppliers = kd" from the "cost of debt capital to the firm = \( kd^* = kd \times (1 - \tau) \)"; note that the cost of debt to the firm is net of (i.e., after) tax, while the required rate of return of the debt suppliers is before tax.

In addition, \( kd^* = kd \times (1 - \tau) = \text{the cost of debt to the firm} \) is reduced below the rate of return demanded by the bondholders because the firm can deduct the interest payments from taxable income, reducing the amount of income tax it must pay. So the firm does not bear the total cost of the debt. This tax-deductibility of interest payments further reduces the net cost of the debt to the firm to a rate smaller than the interest rate on the debt.

**But the cost of each form of capital rises with the debt ratio** \( \theta \). The larger the capital-structure ratio \( \theta = \frac{VD}{VF} = \frac{TL}{TA} \) (the ratio of total liabilities to total assets), the larger are both the cost of debt and the cost of equity. The Weighted-Average Cost of Capital (\( kf^* = \text{WACC} \)) is the
average of the cost of debt and the cost of equity, where the cost of debt is weighted by the ratio of debt to total assets, and the cost of equity is weighted by the ratio of equity to total assets. As the capital structure varies, beginning at zero debt and increasing as debt replaces equity, first the WACC decreases, then after a particular optimum debt ratio is reached, the WACC increases. There is a minimum value of WACC occurring at some intermediate capital structure, and the firm seeks to operate at this minimum value of WACC, the "optimal capital structure". The existence of an optimal capital structure is explored, and the impact of alterations of the capital structure on firm value are determined.

**Valuation Models.** The firm is a system which produces future cash flows to the owners and creditors; hence, it has a value which is commensurate with the timings and amounts of these future cash flows and the risks involved in their receipt. We will study a couple of valuation models for the firm which approximate the value of the firm in a simplified way. These valuation models were suggested by Mike Gordon and Ezra Solomon, and carry their names. The Sustainable Growth "Model" is not a valuation model, but is a formula which estimates the growth rate of sales which the firm can sustain without changes in its operating efficiency, capital structure, or dividend policy.

**Goal of the Firm.** The goal of the firm is to benefit the owners of the firm, since it is their capital which the firm employs, and the economic and social system protects individuals' rights to their property. The firm benefits the shareholders by increasing their wealth as much as possible with each decision and each set of decisions. We call this "shareholder wealth maximization": the firm makes decisions which increase the "present wealth of equity holders" (PWE0) as much as possible. The present wealth of the equity holders consists of the sum of the present values of all the dividends equity holders will receive, beginning now and continuing into the future for the lifetime of the firm. The "value of equity" is the present value of all the dividends beginning with the dividend one period from now in the future and continuing forever. Therefore, the present wealth of equity holders consists of the sum of two components: 1) the current cash flow, + 2) the value of equity. In any decision, the numerical value of the Net Present Value of the course of action selected is the numerical value of the increase in the present wealth of the equity holders, after taking account of all capital structure and dividend implications.

**Term Structure of Interest Rates.** We find that securities of the same degree of default risk but of different terms to maturity generally offer different rates of return. This is called the "term structure of interest rates." You can see it in the "Treasury Issues" column of *The Wall Street Journal.*

**Investment Achieves Growth.** How firms grow: by re-investing earnings from operations and seeking the highest rate of return. \( g = br \): the growth rate is the product of the retention rate \( b \) and the average rate of return on new investment \( r \). Gordon and Solomon Valuation Models both capture this relationship and show us how firms can support growth. Growth of sales requires financing of new assets: the Sustainable Growth Model for a Levered Firm shows how rapidly a firm can grow, and suggests the consequences of growth which is more rapid than the firm can support.

**Operating and Financial Leverage:** Fixed operating costs cause operating income to fluctuate more wildly than sales do from period to period (operating leverage); fixed financing costs (interest payments) cause returns to equity holders to fluctuate more wildly than does operating income (financial leverage). Risk can be viewed as the percentage fluctuation (change) in income or cash flow or return from period to period. Therefore, fixed costs of operations increase risk to the firm, and fixed financing costs (interest expenses) increase the risk borne by the equity holders. However, operating leverage increases the percentage return to the firm from increases in profitable sales, and financial leverage increases the percentage return to the stockholders from use of profitable borrowing ("favorable financial leverage").
Capital Investment Decisions (Capital Budgeting): How to choose whether or not to acquire new assets to perform new functions or replace existing assets. Assets are always selected on the basis of the Net Present Value (NPV) of the course of action involved. Note that an asset does not have a Net Present Value; use of that asset in a particular course of action has a Net Present Value. Assets should never be selected on the basis of the Internal Rate of Return (IRR) computed.

Calculating the NPV. The NPV is calculated from the future cash flows forecasted from a particular course of action. We will discuss forecasting future cash flows--net, after-tax, operating cash flows (CAUt-IVSt); discounting to Net Present Value using the Cost of Capital. The cost of capital is the opportunity cost of the capital: the highest available rate of return in another application, which the capital would earn if it were employed in that application instead of the one we are analyzing. The cost of capital also represents the re-investment rate: the rate of return which will be earned by future cash flows if they are re-invested by the firm in another project.

The cost of capital $k_f^*$ represents the minimum acceptable rate of return which a project must earn in order to be acceptable. The net after-tax operating cash flows of a project are discounted at the $k_f^*$ to determine its Net Present Value. If the project just barely earns the cost of capital (has a zero NPV), the firm will just barely be able to pay to all capital suppliers their respective required rates of return. A project with a NPV of $0.00 should theoretically be accepted because it provides the required rate of return to justify accepting the risk. If the project earns more than the cost of capital (has a positive NPV), then the firm will be able to give stockholders a larger rate of return than they had required for bearing the risk of the stock: stockholders will make a profit.

A "profit" is the additional cash over and above the amount of cash that was required to justify bearing the risk involved, net of all expenses; profit is not merely what is left over out of revenues after payment of all expenses. This would be true only if risk were zero. Risk-bearing is an "expense" that must be compensated. Profit is a non-equilibrium phenomenon: profit is earned only if the project does better than expected. Profit is the gain over what would have been received if the most valuable rejected course of action would have been chosen instead.

NPV Profile. We will always plot the NPV Profile of a proposed project. Changes in working capital and salvage value must be included. We will discuss the conflicts between the NPV and IRR selection criteria and show that use of the IRR in many situations is dangerous, in that it can give incorrect advice regarding which assets to acquire. We will specifically study accept-reject decisions, complex projects, size disparity of projects, projects with differences in the time-shape of the cash flow stream, and replacement decisions. We will carefully examine Mutually-exclusive investment proposals, and will briefly touch on the problems caused by capital rationing.

Business Cycles are Caused by Investment Mistakes brought on by artificial lowering, by government, of the interest rate, below the value it ought to have to reflect the time preferences of the market participants. We will discuss the causes of business cycles: lowering of the apparent rate of interest increases the attractiveness of longer-run, more-capital-intensive projects compared to shorter-run and less-capital-intensive projects, so that firms invest in projects which appear profitable, but turn out not to be profitable; hence, these projects later cause losses (often to other firms) which cause the depression.

The Weighted Average, Marginal Cost of Capital $k_f^*_{ivs}$: How and why the cost of capital $k_f^*$ changes with capital structure (degree of financial leverage) due to risk partitioning ($k_f^* = f(\theta)$); and how the cost of funds changes with the quantity of funds raised ($k_f^*_{ivs} = f(\text{IVS})$). How firms
determine their annual capital budgets by the intersection of the Weighted-Average Marginal Cost of Capital Schedule with the Investment Opportunity Schedule.

