

PART I:

Philosophy, History and Equity Securities

"Ye wise Philosophers explain
What Magick makes our Money rise
When dropt into the Southern Main
Or do these Juglers cheat our Eyes"

Jonathan Swift (1667-1745)
First stanza of the poem *The Bubble* (1721)



"Human beings act, not on the basis of fact and reality as such, but on the basis of *opinions* and *beliefs about facts*, and what is called *knowledge*, but which at best falls notoriously short of the implications of that term. From a logical point of view therefore, one who aspires to explain or understand human behavior must be, not finally but first of all, an epistemologist."

Frank Knight (1885-1972),
"Economic Psychology and the Value Problem", *QJE* (1925)



"One thing badly needed by investors — and a quality they rarely seem to have— is a sense of financial history."

Benjamin Graham (1894-1976),
The Intelligent Investor (1949)



Chapter 1 *The Philosophy of Equity Valuation*

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What is Value?

Value is a concept with many possible interpretations. Taking the ‘value’ to be equal to the ‘true worth’ is too normative for practical purposes. Some method of determining true worth is needed. Because ‘value’ for equity securities is an *ex ante* variable, it is unobserved at the time of valuation. As such, it is difficult to transcend philosophical differences over ***the definition of value***. In one sense, the value of an equity security share is equal to the traded price of the security observed in the securities market. This interpretation of value is consistent with the spirit of the efficient markets hypothesis. In the fundamental analysis of equity securities, it is usually assumed that the market price does not necessarily capture the true worth or ‘intrinsic value’ of a security. At any point in time, the market price may be above or below the intrinsic value. In this sense, value is an economic concept that can be estimated using techniques such as discounted cash flow analysis. This requires forecasts of the key inputs to the model, especially cash flows, capitalization rates and termination dates, to be accurately assembled and interpreted. A substantial portion of this book is concerned with how this task is executed.

I.1 The Equity Security Landscape

A. Characteristics of Equity Securities

This book uses a narrow definition of equity securities. More precisely, *an equity security is defined as a tradeable ownership claim in a company, corporation or real asset*. This includes common stock, preferred stock and warrants traded on public securities markets. Also included are ownership claims in real assets or portfolios of financial assets that are tradeable securities, such as Canadian oil and gas royalty trusts, real estate investment trusts and exchange traded funds. ‘Free standing’ equity derivative securities, such as exchange traded equity options and equity futures, and difficult to trade equity claims, such as a share in a private partnership, domicile or business, are only considered in historical perspective. The omission of non-tradeable claims is a significant exclusion, impacting many items on household balance sheets. Explicitly excluded are debt securities of all types. Also excluded are: insurance products, such as whole life insurance; and, hybrid debt/equity products such as convertible bonds and mortgage backed securities. This approach to defining an equity security follows the common convention of classifying securities issued by corporations with reference to the ‘right hand side’ of the balance sheet as either debt or equity securities.

Corporate securities differ with respect to *priority of claim* against both income and assets. Because an equity security is an ownership claim, failure by the corporation to make an income (dividend) payment to holders of equity securities is permissible. In contrast debt securities have a priority claim over equity securities, with default on the promise to make an income (coupon) payment on a debt security being grounds for initiating a bankruptcy proceeding against the corporation. Such proceedings often have dire consequences for equity investors, making some understanding of debt securities essential to the equity valuation process. The specific contract governing a corporate bond issue is the *bond indenture* for that issue. The bond indenture is a legal document, monitored and enforced by a trustee, that contains the terms and conditions governing that issue. Where applicable, the indenture contains information about coupon payment schedules, protective provisions and covenants, priority of claim relative to other bond issues, conversion conditions, sinking fund payment schedules and the like. Due to the difficulty of obtaining and digesting the bond indenture contracts, there are a number of information sources, such as Moody’s Investor Services, that provide summary information about the contents of the bond indenture for specific bond issues.

The bond indenture typically provides a number of conditions under which the bond holder can initiate a *bankruptcy proceeding* against the issuing corporation. Where applicable, these conditions include failure to make a scheduled coupon payment or violation of a bond covenant governing, say, the net asset value of the company. In the event that a bankruptcy proceeding is initiated, debt claims are typically paid according to the seniority of the issue, as laid out in the indentures of the different bond issues made by the corporation. Debt issues which are secured by specific property, such as mortgage bonds, are repaid either by repossessing the asset or from the proceeds of the disposition of the asset. Debentures are unsecured issues that do not have a lien against a specific asset identified in the indenture. When a number of debentures are issued by a corporation, the issues are usually further classified as senior, senior subordinated and subordinated debentures to reflect the associated priority of claim. In a bankruptcy proceeding, debenture holders have the status of general

creditors.

Tradeable equity securities typically feature *limited liability*, meaning that in the event of bankruptcy shareholders are only liable to the extent of the amount that was paid for the shares. This is a significant restriction on the legal and organizational form used to represent equity ownership. Following Guinnane et al. (2007), possible forms for equity ownership include: ordinary partnership; limited partnership; limited partnership with tradeable shares; incorporation; and, private limited liability company (PLLC). Of these, only corporations and limited partnerships with tradeable shares fall within the definition of equity securities used in this book. For many small and medium sized enterprises, the ordinary partnership or PLLC is the appropriate organizational choice. The historical evolution of limited liability from the unlimited liability of the ordinary partnership and the restricted liability of the joint stock company differs from country to country. As a consequence, the prevalence of businesses with tradeable equity securities also differs, e.g., PLLC is widely used in the UK for smaller businesses. With appropriate adjustment, the general valuation principles developed in this book for tradeable securities can be extended to other more difficult to transfer forms of equity ownership

Equity securities are composed of common stock, preferred stock and claims against equity such as warrants and rights issues. For many corporations, the common stock does not pay a regular cash dividend, preferring to spend any free cash flow on accelerated expansion, stock buy back programs and debt repayments. In such cases, the expectation is that the stock price will appreciate by more than the cash per share that would have been paid as a dividend. In addition to regular dividends (usually paid quarterly) that may or may not be on offer, *common stock holders may also benefit from irregular events* such as: distributions of special cash or stock dividends; payment of equity securities in a subsidiary that is being spun-off from the parent corporation; or an issuance of transferable rights to participate in a future equity offering. The use of such irregular distributions differs from country to country. For example, while the use of rights issues to raise additional capital are common in East Asian equity markets, private placements or secondary stock offerings to raise additional capital are common in North American markets, e.g., Poitras (2002).

Preferred stock differs from common stock in a number of ways. There are a number of possible variations for preferred stock, e.g., it may be redeemable, convertible or floating rate. *All preferred stock is non-voting*, though minimum voting provisions for preferred stock with suspended and accumulating dividend payments are a requirement for listing on the NYSE. In most cases, there is a regular (usually quarterly) scheduled dividend payment of a fixed dollar amount. Because the size of the dividend payment is fixed, as the market price of the preferred stock changes, the dividend yield will change. Hence, there is a close connection between the valuation of a preferred share and the associated debt of the corporation. Because of capital requirements detailed in various national and international banking regulations classifying preferred stock as a favorable source of capital compared to the issuance of debt, financial institutions are important issuers of preferred shares. Also important are utilities and issuers with credit difficulties needing to recapitalize, e.g., GE and Berkshire Hathaway in 2008.

Most preferred share issues have cumulative dividend provisions, meaning that if scheduled preferred dividend payments are not made, all unpaid preferred share dividends have to be made good before any dividend payments can be made to common shareholders. Because preferred stock is an equity claim, the dividend payments are not a tax-deductible expense for the corporation (in

contrast to interest payments on corporate debt). The associated negative tax implications are offset by the favorable tax treatment given to inter-corporate dividend payments. Traditionally, the corporate tax advantages for preferred stock meant that preferred shares were priced to be attractive mainly to corporate investors. Changes in the tax code have eroded the corporate tax advantages of preferred stock dividends to the point where yields for preferred stock can be attractive relative to comparable yields for both Treasury securities and corporate debt.

Common stock stands last in the priority ranking, making common stock the *residual claim* to income payments. The priority of preferred over common also applies in the event of firm liquidation, recognizing that equity is the residual claim against assets.¹ In the typical stylized corporation, each share of common stock is entitled to one vote that can be used in the election of the board of directors held at the annual meeting of the shareholders.² In turn, the board of directors is responsible for selecting the senior management, e.g., chief executive officer and president, that actually runs the company. Votes may also be held at the annual meeting or at special meetings when substantive initiatives are being undertaken by management, e.g., a merger or takeover. Shareholders not attending a meeting may vote by **proxy** that allows a named person, usually a member of management, to vote the shares. A **proxy fight** occurs when a dissident shareholder group solicits proxies to vote against current management. A recent example of a proxy fight occurred in 2002 when a dissident group led by the son of a company founder sought to prevent the merger of Hewlett-Packard with Compaq.