**Capital Structure and Financial Leverage:** The tax-deductibility of interest expense makes debt an attractive financing tool and can (but may not) raise the rate of return which stockholders earn on their investment. Debt financing is cheaper than equity, both because the bondholders bear less risk and because of the tax-deductibility of interest. The "leverage" of debt can cause the returns to stockholders to rise by a greater percentage than does the operating income. But debt increases the risks borne by the stockholders: if operating income SPRINGs, debt always causes the returns to stockholders to SPRING by a larger percentage than the percentage decline in operating income. And bondholders can drive the firm to bankruptcy, thereby eliminating all value of equity. There is an optimal capital structure ratio determined by the offsetting costs and benefits, including bankruptcy costs.

**Risk Analysis in Investment Decisions.** We view risk as the variability of return across time. Portfolio Theory shows us that groups of assets can be less risky than any one of the assets held individually, so long as the returns of these assets are not perfectly positively correlated. An equilibrium argument developed by Sharpe, Lintner, and Mossin from a suggestion by Markowitz provides an approximate method of evaluating the contribution to portfolio risk of a single risky asset, taking account of the portfolio effect. In a “well diversified” portfolio, the only additional risk added by a new asset to the portfolio is the **systematic risk** of the new asset. The **systematic risk** of an asset is a portion of its total risk: that portion arising from the interaction of the variability of the asset with the variability of the market portfolio. **Systematic risk** = correlation coefficient between the asset and the market $\rho_{im}$ multiplied by the standard deviation of the distribution of returns of the asset $\sigma_i$. The ratio of the systematic risk of the stock, $\rho_{im} \sigma_i$ to the systematic risk of the market $\sigma_M$ is called beta:

$$\beta = \frac{\rho_{im} \sigma_i}{\sigma_M}$$

Another equivalent meaning of beta is: the covariance between the stock and the market, $\rho_{im} \sigma_i \sigma_M$ divided by the variance of the market $\sigma_M^2$:

$$\beta = \frac{\rho_{im} \sigma_i}{\sigma_M^2}$$

This "Capital Asset Pricing Model" (CAPM) $k_e = R_F + \beta (E[R_M] - R_F)$ gives us the only method so far discovered of quantifying the tradeoff of Systematic Risk for Required Return of an asset, as described by the Security Market Line and estimating the discount rate required for equity, in the context of a well-diversified portfolio. The CAPM gives us a way of calculating the approximate equilibrium risk-adjusted required rate of return of any asset held in a well-diversified portfolio, which is used as the discount rate in computing the Net Present Value of this asset, and this risk-adjusted equilibrium required rate can be viewed as the cost of capital of an asset whose risk differs from that of the firm's existing assets. The capital budgeting analysis of such assets of varying risk is carried out by discounting the project's expected cash flows by the risk-adjusted required rate given by the CAPM to compute a risk-adjusted NPV. If the asset is not held as part of a well-diversified portfolio, the discount rate given by the CAPM must be increased by additional "risk adjustments" which take account of additional risk beyond that of only systematic risk.
FREE CASH FLOWS TO VALUE THE FIRM AND TO VALUE EQUITY

"Financial Free Cash Flows" Are Used to Value the Firm and to Value Equity.

The value of the firm is the present value to the owners of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day.

Free Cash Flow (FCF) or Leveraged Free Cash Flow to Equity Suppliers (LFCFE) is the annual cash flow the firm can use to pay common dividends after the company has made all the investments in fixed assets and working capital necessary to sustain ongoing operations and without adversely affecting the planned growth of the firm; i.e., after purchasing plant and equipment needed to maintain operations and achieve growth, and after purchasing the net working capital required to operate the new plant and equipment. This definition of "Free Cash Flow" subtracts the required debt service (PP + I) for the year on the way to the computation of FCF. We call this "Leveraged Free Cash Flow to Equity Suppliers", LFCFE.

Another definition is: Free Cash Flow is the cash flow the firm can distribute to all investors after the company has made all the investments in fixed assets and working capital necessary to sustain ongoing operations and planned growth. This means that FCF is the cash which the firm can use to pay either stockholders (pay dividends or repurchase stock) or debtholders (PP or Interest) without adversely affecting the planned growth of the firm; i.e., after purchasing plant and equipment needed to maintain operations and achieve growth, and after purchasing the net working capital required to operate the new plant and equipment, but without having subtracted debt service. Stickney calls this "Unleveraged Free Cash Flow to the Firm", UFCFF.

Note that these two definitions are different, so you must specify what definition you are using.

VALUE OF THE FIRM AND THE VALUE OF EQUITY

The value of the firm is the present value to the owners of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day. If we include "bondholders" in "owners", then the value of the debt is included in this value. If we do not include bondholders, then the owners are only the equity holders, and the value considers only the equity.

VALUE OF THE FIRM = VF₀ = VD₀ + VE₀

assuming the term-structure of interest rates is flat:

\[ VF₀ = \sum_{t=1}^{T} \frac{(UFCF₁ + EV₁)}{(1 + k_f^*)^t} + TV_T / (1 + k_f^*)^T \]

\[ VF₀ = \sum_{t=1}^{T} \frac{(CA₁ - IV₁)}{(1 + k_f^*)^t} + TV_T / (1 + k_f^*)^T \]

\[ VF₀ = \sum_{t=1}^{T} \frac{(CA₁ - IV₁)}{(1 + k_f^*)^t} + TV_T / (1 + k_f^*)^T \]

\[ VF₀ = \sum_{t=1}^{T} \frac{(NCDD₁ + NCDE₁ - ITS₁)}{(1 + k_f^*)^t} + TV_T / (1 + k_f^*)^T \]

\[ VF₀ = \sum_{t=1}^{T} \frac{(NCDD₁ + NCDE₁ - ITS₁)}{(1 + k_f^*)^t} + TV_T / (1 + k_f^*)^T \]
Note that CAC > CAU, so we must use a larger discount rate (kf > kf*) to get the same present value when discounting CAC.

**VALUE OF EQUITY** = \( VE_0 \) (assuming flat term-structure of interest rates):

\[
VE_0 = VF_0 - VD_0
\]

\[
VE_0 = \sum_{t=1}^{T} \left[ \frac{(NCDE_t)}{(1 + ke)^t} \right] + TV_T / (1 + ke)^T
\]

\[
VE_0 = \sum_{t=1}^{T} \left[ \frac{(LFCFE_t)}{(1 + ke)^t} \right] + TV_T / (1 + ke)^T
\]

**TERMINAL VALUE** at time T = \( TV_T \):

\( TV_T = \text{Terminal Value at time T} \) is the value at a particular time point T of all of the following cash flows for the remaining lifetime of the firm. The value of a future cash flow occurring at some future time point, valued at a particular time point T, is computed by discounting that cash flow from its time point of occurrence back to the particular time point T at the proper discount rate or "cost of capital". All of the present values at time T of all of the future cash flows are then added together to get \( TV_T \).

**NEW CONCEPTS TO RECONCILE ACCOUNTING INCOME WITH FINANCIAL CASH FLOWS:**

**Depreciation Tax Savings** (DTS) = \( \tau \cdot DEP \) = the income tax the firm does not have to pay because depreciation expense (a non-cash expense) is deductible from taxable income = \( \tau \cdot DEP \), where \( \tau \) is the firm's total income tax rate and DEP is the depreciation expense for the year.

**Interest Tax Savings** (ITS) = \( \tau \cdot I \) = the income tax the firm does not have to pay because interest expense is tax-deductible = \( \tau \cdot I \), where \( \tau \) is the firm's income tax rate (Federal, State, and City) and I is this year's interest expense for all debt owed.

In valuing the firm, we neglect the distinction between accrued revenues and expenses and cash receipts and expenditures. In real life, of course, only the cash receipts are received and only the cash expenditures are paid. Analysis of past history of the firm must make this distinction; however, for forecasting the future, we generally assume no differences in the collection and payment rate across future time, so that we effectively ignore the increases in accounts receivable and in accounts payable. We recall that "operations" omits consideration of financing, so that "operating income" is the income prior to the subtraction of interest expense.

**NOPAT = Net Operating Profit After Taxes** is the operating profit the firm would have if it had no debt.

NOPAT is not a cash flow used in valuing the firm; it is merely used to compare firms with the same line of business but different capital structures, so as not to be misled by the differences in financial leverage between the firm. NOPAT is the net operating profit after tax. It is not related to the LFCFE or to the UFCFF, which are used to value the equity or to value the firm.

**NOPAT = Net Operating Profit After Taxes = Cash Available to the Unlevered Firm = CAU**
NOPAT ( = CAU) is the net income the firm would have had after tax if it had no debt and paid no interest.

From the Operating Income we must subtract the hypothetical tax the firm would have paid if it had had no debt. This hypothetical tax is larger than the actual tax the firm paid because the hypothetical tax is not reduced by the interest tax savings.

**CASH FLOW NOTATION:**

$RCPT = cash receipts from operations, whether accrued as this year's revenues or not;
$EXPT = cash expenditures for operating expenses, whether accrued for this year or not;

expenditures omits depreciation expense because depreciation expense is not cash;

expenditures omits interest expense because interest expense is not operating.

GCFO = $RCPT - $EXPT = Gross Cash from Operations is a hypothetical operating cash flow
If all revenues were collected and all expenses were paid, GCFO would be a real cash flow.

GCFO is the operating cash flow, neglecting depreciation (because it is not cash) and interest.

But income taxes, paid in cash, take account of both depreciation and interest, which reduce taxable income, so we must compute the cash income taxes paid correctly.

$AITP = Actual Cash Income Taxes Paid = \( \tau \) (GCFO) - DTS – ITS

NOPAT = CAU = GCFO - $AITP – ITS

Notice that when computing NOPAT = CAU, we ignore the reduction in income taxes which results from the interest expense the firm pays. NOPAT = CAU is a smaller number than if we reduced the taxes for the effect of interest deductibility.

NOPAT = CAU = GCFO – GTAX + DTS

NOPAT is the after-tax net income the firm would have if it had no debt.

To compute NOPAT, we do the following:
1. Subtract cash operating expenditures (i.e., cash operating expenses omitting depreciation and other non-cash charges, and ignoring interest) from cash receipts: $RCPT - $EXPT
2. Subtract the hypothetical income tax the firm would pay if it had no debt and therefore had no tax-deductible interest expense. That means, however, that the tax-deductible operating non-cash expense depreciation does have its effect of lowering taxes recognized. However, the effect of the interest expense in lowering taxes is not considered in this calculation.

This is equivalent to EBIT – Adjusted Taxes, where "adjusted taxes" means the larger income tax which would be paid in the absence of interest expense.

If we take account of the interest tax savings, ITS, we add the interest tax savings to NOPAT = CAU, and we get the Cash Available to All Capital Suppliers = CAC.

CAC = CAU + ITS
The Cash Available to All Capital Suppliers is available to pay:
I = interest expense on debt
PP = principal payments on debt
(CDD = Cash distribution to debt suppliers = I + PP )
DIV = dividends on common stock and preferred stock
TSTOCK = cash repurchase of common or preferred stock from the market.

CDE = cash distribution to equity suppliers = DIV + TSTOCK

If we subtract the investment outlays in new plant and equipment plus new net working capital
IVS = New P&E + ∆NWC
From the CAC, we get the cash available to pay to all capital suppliers without adversely affecting the growth of the firm: UFCFF = CAC – IVS.

UFCFF = CAC – IVS

There is a slight discrepancy between the two methodologies, in that we say that (CAC – IVS) is discounted at kf, while UFCFF is discounted at kf*, depending on the context. I think this is unavoidable due to the vagaries of accounting, although I may be incorrect. Cope as best you can.

CASH FLOWS:

VF_t = VD_t + VE_t + Value of Preferred Stock_t

0. Terminal Value T = TV_T = the value at a particular time point T of all of the following cash flows for the remaining lifetime of the firm. The value of a future cash flow occurring at some future time point, valued at a particular time point T, is computed by discounting that cash flow from its time point of occurrence back to the particular time point T at the proper discount rate or "cost of capital". All of the present values at time T of all of the future cash flows are then added together to get TV_T.

TV_T = Terminal Value at time T = (Relevant Cash Flow_T+1) / (k - g_∞)

From the Gordon Constant-perpetual-growth model,
where
Cash Flow_T+1 = Cash Flow_T X (1 + g_∞)
k = the proper discount rate, either ke or kf*
g_∞ = the constant perpetual growth rate from time T to infinity.

The relevant cash flow is the same cash flow as was discounted explicitly at prior t's.
1. **LFCFE**\(_t\) = Leveraged Free Cash Flow to Equity at time \(t\)  
LFCFE\(_t\) is discounted at \(k_e\) to compute \(VE_0\).  
LFCFE\(_t\) can be used to pay common dividends or repurchase Treasury stock.

\[
\text{LFCFE}_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \Delta \text{NWC}_t - \text{PP}_t + \text{NDC}_t + \text{NPS}_t - \text{Pfd Divs}_t
\]

\[
\text{LFCFE}_t = \text{Leveraged Free Cash Flow to Equity}_t = \text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t - \Delta \text{NWC}_t + \Delta \text{NNDC}_t + \text{NPS}_t - \text{Pfd Divs}_t
\]

\(T = \) the total number of years specifically forecasted  
The interest expense + the tax effect of interest have already been subtracted from NIAT.  
Net New Debt Capital\(_t\) = \(\text{NNDC}_t = \text{NDC}_t - \text{PP}_t\)

\[
\text{VE}_0 = \sum_{t=1}^{T} \left( \frac{\text{LFCFE}_t}{1 + k_e} \right) + TV_T / (1 + k_e)^T
\]

\[
\text{VF}_0 = \sum_{t=1}^{T} \left( \frac{\text{CAU}_t - \text{IVS}_t}{1 + k_{f*}} \right) + TV_T / (1 + k_{f*})^T
\]

LFCFE subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends or repurchase Treasury stock. Neglecting preferred stock, we have:

Leveraged Free Cash Flow to Equity\(_t\) = LFCFE\(_t\) = \(\text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t - \Delta \text{NWC}_t + \Delta \text{NNDC}_t = \) ability to pay common dividends

where Net New Debt Capital\(_t\) = \(\text{NNDC}_t = \text{NDC}_t - \text{PP}_t\)

\(\text{NWC} = \) Net Working Capital = \(\) Current Assets – Current Liabilities  
\(\Delta \text{NWC} = \) the increase in Net Working Capital this year from that of last year  
\(\text{NPS} = \) New preferred stock

\[
\text{VE}_0 = \sum_{t=1}^{T} \left( \frac{\text{NCDE}_t}{1 + k_e} \right) + TV_T / (1 + k_e)^T
\]

Net cash distribution to equity\(_t\) = Dividends\(_t\) – New Equity Capital\(_t\)

\(k_e\) = cost of equity capital = the rate of return required by the shareholders

\[
\text{VE}_0 = \sum_{t=1}^{T} \left[ \frac{\text{LFCFE}_t}{1 + k_e} \right] + TV_T / (1 + k_e)^T
\]

2. **UFCFF**\(_t\) = Unleveraged Free Cash Flow to the Firm at time \(t\) = UFCFF\(_t\) =  
Cash Flow from Operations before Subtracting Cash Outflows for Interest Costs (net of tax savings)\(_t\) – IVS\(_t\) - \(\Delta \text{NWC}_t\)

UFCFF\(_t\) = NIAT\(_t\) + Noncash charges\(_t\) + Interest Expense\(_t\) (1 - \(\tau\)) – IVS\(_t\) - \(\Delta \text{NWC}_t\)

UFCFF is discounted at \(k_{f*}\) to give the value of the firm \(VF_0 = VD_0 + VE_0\).