In a sense, the common stockholders are the owners of the firm, though in practice there are considerable impediments to achieving this objective. For example, many companies use a **statutory voting procedure** where each individual member of the board of directors is voted on separately. In this model, the group holding the majority of the shares is able to elect the full board. In an attempt to address the problem of under-representation, in some states corporation law requires common stock to have cumulative voting rights where each share is entitled to a number of votes equal to the number of board members being elected, with all board members being elected according to the number of votes cast for each. In this type of voting, a minority group voting as a block is able to get a voice on the board by electing a member or members to the board. Issues of corporate governance contributed to a number of recent corporate debacles, such as Enron and Worldcom, and are at the core of the legal reforms contained in the Sarbanes-Oxley Act of 2002 (see www.sec.gov/about/laws.shtml).

In addition to voting rights, common stockholders have a number of other rights and protections. The extent of these rights depends on the corporation law of the state of incorporation. **Preemptive rights** allow stockholders to subscribe pro rata to any new issues of stock. This right prevents undesired dilution of ownership. Other rights include protections against stock repurchases or recapitalizations. Though these rights may extend to certain types of non-cash dividends, the size of dividend payments made to the common shares is typically at the discretion of management. As indicated in Table 1-y, there are many firms that do not make regular dividend payments. There are also numerous firms that have a long unbroken record of regular, quarterly dividend payments that have grown gradually over time. Earnings that are not paid to shareholders as dividends are retained within the firm and, presumably, go to the purchase of assets or reduction in other claims against assets, thereby enhancing the claim of common stock against assets and, hopefully, producing an increased common stock price and a capital gain for stockholders.

In the US, except in a few special cases, e.g., nationally chartered banks, corporations come into being when chartered under a particular state code. Each state has a corporation law outlining rules for incorporation and general rules for operation. As such, the state of incorporation defines rules governing corporate status. While conducting business in states other than the state of incorporation, the corporation is subject to the commercial laws and taxes of that state. At the time of incorporation, a **corporate charter** has to be filed which contains the articles of incorporation. The corporate charter provides information about: the methods by which the articles of incorporation can be amended; the classes of stock and the par values; features protecting the preferred stock; voting rights for the stock; powers of the board of directors; rules for retiring common stock; dividend payment provisions; rights of prior security holders in the event of new issues; merger and reorganization procedures. Due to differences in corporation laws across states, many of the largest corporations have opted to incorporate in Delaware. (Why?) The Commerce Clearing House (now a division of Wolters Kluwers) specializes in providing useful references on relevant corporation law issues such as The Delaware Law of Corporations & Business Organizations (3rd ed. 2007).

In most jurisdictions, the corporation law permits different **classes of common stock** to be issued, usually differentiated by voting rights. Such types of common stock are referred to as dual-class shares, restricted shares or classified common stock. While such common stock issues are used by companies in Canada, Europe, Brazil and China, they are unusual in the US, e.g., Partch (1987), Chen et al. (2002), Odegaard (2007), Dittmann and Ulbricht (2008). Due to perceived and actual abuses, the New York Stock Exchange had various degrees of listing restrictions on non-voting common stock from 1924 until 1994 (see Subsection 313 of NYSE Listed Company Manual). Where companies do issue common stock with different voting rights, the different classes trade as separate issues, permitting different prices to be quoted. For example, Canadian Tire Corporation traded on the Toronto Stock Exchange (TSX) has Class A non-voting common stock and regular common stock that does have voting rights. Other than voting rights, both classes of common stock have equal claims, e.g., to common stock dividends.

New York Stock Exchange Listed Company Manual

(Last Modified: 08/21/2006)

Subsection: 313.00 Voting Rights*

(A) Voting Rights Policy

On May 5, 1994, the Exchange's Board of Directors voted to modify the Exchange's Voting Rights Policy, which had been based on former SEC Rule 19c-4. The Policy is more flexible than Rule 19c-4. Accordingly, the Exchange will continue to permit corporate actions or issuances by listed companies that would have been permitted under Rule 19c-4, as well as other actions or issuances that are not inconsistent with the new Policy. In evaluating such other actions or issuances, the Exchange will consider, among other things, the economics of such actions or issuances and the voting rights being granted. The Exchange's interpretations under the Policy will be flexible, recognizing that both the capital markets and the circumstances and needs of listed companies change over time. The text of the Exchange's Voting Rights Policy is as follows:

Voting rights of existing shareholders of publicly traded common stock registered under Section 12 of the Exchange Act cannot be disparately reduced or restricted through any corporate action or issuance. Examples of such corporate action or issuance include, but are not limited to, the adoption of time phased voting plans, the adoption of capped voting rights plans, the issuance of super voting stock, or the issuance of stock with voting rights less than the per share voting rights of the existing common stock through an exchange offer.

(B) Non-Voting Common Stock

The Exchange's voting rights policy permits the listing of the voting common stock of a company which also has outstanding a non-voting common stock as well as the listing of non-voting common stock. However, certain safeguards must be provided to holders of a listed non-voting common stock:

(1) Any class of non-voting common stock that is listed on the Exchange must meet all original listing standards. The rights of the holders of the non-voting common stock should, except for voting rights, be substantially the same as those of the holders of the company's voting common stock.

(2) Although the holders of shares of listed non-voting common stock are not entitled to vote generally on matters submitted for shareholder action, holders of any listed non-voting common stock must receive all communications, including proxy material, sent generally to the holders of the voting securities of the listed company.

(C) Preferred Stock, Minimum Voting Rights Required

Preferred stock, voting as a class, should have the right to elect a minimum of two directors upon default of the equivalent of six quarterly dividends. The right to elect directors should accrue regardless of whether defaulted dividends occurred in consecutive periods.

The right to elect directors should remain in effect until cumulative dividends have been paid in full or until non-cumulative dividends have been paid regularly for at least a year. The preferred stock quorum should be low enough to ensure that the right to elect directors can be exercised as soon as it accrues. In no event should the quorum exceed the percentage required for a quorum of the common stock required for the election of directors. The Exchange prefers that no quorum requirement be fixed in respect to the right of a preferred stock, voting as a class, to elect directors when dividends are in default.

The Exchange recommends that preferred stock should have minimum voting rights even if the preferred stock is not listed.

*This is not the complete subsection, there is further discussion of: increasing the authorized amount or creation of a pari passu issue; creation of a senior issue; alternation of existing provisions; supplementary material for non-US companies; and so on.

Pressure for listing of dual-class stock on the NYSE was created by the globalization of financial markets. Some important stocks in other jurisdictions had a dual class share structure and flexibility was required in the listing requirements. Because conventions applying to dual class stock do differ from jurisdiction to jurisdiction, there is a lack of clarity in the recognition of dual class status. For example, another Canadian company with dual class common stock, Teck-Cominco, has Class A voting (TCK.A-T) and Class B (TCK.B-T) non-voting. Presumably for reasons of liquidity, it is the non-voting Class B Teck-Cominco shares that are traded on the NYSE (TCK-N). There is a wide variation across countries and across firms in the price differences between voting and non-voting shares. For example, the 1/18/2008 closing price for the non-voting Class A Canadian Tire shares (CTC.A) was C\$60.01, up \$1.11 on the day, with the regular shares (CTC) trading at \$70.05, down \$1.45 on the day. Neumann (2003) summarizes results from a number of studies reporting an average price premium for voting over non-voting of 13% in the UK; 20% in Switzerland; and 26% in Germany. The highest *dual-class share premiums* observed were for Israel at 46% and Italy at 82%. Neumann examines the anomalous case of Denmark where, for reasons of liquidity, voting shares traded at a discount to non-voting shares.

Relevant Accounting Statements

The relationship between the assets, liabilities and equity of a corporation is illustrated in Table 1-a which provides an the “Condensed Consolidated Statements of Financial Position”, more commonly known as *the balance sheet*, for Boeing Corporation taken from the 10-K for the 2008 year end results. Boeing is used an illustration and is not intended to represent a best practices model. Since Nov. 15, 2007, certain publicly traded companies in the US are no longer required to follow *Generally Accepted Accounting Principles* (GAAP) when preparing accounts and can file using International Financial Reporting Standards (IFRS). As a consequence, there is even more latitude in the detail provided for the various items of interest in the accounts than the considerable variation already permitted under GAAP. In addition, the securities of corporations traded outside the US, or within the US as American depository receipts (ADR’s), are subject to the securities laws of the relevant home jurisdiction. In general, the detail and clarity of accounts for firms subject to US rules sets a standard for reporting requirements in other jurisdictions.³

INSERT Boeing “Consolidated Statements of Financial Position” 2008 10-K (Table 1-a)

INSERT Boeing Statement of Shareholders’ Equity 2008 10-K (Table 1-b)

INSERT BOEING CASH FLOW STATEMENT 2008 10-K (Table 1-c)

In the Boeing balance sheet, traded securities are associated with the line items, “Short term debt and the current portion of long term debt” (STD), “Long term debt” (LTD) and “Shares Issued”. The debt items are further clarified in the notes to the audited financial statements. An additional statement, the “Condensed Consolidated Statement of Shareholders’ Equity” is prepared exclusively for the determining changes in the equity account. The information content in this statement is often elusive and not closely examined. However, in this particular instance, the statement is helpful. From Table 1-a, Boeing records *a disturbing negative equity value for 2008*. This is a dramatic change from 2007 when equity value for a healthy \$9 billion (around \$9 per share). The

shareholders' equity statement reveals almost all of this equity has been absorbed by and \$8.56 billion "post retirement liability adjustment" and almost \$3 billion in common share repurchases. From the balance sheet, it is apparent that Boeing has used a significant portion of over \$22 billion in accumulated retained earnings in repurchasing over \$17 billion in common stock.