UFCFF can be used to pay debt principal, pay debt interest, and pay dividends and repurchase common stock.
UFCFF does not adversely affect the firm's planned growth because the investment outlays for new plant and equipment (IVS) and the working capital to support those outlays (∆NWC) have already been subtracted in its computation.

\[ V_E = V_F - V_D - \text{Value of Preferred Stock} \]

\[ VF_0 = \sum_{i=1}^{T} \frac{UFCFF_i}{(1 + kf^*)^i} + TV_T / (1 + kf^*)^T \]

\[ UFCFF_t = NIAT_t + \text{DepExp}_t + \text{Int}_t (1 - \tau) - IVS_t \]

\( kf^* = \text{weighted average cost of capital of the firm} = \theta \; kd \; (1 - \tau) + (1 - \theta) \; ke \)
\( \theta = \text{capital structure ratio of the firm} = \text{debt ratio of the firm} = V_D/V_F \)

The firm should always minimize the cost of capital by reducing both business risk and financial risk.

NCE = Non-cash expenses; primarily depreciation and amortization.

"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers"). UFCFO = EBIT + Noncash expense – Income Tax

From that UFCFO, to get the UFCFF the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS, and the new net working capital ∆NWC.

\[ UFCFF = UFCFO - IVS - \Delta NWC \]

So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid: NIATBI = net income after tax before interest = EBIT + NCE – Income Taxes.

Reported Cash Flow from Operations = NIAT + Noncash charges
Cash outflow for interest = Int
Interest Tax Savings = τ Int
Interest cash outflow net of income-tax savings = \( \text{Int} - \tau \; \text{Int} = (1 - \tau) \; \text{Int} \)

<table>
<thead>
<tr>
<th>Unleveraged Cash Flow from Operations, ( t ) = ( UFCFO_t = )</th>
<th>( \text{Reported Cash Flow from Ops,} \ t + \text{Int}_t (1 - \tau) = )</th>
</tr>
</thead>
<tbody>
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<td>( NIAT_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t (1 - \tau) )</td>
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<th>Unleveraged Free Cash Flow to the Firm, ( t ) = ( UFCFF_t = )</th>
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<td></td>
</tr>
</tbody>
</table>

UFCFF can be used to pay debt principal, debt interest, dividends, and purchase common stock in the market.
Free Cash Flows Used in Valuation of the Firm and of Equity—Memorize the following:

0. **Terminal Value** \( T = TV_T \) = the value at a particular time point \( T \) of all of the following cash flows for the remaining lifetime of the firm. The value of a future cash flow occurring at some future time point, valued at a particular time point \( T \), is computed by discounting that cash flow from its time point of occurrence back to the particular time point \( T \) at the proper discount rate or "cost of capital". All of the present values at time \( T \) of all of the future cash flows futureward beyond \( T \) are then added together to get \( TV_T \).

\[
TV_T = \text{Terminal Value at time } T = \left( \text{Relevant Cash Flow}_{T+1} \right) / (k - g^\infty)
\]

From the Gordon Constant-perpetual-growth model.
Cash Flow \( T+1 \) = Cash Flow \( T \times (1 + g^\infty) \)
\( k = \) the proper discount rate, either \( ke \) or \( kf^* \)

1. **LFCFE_t** = Leveraged Free Cash Flow to Equity at time \( t \)
   The stream of LFCFE_t's is discounted at \( ke \).
   LFCFE_t can be used to pay common dividends and buy new working capital

\[
\text{LFCFE}_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \text{PP}_t + \text{NDC}_t + \text{NPS}_t - \text{Preferred Dividends}_t
\]

\( \text{NPS} = \) New preferred stock
LFCFE can be used to pay dividends or invest in new working capital

\[
\text{Net cash distribution to equity}_t = \text{Dividends}_t - \text{New Equity Capital}_t
\]

\( ke = \) cost of equity capital = the rate of return required by the shareholders

\[
\text{Leveraged Free Cash Flow to Equity}_t = \text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t + \Delta\text{NNDCC}_t
\]
\( T = \) the number of years specifically forecasted
The interest expense + the tax effect of interest have already been subtracted from NIAT.
Net New Debt Capital_t = \( \text{NNDC}_t = \text{NDC}_t - \text{PP}_t \)

\[
\text{Leveraged Value}_0 = \sum_{t=1}^{T} \left[ \left( \text{CAU}_t - \text{IVS}_t \right) / (1 + kf^*)^t \right] + TV_T / (1 + kf^*)^T
\]

\( VF_t = \) Value of Preferred Stock

\[
\text{Leveraged Value}_0 = \sum_{t=1}^{T} \left[ \left( \text{CAU}_t - \text{IVS}_t \right) / (1 + kf^*)^t \right] + TV_T / (1 + kf^*)^T
\]
2. \( \text{UFCFF}_t = \text{Unleveraged Free Cash Flow to the Firm at time } t = \text{UFCFF}_t = \) 
Cash Flow from Operations bef. Subtracting Cash Outflows for Interest Costs (net of tax savings) 
\( = \text{NIAT}_t + \text{Noncash charges}_t + \text{Interest Expense}_t \left(1 - \tau\right) \) 
\( \text{UFCFF} \) is discounted at \( k^* \).
\( \text{UFCFF} \) can be used to pay debt principal, pay debt interest, pay dividends, and purchase new working capital
\[ \text{VE}_t = \text{VF}_t - \text{VD}_t - \text{Value of Preferred Stock} \]
\[ \text{VF}_0 = \sum_{t=1}^{T} \text{UFCFF}_t / (1 + k^*)^t + \text{TV}_T / (1 + k^*)^T \]
\( k^* = \text{weighted average cost of capital of the firm} = \theta \text{kd} (1 - \tau) + (1 - \theta) \text{ke} \)
\( \theta = \text{capital structure ratio of the firm} = \text{debt ratio of the firm} = \text{VD} / \text{VF} \)
The firm should always minimize the cost of capital by reducing both business risk and financial risk.

NCE = Non-cash expenses; primarily depreciation and amortization.
"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers"). UFCFO = EBIT + Noncash expense – Income Tax
From that UFCFO, to get the UFCFF, the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS: 
\( \text{UFCFF} = \text{UFCFO} - \text{IVS} \).
So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid: 
\( \text{NIATBI} = \text{net income after tax before interest} = \text{EBIT} + \text{NCE} - \text{Income Taxes} \).
Reported Cash Flow from Operations = NIAT + Noncash charges 
Cash outflow for interest = Int 
Interest Tax Savings = \( \tau \) Int 
Interest cash outflow net of income-tax savings = \( \text{Int} - \tau \text{Int} = (1 - \tau) \text{Int} \)

### Unleveraged Cash Flow from Operations
\[ \text{UFCFO}_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t \left(1 - \tau\right) \]

### Unleveraged Free Cash Flow to the Firm
\[ \text{UFCFF}_t = \text{UFCFO}_t - \text{IVS}_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t \left(1 - \tau\right) - \text{IVS}_t \]

UFCFF can be used to pay debt principal, debt interest, dividends, and purchase working capital.

3. An alternative definition of LFCFE also subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends.
Neglecting preferred stock, we have:

\[ \text{Leveraged Free Cash Flow to Equity}_t = \text{LFCFE}_t = \]
\[ = \text{NIAT}_t + \text{Noncash charges}_t - \Delta \text{NWC}_t - \text{IVS}_t + \Delta \text{NNDC}_t \]
\[ = \text{ability to pay common dividends} \]

where Net New Debt Capital \( t = \text{NNDC}_t = \text{NDC}_t - \text{PP}_t \)
CASH FLOWS

1. **LFCFE**<sub>t</sub> = Leveraged Free Cash Flow to Equity at time <i>t</i>

LFCFE is discounted at <i>ke</i> to compute <i>VE</i><sub>0</sub>. LFCFE can be used to pay common dividends or repurchase Treasury stock.

\[
\text{LFCFE} = \text{NIAT} + \text{DEPR} + \text{AMORT} - \text{IVS} - \Delta \text{NWC} - \text{PP} + \text{NDC} + \text{NPS} - \text{Pfd Divs}
\]

\[
\text{LFCFE}_t = \text{Leveraged Free Cash Flow to Equity}_t = \\
= \text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t - \Delta \text{NWC}_t + \Delta \text{NDC}_t + \text{NPS}_t - \text{Pfd Divs}_t
\]

\[
T = \text{the number of years specifically forecasted}
\]

The interest expense + the tax effect of interest have already been subtracted from NIAT.

Net New Debt Capital<sub>t</sub> = NNDC<sub>t</sub> = NDC<sub>t</sub> - PP<sub>t</sub>

\[
\text{VE}_0 = \sum_{t=1}^{T} \left( \frac{\text{LFCFE}_t}{1 + \text{ke}} \right)^t + \frac{\text{TV}_T}{(1 + \text{ke})^T}
\]

\[
\text{VF}_0 = \sum_{t=1}^{T} \left( \frac{\text{CAU}_t - \text{IVS}_t}{1 + \text{kf}^*} \right)^t + \frac{\text{TV}_T}{(1 + \text{kf}^*)^T}
\]

LFCFE subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends or repurchase Treasury stock. Neglecting preferred stock, we have:

Leveraged Free Cash Flow to Equity<sub>_t</sub> = LFCFE<sub>_t</sub> =

= NIAT<sub>_t</sub> + Noncash charges<sub>_t</sub> - ΔNWC<sub>_t</sub> - IVS<sub>_t</sub> + ΔNND<sub>C_t</sub> = ability to pay common dividends

where Net New Debt Capital<sub>_t</sub> = NNDC<sub>_t</sub> = NDC<sub>_t</sub> - PP<sub>_t</sub>

NWC = Net Working Capital = Current Assets – Current Liabilities

ΔNWC = the increase in Net Working Capital this year from that of last year

NPS = New preferred stock

\[
\text{VE}_0 = \sum_{t=1}^{T} \left[ \frac{\text{NCDe}_t}{1 + \text{ke}} \right]^t + \frac{\text{TV}_T}{(1 + \text{ke})^T}
\]

Net cash distribution to equity<sub>_t</sub> = Dividends<sub>_t</sub> - New Equity Capital<sub>_t</sub>

<\i>ke</\i> = cost of equity capital = the rate of return required by the shareholders

\[
\text{VE}_0 = \sum_{t=1}^{T} \left[ \frac{\text{LFCFE}_t}{1 + \text{ke}} \right]^t + \frac{\text{TV}_T}{(1 + \text{ke})^T}
\]

2. **UFCFF**<sub>_t</sub> = Unleveraged Free Cash Flow to the Firm at time <i>t</i> = UFCFF<sub>_t</sub> =

Cash Flow from Operations before Subtracting Cash Outflows for Interest Costs (net of tax savings) – IVS - ΔNWC

UFCFF = NIAT + Noncash charges + Interest Expense (1 - <\i>τ</\i>) - IVS - ΔNWC

UFCFF is discounted at <\i>kf^*</\i> to give the value of the firm <i>VF</i><sub>0</sub> = <i>VD</i><sub>0</sub> + <i>VE</i><sub>0</sub>.

UFCFF can be used to pay debt principal, pay debt interest, and pay dividends and repurchase common stock.
UFCFF does not adversely affect the firm's planned growth because the investment outlays for new plant and equipment (IVS) and the working capital to support those outlays (\(\Delta NWC\)) have already been subtracted in its computation.

\[
VE_t = VF_t - VD_t \quad \text{Value of Preferred Stock}
\]

\[
VF_0 = (t=1 \text{ to } T) \Sigma \text{UFCFF}_t / (1 + kf^* )^t + TV_T / (1+ kf^* )^T
\]

\[
\text{UFCFF}_t = \text{NIAT}_t + \text{DepExp}_t + \text{Int}_t (1 - \tau) - \text{IVS}_t
\]

\(kf^*\) = weighted average cost of capital of the firm = \(\theta kd (1-\tau) + (1 - \theta) ke\)

\(\theta\) = capital structure ratio of the firm = debt ratio of the firm = \(VD/VF\)

The firm should always minimize the cost of capital by reducing both business risk and financial risk. See Stickney page 749:

NCE = Non-cash expenses; primarily depreciation and amortization.

"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers"). UFCFO = EBIT + Noncash expense – Income Tax

From that UFCFO, to get the UFCFF the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS, and the new net working capital \(\Delta NWC\).

\[
\text{UFCFF} = \text{UFCFO} - \text{IVS} - \Delta\text{NWC}
\]

So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid: NIATBI = net income after tax before interest = EBIT + NCE – Income Taxes.

Reported Cash Flow from Operations = NIAT + Noncash charges
Cash outflow for interest = Int
Interest Tax Savings = \(\tau\) Int
Interest cash outflow net of income-tax savings = Int - \(\tau\) Int = ( 1 - \(\tau\) ) Int

Unleveraged Cash Flow from Operations = UFCFO = Reported Cash Flow from Ops + Int (1-\(\tau\)) = NIAT + DEPR + AMORT + Int ( 1 - \(\tau\) )

Unleveraged Free Cash Flow to the Firm = UFCFF = UFCFO - IVS - \(\Delta\)NWC = NIAT + DEPR + AMORT + Int ( 1 - \(\tau\) ) - IVS - \(\Delta\)NWC

UFCFF can be used to pay debt principal, debt interest, dividends, and purchase common stock in the market.
FREE CASH FLOWS USED IN VALUATION OF THE FIRM AND OF EQUITY:

0. **Terminal Value** \( T = TV_T \) = the value at a particular time point \( T \) of all of the following cash flows for the remaining lifetime of the firm. The value of a future cash flow occurring at some future time point, valued at a particular time point \( T \), is computed by discounting that cash flow from its time point of occurrence back to the particular time point \( T \) at the proper discount rate or "cost of capital". All of the present values at time \( T \) of all of the future cash flows are then added together to get \( TV_T \).

\[
TV_T = \text{Terminal Value at time } T = \frac{(\text{Relevant Cash Flow }_{T+1})}{(k - g_{\infty})}
\]

From the Gordon Constant-perpetual-growth model.

Cash Flow \( _{T+1} \) = Cash Flow \( _T \times (1 + g_{\infty}) 
\]

\( k \) = the proper discount rate, either \( k_e \) or \( k_f^* \)

Remember to discount the Terminal Value back to Present Value by dividing it by \((1+k)^T\)

1. **LFCFE_t** = Leveraged Free Cash Flow to Equity at time \( t \)

LFCFE is discounted at \( k_e \).