How to make sense of the negative value of equity for Boeing? Closer examination of the annual 10-K report provides the not surprising information that the large change was due to adoption of FAS 158 'Employers' accounting for defined benefit pension and other postretirement plans'. In effect, Boeing has not been accurately accounting for generous pension benefits. The common stock traded over \$100 in Nov. 2007 and did not trade below \$30 during the Mar. 2008 market lows. There is clearly a disconnect between book value and market value of equity. For purposes of determining a market value for the equity account, the "Condensed Consolidated Statements of Cash Flows", commonly known as *the cash flow statement* is typically most helpful. This statement provides in a cash flow format information that is contained in the widely reported "Condensed Consolidated Statements of Operations" (Table 1-d) or *earnings statement*. The cash flow statement starts with net income and incorporates in changes accruals for individual balance sheet items. The balancing item for the cash flow statement is the change in the cash position between the beginning and end of period.

INSERT Boeing "Condensed Consolidated Statements of Operations", 2008 10-K (Table 1-d)

In Table 1-a observe that the liabilities plus equity side of the balance sheet represents the claims against the assets's side that generate the earnings and cash flows given in Tables 1-b and 1-d. Traded debt securities are associated with short term debt (\$560) plus long term debt (\$6,952). The annual 10-K report provides some additional discussion of these debt securities, e.g., the \$300 million debenture (unsecured debt issue) due in 2024 is redeemable at the holder's option in 2012.⁴ However, sources beyond the financial statements and notes contained in the annual report are needed to get precise information about each debt issue. As for equity, the balance sheet indicates that 1,012,261,159 shares have been issued. Boeing has no outstanding preferred stock. While previously Boeing gave precise numbers of shares held in Treasury stock and held in ShareValue Trust, a trust which holds Boeing stock for the purpose of making distributions to employees, in this report, the 2008 is less revealing. It is necessary to access Item 3 in the Notes to find 719 million as the 'weighted average number of shares' that has been used to calculate the earnings per share (EPS) reported in Table 1-d.

Accurate assessment of the financial statements of the firm lies at the heart of the fundamental approach to equity security valuation. In this approach, determining the estimated '*intrinsic value*' for, say, the common stock of the Boeing Corporation requires information in the financial statements to be combined with other available information relevant to the business prospects of the company including the state of competition in the industry and the quality of the firm's products and management. The primary objective of determining an estimate for the intrinsic equity value is to assess the difference between the observed market price and this estimated value. If the estimated value is sufficiently above the market price, then this provides a potentially profitable buying opportunity; or, if the estimated value is sufficiently below the market price, this is a selling opportunity. The success of this approach is predicated on the assumption that the market price and

the ‘intrinsic value’ can differ at any point in time but, over time, both will tend to the same correct price.

By focusing on the elements of firm specific risk to determine the ‘value’ of an equity security, the fundamental approach advocated by many practitioners differs markedly from the *modern Finance approach* advanced by academics which seeks to eliminate firm specific risk through the application of optimal diversification strategies. This approach is predicated on the assumption that the market price ‘stochastically equals’ the intrinsic value at any point in time, i.e., the efficient markets hypothesis. As such, attempting to use available information to generate abnormally profitably forecasts of future equity security price movements is futile and the expected utility maximizing solution is to optimally diversify. The method of valuing securities used by each approach leads to investment strategies that differ substantively. As it turns out, the rational basis for these differences is philosophical and cannot, on *a priori* grounds, be resolved. Fundamental empirical questions surrounding the ‘value’ of an equity security involve *ex ante* variables which are not directly observable.

The Classification of Securities

Basic characteristics of equity securities include elements such as priority of claim, limited liability and other features identified in the corporate charter. The explicit consideration of only equity securities in this book follows the conventional analytical classification of corporate securities into bonds and stocks. This classification scheme conforms to the legal distinction between the equity holders as owners of the firm and the debt holders as creditors with a contractually defined claim against the firm, typically for interest and principal payments. *The higher priority of claim* suggests that debt securities possess a ‘higher degree of safety’ while equity claims have a ‘lower degree of safety’ that, presumably, is compensated by a greater potential for gain. While useful, this method of classifying corporate securities has limitations that, in some cases, can lead to confusions and misrepresentations. Graham and Dodd (1934) recognized these problems and suggested an alternative classification scheme for securities that was more in keeping with the theme of investment versus speculation in security valuation and selection decisions.

The modern investment landscape has become considerably more complicated than in the days of Graham and Dodd (1934). The division of equity securities into common stocks and preferred stocks has been blurred by the presence of hybrid preferred issues such as mandatory convertible preferred shares, e.g., Battacharya (2001, p.1138), that are closer to common stocks than the traditional non-convertible fixed coupon preferred stock. The distinction between debt and common equity is blurred by the widespread use of financial structures such as warrant bond issues. Yet, there is still considerable substance in *the “new classification” scheme* for securities recommended by Graham and Dodd (1934) and carried forward into Graham, Dodd and Cottle (1962, p.101). In conventional terminology, these three classes can also be stated as:

Class I. Investment grade bonds and preferred stocks;

Class II. Speculative grade bonds and preferred stocks; which can be further divided into:

II.A. Hybrid Debt, such as convertible bonds and mortgage backed securities;

II.B. Below investment grade senior notes and preferred shares;

Class III. Securities with characteristics of common stocks.

The basic idea behind the proposed classification scheme is to emphasize the investment characteristics of a security, as opposed to the ‘type’ of security, i.e., bond vs. preferred vs. common. In particular, securities in class I “are bought in the reasonable expectation that the income therefrom will continue unchanged and that their market quotation will not deviate greatly from the purchase price” (GDC, p.102). Securities in class I provide *safety of principal and a steady income*. Securities in class II are subject to significant possibilities about the safety of principal. The division of class II into A and B groups is to recognize the possibility of different factors contributing to price changes. In class A, the price change arises from the security combining a “straight investment” with a conversion right or some other privilege, e.g., prepayment options, that carries the possibility of profit or loss. In class B, the possibility of profit or loss is inherent in the ‘straight security’ and not in the attached provision. Securities in class B differ from common stock in two ways: the securities have an “effective priority” over some junior issue, which gives some degree of protection; the possibility for profit is limited in time and amount, in contrast to common stock where the possibility of gain is “theoretically or optimistically” unlimited.

As for the specific types of security in each class, “all *straight* bonds and preferred stocks of high quality selling at a normal price” belong in class I, together with “sound convertible issues” where the conversion option is well out of the money. Just because a bond is rated investment grade does not qualify the security as belonging in class I. If the bond sells at “any unduly low price” then the possibility of capital gain puts the bond in class II. Precisely where the dividing line between classes I, II and III is drawn is difficult to specify. The essence of the classification scheme is to shift the focus onto the price and cash flow characteristics of the security as opposed to more traditional features such as priority of claim. “Any issue which displays the main characteristics of a common stock belongs in Group III, whether it is entitled ‘common stock’, ‘preferred stock’ or even ‘bond’”. This would apply, for example, to a convertible bond where the conversion right was deep in the money. Another example is a senior bond selling at a price so low that the junior bonds have no value. Such a bond “lacks the prime requisite of a senior security, viz., that it should be followed by a junior investment of substantial value”.

Preferred Stock versus Corporate Debt

The Graham and Dodd Class I - Class III security classification scheme identifies a closer similarity of preferred stocks to corporate debt than to common stocks. This can create pedagogical confusion in a book concerned about equity securities. As a consequence, common stocks dominate much of the attention in this book given to equity securities. When general reference is made to ‘equity securities’ in this book, it is the Class III security category that is intended. Though preferred stock has played an important role in the history of equity securities, this type of equity security currently has a limited role to play in most corporate financing, with the exception of certain advantages for financial institutions subject capital requirements and those seeking the tax advantages that are present for both borrowers and investors. With this in mind, a brief overview of preferred shares is provided at this stage to offset relative lack of subsequent discussion compared to common stocks.