LFCFE can be used to pay common dividends and buy new working capital

\[
\text{LFCFE} = \text{NIAT} + \text{DEPR} + \text{AMORT} - \text{IVS} - \text{PP} + \text{NDC} + \text{NPS} - \text{Preferred Dividends}
\]

\( NPS \) = New preferred stock

LFCFE can be used to pay dividends or invest in new working capital

\[
\text{VE}_0 = \sum_{t=1}^{T} \frac{\text{NCDE}_t}{(1 + k_e)^t} + \frac{TV_T}{(1 + k_e)^T}
\]

Net cash distribution to equity \( t \) = Dividends \( t \) – New Equity Capital \( t \)

\( k_e \) = cost of equity capital = the rate of return required by the shareholders

\[
\text{VE}_0 = \sum_{t=1}^{T} \frac{\text{LFCFE}_t}{(1 + k_e)^t} + \frac{TV_T}{(1 + k_e)^T}
\]

Leveraged Free Cash Flow to Equity \( t \) =

\[= \text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t + \Delta \text{NNDC}_t \]

\( T \) = the number of years specifically forecasted

The interest expense + the tax effect of interest have already been subtracted from NIAT.

\[
\text{VF}_0 = \sum_{t=1}^{T} \frac{(\text{CAU}_t - \text{IVS}_t)}{(1 + k_f^*)^t} + \frac{TV_T}{(1 + k_f^*)^T}
\]

\[
\text{VF}_t = \text{VD}_t + \text{VE}_t + \text{Value of Preferred Stock}
\]
2. UFCFF = Unleveraged Free Cash Flow to the Firm at time t = UFCFF_t =
Cash Flow from Operations bef. Subtracting Cash Outflows for Interest Costs (net of tax savings)
= NIAT + Noncash charges + Interest Expense (1 - τ)
UFCFF is discounted at kf*.
UFCFF can be used to pay debt principal, pay debt interest, pay dividends, and purchase new working capital

\[
VE_t = VF_t - VD_t \quad \text{Value of Preferred Stock}
\]
\[
VF_0 = (t=1 \text{ to } T) \sum \frac{UFCFF_t}{(1 + kf^*)^t} + TV_T / (1 + kf^*)^T
\]
\[
UFCFF_t = NIAT_t + DepExp_t + Int_t (1 - \tau) - IVS_t
\]
\[
\theta = \frac{\text{capital structure ratio of the firm}}{\text{debt ratio of the firm}} = \frac{VD}{VF}
\]

The firm should always minimize the cost of capital by reducing both business risk and financial risk.

NCE = Non-cash expenses; primarily depreciation and amortization.
"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers").

\[
UFCFO = EBIT + \text{Noncash expense} - \text{Income Tax}
\]

From that UFCFO, to get the UFCFF the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS. UFCFF = UFCFO - IVS.
So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid:

Reported Cash Flow from Operations = NIAT + Noncash charges
Cash outflow for interest = Int
Interest Tax Savings = τ Int
Interest cash outflow net of income-tax savings = Int - τ Int = (1 - τ) Int

\[
\begin{array}{|c|c|}
\hline
\text{Unleveraged Cash Flow from Operations} & \text{UFCFO} = \\
\text{Reported Cash Flow from Ops} + \text{Int (1-τ)} = & \text{NIAT} + \text{DEPR} + \text{AMORT} + \text{Int (1 - τ)} \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
\text{Unleveraged Free Cash Flow to the Firm} & \text{UFCFF} = \\
\text{UFCFO} - \text{IVS} = & \text{NIAT} + \text{DEPR} + \text{AMORT} + \text{Int (1 - τ)} - \text{IVS} \\
\hline
\end{array}
\]

UFCFF can be used to pay debt principal, debt interest, dividends, and purchase working capital.

3. LFCFE_t = Leveraged Free Cash Flow to Equity
An alternative definition of LFCFE also subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends. Neglecting preferred stock, we have:

\[
\begin{aligned}
\text{Leveraged Free Cash Flow to Equity}_t &= \text{LFCFE}_t = \\
&= \text{NIAT}_t + \text{Noncash charges}_t - \Delta \text{NWC}_t - \text{IVS}_t + \Delta \text{NNDC}_t \\
&= \text{ability to pay common dividends}
\end{aligned}
\]

where Net New Debt Capital_t = NNDC_t = NDC_t - PP_t
DEFINITIONS AND EQUATIONS FOR VALUATION:

Financial Free Cash Flows, UFCFF, LFCFE Are Used to Value the Firm and to Value Equity.

\( ke = \text{cost of equity capital} = \text{the risk-adjusted rate of return required by the shareholders} \)

\( ke = kd + \text{risk adjustment} = d_t/P_0 + g_\infty = R_t + \beta (E[R_M] - R_t) \)

\( kf^* = \text{the weighted-average cost of capital} = \theta kd (1-\tau_t) + (1 - \theta) ke \)

\[
\begin{align*}
\text{LFCFE}_t &= \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \Delta\text{NWC}_t - \text{PP}_t + \text{NEC}_t + \text{NDC}_t + \text{NPS}_t - \text{Pfd Divs}_t \\
\text{UFCFF}_t &= \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t (1 - \tau_t) - \text{IVS}_t - \Delta\text{NWC}_t + \text{NDC}_t + \text{NEC}_t + \text{NPS}_t - \text{PfdDivs}_t \\
\Delta\text{NWC}_t &= \text{NWC}_t - \text{NWC}_{t-1}, \text{ and } \text{NWC}_t = \text{CA}_t - \text{CL}_t
\end{align*}
\]

The value of the firm \( VF_0 \) is the present value to the owners of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day. If we include "bondholders" in "owners", then the value of the debt is included in this value. If we do not include bondholders, then the owners are only the equity holders, and the value considers only the equity, so it is called Value of Equity, \( VE_0 \).

The value of the firm \( VF_0 \) is the present value to the owners (debt holders and equity holders) of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day. The value of equity \( VE_0 \) is the value of the firm minus the value of debt: \( VE_0 = VF_0 - VD_0 \). The value of equity \( VE_0 \) is also the present value to the equity holders of all the future net benefits (dividends minus new equity capital supplied) they will receive from the firm for the remainder of its lifetime forward from the present day.

\[
\begin{align*}
VF_0 &= \sum_{t=1}^{T} \left[ \frac{\text{UFCFF}_t}{(1 + kf^*)^t} + \frac{TV_T}{(1 + kf^*)^T} \right] \\
TV_T &= \text{Terminal Value at time } T = \frac{\text{UFCFF}_{T+1}}{(kf^*- g_\infty)} \\
VE_0 &= VF_0 - VD_0
\end{align*}
\]

We calculate the Value of Equity \( VE_0 \) by discounting the series of the "Leveraged Free Cash Flows to Equity at each time point" (LFCFE) from \( t=1 \) through \( t=T \) plus the Terminal Value at \( T \), all by the cost of equity capital \( ke \). In this Problem, \( t1 = t1 \), and \( T \) is \( t2 \).

\[
\begin{align*}
VE_0 &= \sum_{t=1}^{T} \left[ \frac{\text{LFCFE}_t}{(1 + ke)^t} + \frac{TV_T}{(1 + ke)^T} \right] \\
TV_T &= \text{Terminal Value at time } T = \frac{\text{LFCFE}_{T+1}}{(ke - g_\infty)} \\
\text{LFCFE}_{T+1} &= \text{LFCFE}_T (1 + g_\infty)
\end{align*}
\]