The origins of preferred shares can be traced to the triple contract used in medieval and

Renaissance finance (Poitras 2000, ch.2). Preferred share arrangements appear in the capital structure of early English joint stock companies and were an important financing feature of the US industrial trusts in the late 19th century. Initially, the basic notion of a preferred share related to the prior claim to dividend payments. Over time, other features have been added, such as the prior claim against assets in the event of a liquidation. In addition to ***preference over common stock to dividend payments and assets in liquidation***, features that apply to all preferred issues, there are a range of other features that may or may not be part of the preferred structure. For example, most preferred shares are ‘cumulative’, i.e., if preferred dividends are not paid then the unpaid amount ‘cumulates’ and all cumulative unpaid preferred dividends have to be settled before any dividend payments can be made to common shareholders. Though preferred shares do not usually have the unrestricted voting rights associated with common stock, contingent voting rights provisions are often included that permit preferred stock to have voting rights when there are unpaid preferred dividends outstanding.⁵

As an equity claim, failure to make a dividend payment on either preferred or common shares is not sufficient to initiate a bankruptcy proceeding, as in the case of debt issues. The ***prospectus*** published at the time a share is issued is an excellent source for finding information about the terms and conditions for a specific issue. For example, the prospectus will specify the various protections afforded the preferred shareholder, such as the cumulative dividend provision and contingent voting rights. Other forms of protection may include restrictions on the ability to make additional issues of more senior securities. Another typical protective feature is a redemption or sinking fund provision that permits the corporation to retire outstanding preferred shares. Preferred share issues may also be convertible, though preferred shares with this provision appear less frequently than straight (non-convertible) preferred shares.⁶ Convertible preferred stock is often issued to facilitate a merger or takeover or recapitalization. As with debt issues, preferred shares are rated by the major ratings services, Moody’s, S&P and Fitch, using the same ratings scheme as for bonds. The ratings agencies are another potential source of information about the terms of a specific equity security issue.

Three basic types of preferred share dividend payment provisions are observed in modern financial markets: fixed-rate (fixed-dividend); adjustable rate; and auction/re-marketed rate.⁷ The fixed rate preferred is the traditional type of dividend payment provision. For this type of preferred, the dividend payment is based on a predetermined rate (percentage) of the par value. This may be expressed as a dollar value per share. For example, if the par value is \$50 a 10% dividend preferred would have a \$5.00 annual dividend payment. As with common stock dividends, the dividend payment is usually paid quarterly so the 10% dividend preferred (\$50 par value) would make a regular payment of \$1.25 each quarter. Even though preferred shares have redemption provisions and other features that can impact the yield calculation, e.g., conversion provisions, it is conventional to quote the ‘dividend yield’ (Div/P) for preferred stocks and use this as a method of assessing value much as in traditional yield spread analysis. Given that this measure of the dividend yield is a current yield calculation, this procedure is a theoretically precise measure of the yield only if the preferred is assumed to be perpetuity.

Prior to 1982, all preferred shares traded in US stock markets were of the fixed-rate type (Wilson in Fabozzi 2001, p.338). Following a practice that had started a few years earlier in the private placement market, in 1982 adjustable rate preferred stock issues started to appear, followed two years

later by auction rate preferred issues and, the following year, by re-marketed preferred issues. All of these types of preferred stock issues have a dividend payment that changes from period to period. Though a number of variations are possible, an adjustable rate preferred typically has a quarterly resetting of the dividend rate determined by some spread off the highest of three points on the Treasury yield curve, e.g., using the yields for 3 month, 10 year and 20 year maturities. This maximum rate may be subject to a floor rate below which the dividend payment rate will not fall, i.e., the adjustable rate preferred has a 'collar'. The spread off the Treasury yield can be positive or negative. A difficulty with this type of preferred stock design is that the method of adjusting the dividend payment rate is fixed. The spread does not change with market conditions or the risk of the issuer. As such there is some associated principal risk.

For a number of reasons, purchasers of variable rate preferred stock are often corporate cash managers seeking a tax-exempt or tax-advantaged money market security (Wilson in Fabozzi 2001, p.343-4). This type of investor is seeking a competitive interest rate without risk of principal. The auction rate preferred structure addresses the potential problem that the adjustable rate preferred poses for this type of investor. For this type of preferred, the dividend payment rate is set at regular intervals, usually every seven weeks, through auctions involving current holders of these preferred issues and other investors interested in purchasing the shares. In this fashion, the dividend payment rate reflects market conditions and changes in the risk of the issuer. The remarketed rate preferred stock issues are a variation on the auction rate preferred that uses a remarketing agent to reset the dividend payment rate. By avoiding the costs associated with the auction process, the remarketed issue can feature a shorter reset period, usually varying between one week and seven weeks. In this fashion, the auction rate and re-marketed rate preferred issues avoid most of the principal risk associated with adjustable rate preferred stocks.

Since the first issues appeared, these variable dividend preferred issues have come to represent about half of new preferred issues, with the split between fixed and variable dividends varying from year to year. These changes in dividend structure were accompanied by a change in the composition of issuers. While the traditional issuer of preferred shares was a utility, i.e., electric, water, gas and telephone companies, more recently the financial companies such as banks, thrifts and insurance companies, have become significant sources of preferred share issues. These entities are important drivers of the variable rate preferred structures. For example, the first auction rate preferred stock issue, in 1984, was by American Express. From 1990 to 2003, it is estimated that \$332 billion in new preferred stock was issued, much of this by financial companies (Poitras 2005). Combined with the approximately \$60 billion of preferred issues outstanding in 1990, net of redemptions, the amount of the preferred stock outstanding in the US was about \$350 billion. Even with these changes and considerable growth, the size of the outstanding preferred share market can be measured in the hundreds of billions of dollars, compared to the trillions in par value of outstanding issues in the debt market.

The preferred share is a hybrid security, sharing some features of debt and some features of common stock. On the issue of whether to purchase a preferred stock or the debt of a company, Graham, Dodd and Cottle (1962, p.382) observe:

What yield advantage should the investor demand to compensate him for the contractual weakness of preferred stocks against bonds? We are inclined to think that an *individual* should

not buy any preferred stock unless he is able to obtain *both* adequate safety and a differential of, say, 1 percent in the yield over that afforded by a bond of similar safety. ... What of preferred stocks of secondary or inferior grade which can be bought at tempting yields? Our attitude toward them is the same as that toward high-coupon bonds. It is unsound to accept inadequate security to obtain a higher income, *unless* the buyer obtains also a opportunity for a substantial increase in principal value and *unless also* he is prepared to take the speculative risk of loss involved in the transaction.

In addition to being an excellent illustration of the Graham and Dodd approach to speculation vs. investment in security analysis and selection, preferred shares are also an excellent illustration of the impact that tax treatment and regulations can have on a security. For example, the reason that GDC state individual investors will, typically, not be attracted to preferred stocks is due to the different tax treatment compared to debt.

Preferred Stock and Taxes

Taxes impact security purchasers and issuers in different ways. For example, a high net worth individual subject to capital gains taxes will have different investment concerns than a tax-exempt charitable institution or pension trust. There are so many possible iterations that it is impractical to consider the different possible tax implications involved in the valuation of common stocks, let alone consider the tax implications of an exotic preferred share. In general, the tax rate of the marginal investor is usually too difficult to identify. Unlike common stocks where the tax motivations of purchasers and issuers are unclear, fixed rate preferred shares provide a relatively clean security structure for examining the impact of tax considerations on the valuation of equity securities. For the issuer, preferred shares have the disadvantage that dividends paid are not a deductible expense like the interest payments on corporate debt.⁸ In the US, the Internal Revenue Code (IRC) §243 provides a 70% deduction for dividend received by corporate investors owing less than 20% of the paying corporation. This rises to 80% for ownership shares between 20% and 80% and is 100% for greater than 80% ownership.

The valuation of preferred stock depends on the tradeoff between: the increase in issuer opportunity cost due to the loss of the interest deductibility foregone by issuing preferred stock instead of debt; and the reduction in tax liabilities of corporate preferred share purchasers due to the partial income tax deductibility of dividends paid on preferred shares. The benefits to investors means that the coupons on preferred stock will be lower than on comparable debt issues. This makes preferred stocks an attractive source of financing relative to long term debt for firms with low expected marginal tax rates, e.g., Ely et al. (2002). In practice, the financing benefits of preferred stocks to issuers are reduced by the generally higher issue costs of preferred stock relative to long term debt. These additional costs depend on a combination of factors related to the characteristics of the preferred being issued (e.g., convertible preferreds are more expensive to issue than fixed rate preferreds), the size of the issue, the credit risk rating and the type of issuer (e.g., financial company vs. public utility) (Bajaj et al. 2002). Given this, the decision to issue preferred stock versus debt will depend on the tradeoff between the tax benefit to the marginal corporate investor and the incremental tax burden on the issuing corporation.

Despite some sweeping tax code changes associated with the Tax Reform Act (1986) and later reforms, little has changed for US individual investors in preferred stocks since GDC (1962, p.382) wrote: "under present tax laws high-grade preferred stocks are not logical investments for individuals. They *are* logical investments for corporations, which can obtain a much higher net return from them than from corporate bonds of comparable quality." Despite some current proposals to reduce or eliminate the 'double taxation' of dividends, US individuals receiving common stock or preferred stock dividends are subject to taxation on that income at their marginal tax rate. In the US, the coupon rates on preferred shares only make sense for corporate investors able to take advantage of the favorable dividend tax treatment. The US is unusual in applying the full marginal tax rate to dividend payments made to individuals. In Canada, for example, dividend income from both preferred and common stock is usually taxed at rates well below the marginal tax rate for individuals and not taxed when received by Canadian corporations.⁹ Unfortunately, the theoretically attractive features of this reduction in 'double taxation' of preferred dividends has, in practice, been characterized by numerous tax management schemes by corporations to reduce or eliminate corporate taxes paid.

In addition to tax consequences associated with dividend payments, the issuance of preferred shares can also be motivated by regulatory considerations and other aspects of the tax code, e.g., Callahan (2001). In particular, the Tax Reform Act (1986) limited the deductibility of net operating loss carry forwards after a change in corporate ownership. Under the rules, straight preferred stock does not count toward the 'change in ownership criteria' that measures ownership change in terms of holdings of common stock and convertibles. As firms with such loss carry forwards are usually subject to severe restrictions on the issue of debt, preferred shares are an attractive form of financing. A regulatory motivation for the issuance of preferred shares for financial institutions can be found in the capital adequacy requirements that have been introduced since the 1989 Basle accord and continue with the 2004 Basle II agreements, e.g., Kupiec (2007). Because preferred stock is considered to be equity, this provides an added motivation for financial companies subject to the capital adequacy guidelines to issue preferred stock instead of debt. The ongoing trend for financial institutions to create equity/debt hybrids that are booked as equity has been an impetus to the accounting standards FAS 149 and FAS 150 that require corporations to treat equity/debt hybrids issued as 'preferred shares' as debt on the balance sheet.

B. Regulation of Equity Securities

INSERT BOX SEC Website, Figure 1.1.x

Government Regulation

Like it or not, governments are key players in the valuation of equity securities. The scope of government influence is pervasive and systemic. For example, exchange rate and interest rate policy indirectly impact the value of equity by affecting the relative price of debt and securities traded in other currencies. Two key areas where government regulation directly impacts equity security valuation are: tax policy, both corporate and personal; and, the legal environment which includes corporation law and securities regulations and the scope of enforcement by regulators. It would be

presumptuous in the extreme to claim that accurate equity valuation can be conducted without intimate knowledge and understanding of the subjects of taxation, corporate law and securities law. However, to provide detailed discussion of these subjects in this book is not possible, if only because the relevant rules and laws vary across jurisdictions. These are subjects that require detailed separate treatment. Numerous useful sources are available. What is provided here is a brief overview combined with a certain perspective.

Besides restrictions imposed by the corporation law governing the corporate charter, there are a number of other laws that govern the issuance of corporate securities. In the US, most prominent are the federal regulations administered by the *Securities and Exchange Commission* (SEC) (www.sec.gov, see Figure 1.1.x), especially the Securities Act (1933, most recently amended 2008), the Securities and Exchange Act (1934), the Investment Company Act (1940), the Public Utility Holding Company Act (1935) and the Sarbanes-Oxley Act (2002).¹⁰ These regulations cover filing requirements for all firms with publicly traded securities. The most prominent filing requirement is the 10-K form, required under the Securities and Exchange Act (1934), that provides annual financial statements of the corporation, certified by a chartered public accountant. Under the Securities Act (1933), companies issuing publicly traded securities for the first time also must meet SEC filing requirements in the form of a prospectus providing full disclosure of pertinent facts about the issue. The SEC is also responsible for monitoring regulations governing insider trading. The regular and irregular filings with the SEC are essential sources of information for security analysis of publicly traded companies.

The federal rules and regulations administered by the SEC are not the only ones relevant to corporate securities. There are also state regulations – “*blue-sky laws*” – that can cover the licensing of securities firms, filing information requirements, oversight responsibilities and penalties relating to violating the statutes. A useful reference on these laws is the Commerce Clearing House *Blue-Sky Law Reporter*. State securities laws can have national significance. For example, blue-sky laws of New York and Massachusetts states played an important role in the prosecution of major securities firms such as Merrill-Lynch when analysts and investment advisors were found to be unfairly touting stocks such as Worldcom to retail accounts. In addition to state blue sky laws, there are also federal and state laws governing corporate mergers, such as the federal Sherman Anti-Trust Act, and corporate bankruptcies, such as the federal Bankruptcy Reform Act of 1978 and Bankruptcy Abuse Prevention and Consumer Protection Act of 2005.

The significance of government regulation to equity valuation is aptly framed by events of 2008. The virtual absence of effective regulation and oversight of the hedge fund industry facilitated the spectacular success of *the Ponzi scheme run by Bernard Madoff*. The collapse of this scheme was precipitated when equity valuations both in the US and globally were devastated by the spillover from the financial crisis. Arguably, this crisis was generated by yet another instance of lax or ineffective regulatory oversight, in this case associated with the sub-prime mortgage and credit default swap markets. Historically, the ineffectiveness of government regulatory oversight is usually identified as a prime contributor in widespread financial crises, certain types of corporate collapses and spectacular investment frauds. From the perspective of equity valuation, the associated public policy debates over the extent of government responsibility is ‘dead letter’ – largely irrelevant to the problem at hand. Such debates are predicated on the assumption that governments are capable of effective oversight. Assuming that government regulators will provide adequate protection can prove

to be costly in determining an accurate equity security value.

An assessment of potential for future changes in the regulatory and tax framework that could impact the valuation is a useful step to include in the equity valuation process. In turn, the selection of a particular process will depend on perceptions concerning the role and effectiveness of government regulation. One obvious example involves the valuation of ‘sin’ stocks for companies producing alcohol, tobacco, or gambling entertainment. While the government regulatory environment changes so slowly that it is typically taken as given, the environment for sin stocks is decidedly more fluid. In general, it is too much to expect government regulators to: prevent debacles such as the sub-prime mortgage driven financial crises; uncover frauds such as the Madoff Ponzi scheme; or, effectively detect and deter hedge funds and other unregulated traders engaging in market manipulations. It is also too much to expect that governments won’t arbitrarily change laws or regulations having a material impact on the valuation problem. For equity securities where government regulations play a central role, *caveat emptor* needs to be ingrained into the valuation process.

Industry Self-Regulation

Despite the appearance of substantial government control and oversight, equity security markets are largely self-regulatory. While the role of government has expanded over time, this expansion has been largely driven by events in securities markets. It was not until the collapse of equity markets during the Great Depression that the Securities Act (1933) and the Securities and Exchange Act (1934) were developed. A more recent example is the Sarbanes-Oxley Act (2002) that emerged following the collapse of the technology stock-led financial market bubble in early 2000. Undoubtedly, the financial crisis that began in 2008 will produce additional future examples. From the beginning of trade in equity securities, *self-regulation by market participants* has played the key role in determining the milieu for trading with government determining the legal and taxation environment. Self-regulation by those directly involved in the market has the potential to address problems that cannot be effectively tackled by government regulators. Yet, as has been amply demonstrated, self-regulation is a two-edged sword, e.g., Pirrong (1995), Markham and Harty (2008). While self-regulation is potentially the best mechanism for identifying and averting market manipulation and fraud, the costs associated with achieving this objective can conflict with the profit seeking motives of market participants.

Where self-regulation appears to fail, governments react by introducing regulations that change the rules of the game. Given the costs associated with adhering to government regulations, there is an on-going incentive for equity market participants to develop new equity products, organizational schemes or trading techniques that avoid government regulatory oversight. Such innovation eventually produces a sufficiently negative event to generate incremental change in government regulatory oversight. Modern securities laws pertaining to self-regulation cover broker-dealers, exchanges, investment advisors and the like. The basis for these laws can be traced back to the early 17th century trade in shares of the Dutch East India Company where market manipulation, fraudulent trading practices and failures in corporate governance featured prominently, e.g., De Marchi and Harrison (1994). From that time to the present, the history of equity security trading reflects a tension between well positioned market participants seeking to engage in unfettered activity and

regulators attempting to protect unwary investors and to avert the negative systemic spillovers arising from such trade. The same relatively-opaque-value characteristic of equity securities that is so useful to the capital formation process also provides tempting opportunities to less than scrupulous market insiders.