Free Cash Flow (FCF) or "Free Cash Flow to Equity" (FCFE) or "Leveraged Free Cash Flow to Equity" (LFCFE) is the annual cash flow the firm can use to pay common dividends after the company has made all the investments in fixed assets and working capital necessary to sustain ongoing operations and without adversely affecting the planned growth of the firm; i.e., after purchasing plant and equipment needed to maintain operations and achieve growth, and after
purchasing the net working capital required to operate the new plant and equipment. This definition of "Free Cash Flow" subtracts the required debt service (PP + I) for the year on the way to the computation of FCF. We call this "Leveraged Free Cash Flow to Equity Suppliers", LFCFE. (Stickney)

\[ \text{VE}_0 = \sum_{t=1}^{T} \left[ \frac{\text{LFCFE}_t}{(1 + ke)^t} \right] + \frac{\text{TV}_T}{(1 + ke)^T} \]

**TERMINAL VALUE** at time T = TV\(_T\):

TV\(_T\) = Terminal Value at time T = the value at a particular time point T of all of the following cash flows for the remaining lifetime of the firm; i.e., beginning at T+1 and going on to \(\infty\). The value of a future cash flow occurring at some future time point, valued at a particular time point T, is computed by discounting that cash flow from its time point of occurrence back to the particular time point T at the proper discount rate or "cost of capital". All of the present values at time T of all of the future cash flows are then added together to get TV\(_T\).

TV\(_T\) = Terminal Value at time T = (Relevant Cash Flow\(_{T+1}\) ) / (ke - g\(_\infty\) )

**COST OF CAPITAL, THE DISCOUNT RATE FOR FUTURE CASH FLOWS:**

1. Weighted-average cost of capital, \(k^*_f = \theta_kd \times (1 - \tau) + (1 - \theta) \times ke\)
   Used to discount UFCFF's.

2. Cost of Equity Capital,
   \[ ke = R_f + \beta (E[R_M] - R_f) + \text{non-systematic risk factors} \]
   Used to discount LFCFE's.

   ke is determined by the Capital Asset Pricing Model: \(ke = R_f + \beta (E[R_M] - R_f)\).
   If another risk adjustment is necessary, it must be added.

The value of the firm \(VF_0\) is the present value to the owners (debt holders and equity holders) of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day. The value of equity \(VE_0\) is the value of the firm minus the value of debt: \(VE_0 = VF_0 - VD_0\). The value of equity \(VE_0\) is also the present value to the equity holders of all the future net benefits (dividends minus new equity capital supplied) they will receive from the firm for the remainder of its lifetime forward from the present day.

We calculate the Value of Equity \(VE_0\) by discounting the series of the "Leveraged Free Cash Flows to Equity at each time point" (LFCFE\(_t\)) from t=1 through t=T plus the Terminal Value at T, TV\(_T\), all by the cost of equity capital ke.

Free Cash Flow (FCF) or "Free Cash Flow to Equity" (FCFE) or "Leveraged Free Cash Flow to Equity" (LFCFE) is the annual cash flow the firm can use to pay common dividends after the company has made all the investments in fixed assets and working capital necessary to sustain ongoing operations and without adversely affecting the planned growth of the firm; i.e., after purchasing plant and equipment needed to maintain operations and achieve growth, and after purchasing the net working capital required to operate the new plant and equipment. This definition of "Free Cash Flow" subtracts the required debt service (PP + I) for the year on the way to the computation of FCF. We call this "Leveraged Free Cash Flow to Equity Suppliers", LFCFE. (Stickney)
TERMINAL VALUE at time T = TV\(_T\):
TV\(_T\) = Terminal Value \(_T\) = the value at a particular time point \(T\) of all of the following cash flows for the remaining lifetime of the firm; \(i.e.,\) beginning at \(T+1\) and going on to \(\infty\). The value of a future cash flow occurring at some future time point, valued at a particular time point \(T\), is computed by discounting that cash flow from its time point of occurrence back to the particular time point \(T\) at the proper discount rate or "cost of capital". All of the present values at time \(T\) of all of the future cash flows are then added together to get \(TV\(_T\)\).

\[
TV\(_T\) = \text{Terminal Value at time } T = \left(\text{Relevant Cash Flow}_{T+1}\right) / \left(ke - g_{\infty}\right)
\]

From the Gordon Constant-perpetual-growth model,

\[
\text{Cash Flow}_{T+1} = \text{Cash Flow}_T \times (1 + g_{\infty})
\]

\(k = \text{the proper discount rate, } ke \text{ from the Capital Asset Pricing Model, usually; }\)

\(g_{\infty} = \text{the constant perpetual growth rate from time } T \text{ to infinity. }\)

The relevant cash flow is the same cash flow as was discounted explicitly at prior \(t\)’s.

\[
LFCFE_t = \text{Leveraged Free Cash Flow to Equity at time } t
\]

The stream of \(LFCFE_t\)'s plus \(TV\(_T\)\) is discounted at \(ke\) to compute \(VE_0\).

LFCFE can be used to pay common dividends or repurchase Treasury stock.

In any year \(t\),

\[
LFCFE_t = \text{NIAT}_t + \text{DEPR}_t + \text{AMORT}_t - \text{IVS}_t - \Delta\text{NWC}_t - \text{PP}_t + \text{NDC}_t + \text{NPS}_t - \text{Pfd Divs}_t
\]

\(LFCFE_t = \text{Leveraged Free Cash Flow to Equity}_t = \text{available dividends in year } t = \)
\(= \text{NIAT}_t + \text{Noncash charges}_t - \text{IVS}_t - \Delta\text{NWC}_t + \Delta\text{NNDC}_t + \text{NPS}_t - \text{Pfd Divs}_t\)
\(T = \text{the number of years specifically forecasted; in Problem 11.4, } T = 17.\)

The interest expense + the tax effect of interest have already been subtracted from NIAT.

Net New Debt Capital\(_t\) = \(\text{NNDC}_t = \text{NDC}_t - \text{PP}_t\)

\(\text{LFCFE subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends (or repurchase Treasury stock). LFCFE subtracts changes in net working capital in defining LFCFE so that the only task for LFCFE is the ability to pay common dividends (or repurchase Treasury stock). }\)

Neglecting preferred stock, we have:
Leveraged Free Cash Flow to Equity\(_t\) = \(LFCFE_t = \)
\(= \text{NIAT}_t + \text{Noncash charges}_t - \Delta\text{NWC}_t - \text{IVS}_t + \Delta\text{NNDC}_t = \text{ability to pay common dividends }\)
where Net New Debt Capital\(_t\) = NNDC\(_t\) = NDC\(_t\) - PP\(_t\)

\(\text{NWC} = \text{Net Working Capital} = \text{Current Assets - Current Liabilities}\)
\(\Delta\text{NWC} = \text{the increase in Net Working Capital this year from that of last year}\)
\(\text{NPS} = \text{New preferred stock}\)

\[
\text{VE}_0 = \sum_{t=1}^{T} [LFCFE_t / (1 + ke)^t] + TV_T / (1 + ke)^T
\]

The value of the firm \(VF_0\) is the present value to the owners of all the future benefits they will receive from the firm for the remainder of its lifetime forward from the present day. If we
include "bondholders" in "owners", then the value of the debt is included in this value. If we do not include bondholders, then the owners are only the equity holders, and the value considers only the equity.