Despite an impressive layering of regulations and regulators, modern equity markets are still impacted by the general types of self-regulation problems that have plagued the history of equity markets. The collapse of the Madoff hedge fund Ponzi scheme is a particularly apt example of three problems generated by *the self-regulatory framework for modern equity markets* set out in the Securities Exchange Act (1934) also referenced as US Code Title 15, Chapter 2A. Centerpieces of this self-regulatory framework are the equity securities exchange, the broker-dealer and the investment advisor (15 USC Chapter 2D). Each has legislatively mandated requirements governing registration, oversight, fiduciary responsibility and the like. The prolonged success and extent of the Madoff scheme speaks to the inadequacies of the protections provided by the current framework. In 1990-1 and 1993, Madoff served as chairman of National Association of Securities Dealers which runs the NASDAQ over-the-counter exchange, one of the two most important US equity exchanges. Founded in 1960, Bernard L. Madoff Investment Securities LLC was at one time the largest market maker on NASDAQ and, at the end of 2008, was the sixth largest market maker on Wall Street. The broker-dealer is another key element of the self-regulatory framework. The final piece of the puzzle is the hedge fund organizational scheme that Madoff employed for the Ponzi scheme, aimed specifically at the avoidance of government reporting requirements set out in 15 U.S.C. 78m or 78o(d)) which governs investment advisors.

The rise of hedge funds in equity securities markets over the past two decades has been dramatic. Recognizing that there are a range of possible legal and operational definitions of a ‘hedge fund’, rough estimates from a variety of sources indicate the hedge fund sector, including funds trading commodities and securities, has grown from approximately \$22 billion capital invested in 1987 to over \$2.7 trillion in 2007 (Cumming and Johan 2008). Much of this growth has occurred in the last decade, from 3000 operating hedge funds in 1998 to over 13,000 in 2007 (Wyderko 2007). Despite previous warning signs, such as the collapse of Long Term Capital Management in 1998, the considerable subsequent growth of the hedge fund industry raises fundamental questions about the adequacy of regulatory institutions, both in the US and internationally. Questions regarding the appropriate path to regulatory reform of hedge funds have been complicated by recent US court decisions restricting Securities and Exchange Commission (SEC) administrative authority, e.g., Pekarek (2007). In addition to problems associated with hedge funds, private equity and venture capital funds pose similar self-regulatory difficulties.

The regulatory treatment of hedge funds is particularly incoherent, even by historical standards. As the SEC observes, “there is no universally accepted definition of the term ‘hedge fund’” (SEC 2003, p.3). Definitions that are provided depend on the perspective taken. Regulatory bodies, such as the SEC, use *definitions which emphasize legal characteristics*, e.g., a hedge fund is “an entity that holds a pool of securities and perhaps other assets, whose interests are not registered as an investment company under the Investment Company Act” (SEC 2003, p.3). Such definitions implicitly identify hedge funds as entities structured to operate under exemptions from securities laws. However, hedge funds are not the only capital pools operating in domestic capital markets largely outside the scope of regulatory oversight. Private equity funds and venture capital funds are

other forms of unregistered capital pools that are legally similar to hedge funds (SEC 2003, p.5-8). Some types of commodity pools are also structured to avoid regulatory oversight. As such, the distinction between hedge funds and other unregistered funds is artificial. From a regulatory perspective, the activities of all unregistered funds operating in domestic capital markets require closer public scrutiny.

In contrast to the legal definitions of hedge funds used by regulators, *an ‘academic’ definition of hedge funds* aims to systematically identify characteristics that are possessed by all hedge funds, e.g., Atiyah and Walters (2004, p.173); van Berkel (2008, p.198). Unfortunately, the evolution of hedge funds and other alternative asset classes has produced such a wide variation in fund structures that it is difficult to identify characteristics common to all. For example, van Berkel (2008, p.198) states that a hedge fund is a pooled investment vehicle that is organized as a private limited partnership or limited liability company, usually domiciled off-shore, with legal characteristics sufficient to operate under exemptions in securities laws in order to permit tax efficiency and minimal regulatory oversight. In the US and most jurisdictions, such exemptions require shares in the hedge fund not be directly sold to retail investors, restricting available clients to a small number of high net worth individuals and institutional investors. In addition to these general characteristics not being unique to hedge funds, the search for generalities ignores the specifics of the conventional ‘master-feeder’ structure used by many hedge funds. Such structures involve making a jurisdictional choice regarding the domicile of the master fund and feeder fund(s) based on tax and regulatory considerations. In practice, this will result in a part of the fund structure that is domestically domiciled.

Both the near collapse of Long Term Capital Management and the collapse of the Madoff scheme speak to the impotence and incoherence of the regulatory structure governing the hedge fund industry, specifically, and the equity security markets, in general. At the same time that regulators such as the SEC have made a sequence of more-or-less unsuccessful efforts to bring hedge fund trading activities under public scrutiny, the industry has been able to expand dramatically in size and diversity. In practice, the burden and scope of domestic regulatory oversight is further complicated because, for tax and regulatory avoidance reasons, many hedge funds are domiciled in off-shore locations. Not only have hedge funds flourished, the industry has even been able to achieve significant changes in administrative rulings, e.g., SEC rulings on the ‘up tick’ rule for short sales. The upshot is that accurate equity valuation requires healthy ‘sharks in the water’ skepticism about the effectiveness of regulators in preventing ‘fleecing of the lambs’. As Fred Schwed asked in 1940: “Where are the customers’ yachts?”.

C. Trading of Equity Securities

INSERT BOX NYSE/EuroNext (Figure 1.1.c_NYSE_Euronext.pdf)

Equity securities are traded in a range of different venues. The method of issue and exchange for securities differs according to whether the security is a *primary issue* or a *secondary issue*. A primary issue is a new security that is just coming to market, generating a cash inflow to the issuing entity. Some primary issues are *seasoned*, i.e., are increases in the outstanding issues for companies which are already publicly traded. For example, if Ford Motor makes a new issue of common stock

this would be a seasoned primary issue. Other primary issues are *unseasoned*, being made by companies which are making a first issue of publicly traded equity.¹¹ The primary market for equity securities, such as common stock, is the initial public offering (IPO) market. Though some companies do sell primary security issues directly to investors, it is conventional to employ an investment banking firm to market the securities. For historical reasons, this investment banking activity is called underwriting (Poitras 2000, ch.12). Investment banks also do underwriting of debt issues for both corporations and governments.

INSERT BOX (WSJ Common Stock Quotes) Table 1.1.y

There are a number of variations on *underwriting* that are used by investment bankers in the distribution of primary issues. The mainstay of the investment banking business involves purchasing-distributing where a lead investment bank (or banks) will set up a purchase group or *syndicate* with a number of other investment banks. All the investment banks in the group agree to purchase a specified portion of the new issue for sale and distribution to customer accounts. As such, the ability to evaluate the price and marketability of a new issue is crucial to investment banking as are a substantial sales force and connections to the purchasers of new issues. Because the process of underwriting is risky, e.g., the firm could be left holding a sizable amount of unmarketable issue due to changes in market conditions in the period between the pricing agreement with the issuer and distribution of the issue, sometimes agency marketing or *best efforts* marketing is used to distribute the issue. In this case, the issuing corporation seeks to reduce investment banking fees by taking on some or all of the risk that the issue will not be sold. Some types of primary issues, e.g., rights issues that are sold directly to shareholders, permit the use of standby underwriting where the firm markets the issue and the investment bank agrees to take up any unsold securities at a given price.

In order to attract attention from the financial media, securities usually have to be *publicly traded* and *transferable*. The main exception is certain mutual funds (open end funds) which are issued directly by the fund company and are *redeemable* instead of transferable.¹² The secondary market for publicly traded securities has come to be dominated by a network of exchanges that is gradually converging onto two corporate entities that were initially associated with the New York Stock Exchange, now NYSE Euronext group, and the US over-the-counter (OTC) equity market giant the NASDAQ, now NASDAQ OMX group (see Table 1.1.y for examples of quoted prices of common stock). The various stock exchanges also trade other securities than individual stocks, such as corporate debt and closed end funds. This corporate convergence has engulfed regional exchanges and exchanges specializing in also trade options and indexes, such as the AMEX, which merged into NYSE Euronext in 2008, and PHLX, which is now part of NASDAQ OMX. The evolution and convergence of one of these major stock exchange groups is given in Figure 1.1.c which illustrates the ongoing global consolidation involving the NYSE, including the April 4, 2007 merger of the NYSE with Euronext – itself the merger of four national European exchanges and the London International Financial Futures Exchange in 2000 and 2002. The NASDAQ has also evolved from the primary US OTC stock market into a global stock market trading platform.