**VALUE OF THE FIRM** = \( VF_0 = VD_0 + VE_0 \) (assuming flat term-structure of interest rates):

\[
VF_0 = \sum_{t=1}^{T} \left[ \frac{(UFCFF_t}{1 + (k^*)^t} \right] + TV_T / (1 + (k^*)^T)
\]

**VALUE OF EQUITY** = \( VE_0 \) (assuming flat term-structure of interest rates):

\( VE_0 = VF_0 - VD_0 \)

\( VF_t = VD_t + VE_t + \text{Value of Preferred Stock}_t \)

0. Terminal Value \( T = TV_T = \text{the value at a particular time point T of all of the following cash flows for the remaining lifetime of the firm. The value of a future cash flow occurring at some future time point, valued at a particular time point T, is computed by discounting that cash flow from its time point of occurrence back to the particular time point T at the proper discount rate or "cost of capital". All of the present values at time T of all of the future cash flows are then added together to get TV}_T.\)

\( TV_T = \text{Terminal Value at time T} = \frac{\text{Relevant Cash Flow}}{k - g_{\infty}} \)

From the Gordon Constant-perpetual-growth model,

where

Cash Flow \( T+1 = \text{Cash Flow}_T \times (1 + g_{\infty}) \)

\( k = \text{the proper discount rate, either ke or kf}^* \)

\( g_{\infty} = \text{the constant perpetual growth rate from time T to infinity.} \)

The relevant cash flow is the same cash flow as was discounted explicitly at prior t's.

2. UFCFF\(_t\) = Unleveraged Free Cash Flow to the Firm at time t = UFCFF\(_t\) = Cash Flow from Operations before Subtracting Cash Outflows for Interest Costs (net of tax savings) - IVS - \( \Delta NWC + NDC_t \)

\[
\text{UFCFF}_t = NIAT_t + \text{Noncash charges}_t + \text{Interest Expense}_t (1 - \tau) - IVS_t - \Delta NWC_t + NDC_t
\]

\[
\text{UFCFF}_t = NIAT_t + \text{DEPR}_t + \text{AMORT}_t + \text{Interest Expense}_t (1 - \tau) - IVS_t - \Delta NWC_t + NDC_t
\]

UFCFF is discounted at \( kf^* \) to give the value of the firm \( VF_0 = VD_0 + VE_0 \).

UFCFF can be used to pay debt principal, pay debt interest, and pay dividends and repurchase common stock.

UFCFF does not adversely affect the firm's planned growth because the investment outlays for new plant and equipment (IVS\(_t\)) and the working capital to support those outlays (\( \Delta NWC_t \)) have already been subtracted in its computation.

\[
VE_t = VF_t - VD_t - \text{Value of Preferred Stock}
\]

\[
VF_0 = (t=1 \text{ to } T) \sum \text{UFCFF}_t / (1 + (k^*)^t) + TV_T / (1 + (k^*)^T)
\]

\(\text{UFCFF}_t = NIAT_t + \text{DepExp}_t + \text{Int}_t (1 - \tau) - IVS_t\)

\( kf^* = \text{weighted average cost of capital of the firm} = \theta kd (1-\tau) + (1 - \theta) ke \)
θ = capital structure ratio of the firm = debt ratio of the firm = VD/VF

The firm should always minimize the cost of capital by reducing both business risk and financial risk.

See Stickney page 817:

NCE = Non-cash expenses; primarily depreciation and amortization.

"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers").

UFCFO = EBIT + Noncash expense − Income Tax

From that UFCFO, to get the UFCFF the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS, and the new net working capital ∆NWC.

UFCFF = UFCFO − IVS - ∆NWC.

So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid: NIATBI = net income after tax before interest = EBIT + NCE − Income Taxes.

Reported Cash Flow from Operations = NIAT + Noncash charges

Cash outflow for interest = Int

Interest Tax Savings = τ Int

Interest cash outflow net of income-tax savings = Int - τ Int = ( 1 - τ ) Int

Unleveraged Cash Flow from Operations_t = UFCFO_t =

Reported Cash Flow from Ops_t + Int_t (1-τ) =

NIAT_t + DEPR_t + AMORT_t + Int_t (1 - τ) + NDC_t

Unleveraged Free Cash Flow to the Firm_t = UFCFF_t =

UFCFO_t − IVS_t - ∆NWC_t =

NIAT_t + DEPR_t + AMORT_t + Int_t (1 - τ) - IVS_t - ∆NWC_t + NDC_t

UFCFF can be used to pay debt principal, debt interest, dividends, and purchase common stock in the market. This is, in my view, the more useful understanding of UFCFF.

(An alternative definition of UFCFF does not subtract the change in Net Working Capital so that the UFCFF can also be used to purchase new working capital. I think this is not a helpful way of looking at things, because the new working capital is needed for the planned investment outlays in new plant and equipment. But you may sometimes see this.

(Alt 2. UFCFF_t = Unleveraged Free Cash Flow to the Firm at time t = UFCFF_t =

Cash flow from Operations bef. Subtracting Cash Outflows for Interest Costs (net of tax savings)

( = NIAT + Noncash charges + Interest Expense (1 - τ) + NDC_t

UFCFF is discounted at kf*

( this definition of UFCFF can be used to pay debt principal, pay debt interest, pay dividends, and purchase new working capital.)

VE_t =VF_t − VD_t − Value of Preferred Stock

VF_0 = (t=1 to T)Σ UFCFF_t / (1 + kf* )^t + TVT / (1 + kf* )^T

UFCFF_t = NIAT_t + DepExp_t + Int_t (1 - τ) - IVS_t

kf* = weighted average cost of capital of the firm = θ kd (1-τ) + (1 - θ ) ke

θ = capital structure ratio of the firm = debt ratio of the firm = VD/VF

The firm should always minimize the cost of capital by reducing both business risk and financial risk.

NCE = Non-cash expenses: primarily depreciation and amortization.
"Unleveraged free cash flow from Operations" (UFCFO) is cash flow (that is, the non-cash expenses are added back to net income) before any payments to debtholders, either principal or interest (hence, it neglects financial leverage), but after income taxes (so it is "free" or "available to capital suppliers"). UFCFO = EBIT + Noncash expense – Income Tax

From that UFCFO, to get the UFCFF the unleveraged free cash flow to the firm, we must subtract the cash outlay necessary for new investment, IVS. UFCFF = UFCFO - IVS. This alternative definition of UFCFF neglects the needed additional investment in new Net Working Capital to support the new investments.

So this cash flow begins with EBIT, adds back the noncash expenses, and then subtracts the tax which was paid: NIATBI = net income after tax before interest = EBIT + NCE – Income Taxes.

Reported Cash Flow from Operations = NIAT + Noncash charges
Cash outflow for interest = Int
Interest Tax Savings = \(\tau \text{ Int}\)
Interest cash outflow net of income-tax savings = \(\text{Int} - \tau \text{ Int} = (1 - \tau) \text{ Int}\)

**Alternative Unleveraged Cash Flow from Operations**

\[\text{Alternative Unleveraged Cash Flow from Operations}_t = \text{UFCFO}_t = \text{Reported Cash Flow from Operations}_t + \text{Int}_t (1-\tau) + \text{NDC}_t = \niat_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t (1 - \tau) + \text{NDC}_t; \text{ note no } -\Delta\text{NWC}\]

**Alternative Unleveraged Free Cash Flow to the Firm**

\[\text{Alternative Unleveraged Free Cash Flow to the Firm}_t = \text{UFCFF}_t = \text{UFCFO}_t - \text{IVS}_t + \text{NDC}_t = \niat_t + \text{DEPR}_t + \text{AMORT}_t + \text{Int}_t (1 - \tau) + \text{NDC}_t - \text{IVS}_t; \text{ note no } -\Delta\text{NWC}\]

This alternative UFCFF can be used to pay debt principal, debt interest, dividends, and purchase working capital to support the new investments.