I.2 Risk, Return and Uncertainty

A. Basics of the Risk and Return Tradeoff

Equity security valuation seeks to determine an estimate for the intrinsic value of the security. In turn, differences between the estimated intrinsic value and the observed market price for the security can be used to guide equity security selection. However, due to the absence of comparable par value, it is not possible to directly compare prices across securities to assess relative value. For this purpose, the security return is often used to measure changes in value over time and across securities. The conventional method used for calculating the one-period return on a domestic security, $R(1)$, assumes that at $t=0$ the security is purchased at price $P(0)$, held for one period and then sold at price $P(1)$. For simplicity, it is also assumed that any dividend payment (*Div.*) paid during the holding period is received at the time the security is sold.¹³ The return can now be calculated as:

$$R(1) = (P(1) - P(0) + \text{Div.})/P(0) = [P(1)/P(0)] + [\text{Div.}/P(0)] - 1 =$$

$$[(P(1) - P(0))/P(0)] + [\text{Div.}/P(0)] = \text{Capital Gain (Loss)} + \text{Dividend Yield}$$

The funds received from the sale of the security are available to be reinvested at $t=1$. This same security can now be purchased at price $P(1)$, held for one period and then sold at price $P(2)$, with any dividend payment again assumed to be paid at the time the security is sold. This second, one period return is $R(2)$. And so it goes for $R(3)$, $R(4)$, $R(5)$... until a time series of one period returns is generated.

The tradeoff between *risk* and *expected return* is the most fundamental notion in modern Finance.¹⁴ This result has been approached at a number of levels. At one level, the result is empirical, e.g., Campbell (1996). There are many studies which provide empirical estimates for various types of unconditional mean return and volatility of return measures, e.g., Ibbotson and Sinquefeld (1976), Siegel (1998, ch. 2), Dimson et al. (2002). These empirical results cover a wide range of countries, securities and time periods. At another level, the tradeoff between risk and expected return is theoretical. Starting with Markowitz (1952) and Roy (1952), the tradeoff has been examined in the context of the optimal selection problem for a portfolio of securities. Over time, this approach developed into ‘modern portfolio theory’. At yet another level, the tradeoff between risk and expected return is rhetorical. In the spirit of McCloskey (1994), the tradeoff is an essential component of the arguments that academics and practitioners in Finance use to persuade others.

INSERT TABLE 1.2.e: Annual Return and Risk for US Stocks, Bonds and Bills, 1974-1998

Some basic empirical evidence about risk and return estimates is presented in Table 1.2.e for US data. This particular sample is chosen for purposes of illustration. Various studies going back at least to Fisher and Lorie (1964) extend these results to different sample periods, e.g., Dimson et al. (2002), and explore comparative properties of the returns such as the equity risk premium, e.g.,

Mehra and Prescott (1985); Samuelson (1994). The main items of interest are the values for the mean and standard deviation over the full sample. Casual inspection reveals that, for the categories selected, stocks exhibit the highest estimated (arithmetic average) return and highest estimated standard deviation of return, followed by long term bonds and Treasury bills.¹⁵ Also included for comparison is the inflation rate, which has an average rate of increase below that of bills. Only the standard deviation of inflation for the US, which is above that for bills, is anomalous. Unfortunately, upon closer inspection, the number of questions raised by these empirical results is substantial. The implications for equity security valuation and selection are not as apparent as first appearances indicate.

The first type of question that comes to mind concerns the form of the estimators used to compare the performance of the securities selected. In Table 1.2.e, parameters of the *unconditional distribution* are evaluated, i.e., the expected return for security i is estimated using the arithmetic average of the time series of the observed returns for security i , $R_i(t)$, risk is estimated using the standard deviation of returns, i.e., the square root of the unbiased estimate of the variance:¹⁶

$$\bar{R}_i = \frac{\sum_{t=1}^T R_i(t)}{T} \quad \hat{\sigma}_i = \sqrt{\frac{\sum_{t=1}^T (R_i(t) - \bar{R}_i)^2}{T-1}}$$

The use of the arithmetic mean to estimate the expected return can be justified under the assumption that the returns are independently, identically distributed random variables, i.e., the process is strictly stationary. In this case, the arithmetic mean has the desirable property that it is a best linear unbiased estimate of the return to be obtained in the next period. A similar conclusion applies to the use of the standard deviation to estimate the risk.

For statistical purposes, being the best estimator in the class of linear unbiased estimators is a desirable property. Yet, when used in the context of calculating the returns from holding a security, the use of this estimate embeds assumptions about the underlying investment strategy. In particular, it assumes that the security selection process and associated portfolio rebalancing occurs each sampling period ($t=1,2,3 \dots$). Alternatively, it is also possible to assume that the trader is entering the market for the first time that period and will hold the security for one period. If the objective is to determine the return on a security that was purchased and then held over multiple periods, then the **arithmetic average return** will give a biased result when compared to the **geometric average return**. The arithmetic average only gives an unbiased estimate of the return over the next period. It can give misleading results when used to describe the return over more than one period.

Similarly, the ‘best’ property of the arithmetic average is achieved by weighting each observation equally by $1/T$.¹⁷ Best in this context means the mean squared error for the estimator is the smallest. In the class of unbiased estimators this translates into the smallest variance around the true population parameter. **Weighted average estimators** which, say, give more weight to observations that are more recent and less weight to observations in the more distant past would not be statistically ‘best’, but do have the intuitively appealing property of giving more weight to recent changes in market conditions ($\omega(t) > \omega(t-1)$). When unbiased, such estimators can be specified as:

$$\bar{R}_i^w = \frac{\sum_{t=1}^T \omega(t) R_i(t)}{T} \quad \text{where} \quad \sum_{t=1}^T \omega(t) = 1$$

However, this requires some method of determining the relationship between the various observations, e.g., Dhrymes (1981). If sufficient information is available to formulate prior distributions, the weights could even be determined in a Bayesian fashion.

To better understand the investment strategy implications of basing decisions on arithmetic averages, consider *again* the method used for calculating the one-period return on a domestic portfolio which holds only one security. To calculate the return on this portfolio, it is assumed that at $t=0$ the security is purchased at price $P(0)$, held for one period and then sold at price $P(1)$. For simplicity, it is assumed that any dividend payment (*Div.*) paid during the holding period is received at the time the security is sold. At this time the portfolio is **rebalanced** where the funds received from the sale of the security are reinvested at $t=1$ in another (probably different) security which is purchased at price $P(1)$, held for one period and then sold at price $P(2)$, with any dividend payment again assumed to be paid at the time the security is sold. This second, one period return is $R(2)$. And so it goes for $R(3)$, $R(4)$, $R(5)$. The investment strategy associated with the use of arithmetic averages necessarily involves rebalancing at fixed intervals.

For purposes of illustrating the difference between the use of geometric or arithmetic averages, assume that the security does not pay dividends and that $P(0) = \$100$, $P(1) = \$50$ and $P(2) = \$100$. It follows that $R(1) = (\$50 - \$100)/\$100 = -50\%$ and $R(2) = (\$100 - \$50)/\$50 = 100\%$. The arithmetic average for this process is $(-50\% + 100\%)/2 = 25\%$. But the security which was purchased at $\$100$ at $t=0$ is only worth $\$100$ at $t=2$. The security value is unchanged from $t=0$ to $t=2$ yet the arithmetic average rate of return is 25%. These same numbers can be used to illustrate the properties of the geometric mean:

$$(1 + \bar{R}_i^G) = \left[\prod_{t=1}^T (1 + R_i(t)) \right]^{1/T}$$

The geometric mean can now be calculated as $\sqrt{(1 + -.5)(1 + 1)} = 1$, implying a geometric mean equal to zero. Hence, if the investor is concerned with the terminal value of the investment, then the geometric average would seem to be more appropriate.

The advantages of using the geometric mean to guide investment decisions has been recognized at least since Durand (1957a), Latane (1959) and Brieman (1960). Often being referenced as the “growth optimal” model, early explorations in Finance on the implications of using the geometric mean were developed by Young and Roberts (1969), Hakansson (1971), Roll (1973) and Elton and Gruber (1974). Proponents of the arithmetic average observe that the illustration used is not a fair example as the probabilities of future movements in rates are not given accurate accounting. Say the probability of the 100% increase is 50% and for the -50% reduction is also 50%. Then there are four possible paths:

INSERT GRAPH 1-a: Binomial Process for Stock Price

Given the probabilities the expected terminal value at time $t=2$ would be: $E[V] = .25(400) + .5(100)$

$+ .25(25) = \$156.25 = \$100 (1.25)^2$. Assuming that -50% and +100% are both equally likely then the expected return is 25%, not 0%.

As noted, differences between the geometric and arithmetic mean can translate into potential differences in investment strategies. Conventionally, use of the geometric mean has been associated with *an investment strategy that maximizes the expected terminal value of a portfolio* while the arithmetic average has been associated with maximizing the expected utility of the terminal value, where expected utility is identified with a mean-variance objective function. Considerable effort has been given to identifying cases where these two objectives will produce the same portfolio. Not surprisingly, one case that has been identified occurs when returns are normally distributed. Introductory statistics texts observe that a limitation of the arithmetic mean is that it can give misleading results when there are extreme observations. In practice, differences between the geometric and arithmetic means are only significant when returns are decidedly non-normal, as in the case of small stocks, and are almost identical when returns are approximately normal, as in the case of Treasury bills and inflation.

B. History of Risk and Uncertainty

In the first half of the 20th century, the distinction between risk and uncertainty was a hotly debated subject which fell well within the confines of active academic discussion, e.g., Greer (2000). More recently, this distinction has been ignored in favor of scientific methodologies that rely on the assumption of ergodicity of the underlying time reversible stochastic processes. Parametric inferences drawn from conditional or unconditional distributions are now the fashion. Analysis of the implications of ‘true uncertainty’ have been relegated to non-mainstream proponents, such as the Post Keynesian economists, e.g., Davidson (1991), Bernstein (1997, 1998), McGoun (2007). This is unfortunate. Inclusion of uncertainty into the valuation of equity securities and formation of equity selection strategies does have profound implications for both the modeling process and the conclusions reached. As argued by J.M. Keynes in The General Theory (1936) and elsewhere, the implications of uncertainty extend well into the realm of public policy about the role of equity securities markets in determining aggregate investment behavior.

INSERT PHOTO JMKeynes.jpg

Modern financial economics is careful to develop logical relationships based on parameters from the conditional (or unconditional) distribution. Typically, attention focuses on the expected value (mean) and variance of the distribution of returns, though attention is sometimes given to higher moments of the distribution such as skewness and kurtosis. Precisely how to model predictions for random variable outcomes using the conditional distribution raises deep philosophical questions, variants of which have been debated for centuries. For example, the problem of determining the inverse probability of an event was introduced by Thomas Bayes (1701-1761) who demonstrated that the conditional (posterior) distribution can be determined by combining prior beliefs with available empirical evidence. In the 20th century, both J.M. Keynes (1883-1946) and Frank Knight (1885-1972) advanced different interpretations of the notion that variation in future outcomes is a combination of a measurable component, risk, and an unmeasurable component, uncertainty. This

distinction is effectively muted if time reversible ergodic processes are employed, as in modern Finance.

Knight and Keynes were both struggling with different facets of the impact that randomness has on economic activity. When trying to make sense of the difference between *ex ante* and *ex post* distributions, their seemingly arcane ideas still have considerable relevance. Knight worked within the tradition of neoclassical economics, seeking to explain how economic profits can arise from uncertainty in the process of production and distribution. Neoclassical economic theory depends on the assumption that outcomes are certain, if there is randomness then the probabilities of the possible outcomes are known with certainty. Issues associated with cases where the probabilities are uncertain treat all relevant outcomes as equally likely. In the absence of market imperfections, such as monopoly, neoclassical economic theory argues that economic profits will dissipate to zero and each of the factors of production will earn their value of marginal product. Knight questioned this *ex post* view, arguing that economic profits could still arise from the ability of entrepreneurs to resolve the *ex ante* uncertainty facing factors of production.

Frank Knight still has relevance, not because of his theoretical musings, but because of his interpretation of the randomness arising from commercial risks. Part Three of Risk, Uncertainty and Profit (1921), especially the chapters on “The Meaning of Risk and Uncertainty” and “Structures and Methods for Meeting Uncertainty”, contain many insights. For example, Knight discusses the application of “the principle of insurance” to “business hazards”. After recognizing the wide divergence of insurable risks, from life to fire to marine to theft and burglary, Knight concludes (p.252): “The possibility of ... reducing uncertainty by transforming it into a measurable risk ... constitutes a strong incentive to extend the scale of operations of a business establishment. This fact must constitute one of the important causes of the phenomenal growth in the average size of industrial establishments which is a familiar characteristic of modern life”. Knight also clearly recognizes “specialization” in activities which isolate the “true uncertainty” in business risk including “organized speculation as carried on in connection with produce and security exchanges” (p.257).

From the perspective of equity security valuation, it is possible to extend *Knight’s interpretation of commercial risks* (e.g., p.226) to read like the following: ‘An investor is considering the advisability of increasing the percentage of the portfolio allocated to a certain common stock. He figures more or less on the proposition, taking account as well as possible the various factors impacting the stock price that are more or less susceptible to measurement, but the final result is an “estimate” of the probable outcome of the future common stock price. What is the “probability” or error in the judgment? It is manifestly meaningless to speak of either calculating such a probability *a priori* or of determining it empirically by studying a large number of instances. The essential and outstanding fact is that the instance in question is so entirely unique that there are no others or not a sufficient number to make it possible to tabulate enough like it to form a basis for any inference of value about any real probability of the case we are interested in.’

Keynes, Uncertainty and the Stock Market¹⁸

Following Knight, risk is associated with objectively measured probabilities. This applies to cases where the *ex post* sample path for the random variable provides an accurate estimate of the

parameters of the *ex ante* distribution. Being associated with cases where the *ex post* and *ex ante* distributions differ, uncertainty requires subjective probability assessments. The economic rents to business ownership arise from correctly anticipating uncertain outcomes. While Knight struggled with the notion of “true uncertainty”, he is clear that “risk” which is objectively measurable is also insurable and, as such, cannot be a source of economic profit. Growth in markets and firm size will foster the transformation of uncertainty into risk, providing for a reduction in true uncertainty over time. This vision based on the production of goods contrasts markedly with the vision of J.M. Keynes where the increased liquidity provided by the growth in equity markets will exacerbate the impact of uncertainty on equity security valuation and, as a consequence, hinder economic growth. “For it is not sensible to pay 25 for an investment of which you believe the prospective yield to justify a value of 30, if you also believe that the market will value it at 20 three months hence” (Keynes 1936, p.155). Seeming conflict between Knight and Keynes on the correct interpretation of risk and uncertainty can be traced to the context used to capture the basic notions. Knight was concerned about the role of the entrepreneur in resolving the uncertainty in commercial ventures. In this case, the growth in goods markets will temper uncertainty. In contrast, Keynes was concerned about the implications of uncertainty in the equity valuation process where the enhanced liquidity associated with the growth of equity markets will increase market instability.

The General Theory of Employment, Interest and Money (1936) is a difficult book to read, quite untidy and poorly written. Keynes proposes “not one, or two, but three or four ‘models’ of the workings of a modern economy” (Blaug 1978, p.682). Of particular interest to the history of equity security valuation is Chapter 12 of The General Theory, a largely self-contained essay on “The State of Long Term Expectation”. In this chapter, Keynes is concerned with *the social consequences of instability in stock markets*, arguing for government intervention to offset inherent deficiencies. The core of the argument revolves around an examination of the process by which expectations are formed in financial markets. Due to an excess bias towards maintaining liquidity, expectations in financial markets are focused on near-term prospects (p.157): “Investment based on genuine long-term expectation is so difficult today as to be scarcely practicable”. The importance of the book lies in the substance of certain arguments, who was making those arguments and when the book was presented, i.e., during the stagnation following the economic collapse of the early 1930's.

Many ideas are presented in The General Theory, some seemingly off-the-cuff. Such is the case with Chapter 12. Some of the observations are insightful, for example (p.154-5):

It might be supposed that competition between expert professionals, possessing judgment and knowledge beyond that of the average private investor, would correct the vagaries of the ignorant individual left to himself. It happens, however, that the energies and skill of the professional investor and speculator are mainly occupied otherwise. For most of those persons are, in fact, largely concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with forecasting changes in the conventional basis of valuation a short time ahead of the general public. They are concerned, not with what an investment is really worth to a man who buys it “for keeps”, but with what the market will value it at, under the influence of mass psychology, three months or a year hence. Moreover, this behaviour is not the outcome of a wrong-headed propensity. It is an inevitable result of an investment market organized (to concentrate resources upon the

holding of “liquid” securities). For it is not sensible to pay 25 for an investment of which you believe the prospective yield to justify a value of 30, if you also believe that the market will value it at 20 three months hence.

In true Keynesian fashion, this is shortly followed with the rhetorical statement (p.155): “The social objective of skilled investment should be to defeat the dark forces of time and ignorance which envelop our future”. The source of these “dark forces” is the uncertainty confronting players in the equity security markets.

What Keynes develops in Chapter 12 is a model where the heterogenous, subjective expectations of market participants leads to a financial market equilibrium in which prices are “subject to waves of optimistic and pessimistic sentiment, which are unreasoning and yet in a sense legitimate where no solid basis exists for a reasonable calculation” (p.154). The implication is that prices can change “violently as the result of a sudden fluctuation of opinion due to factors which do not really make much difference to the prospective yield”(p.154). Not only will prices be considerably more volatile than is justified by the long term expectation, prices will typically depend more on “*what average opinion expects average opinion to be*” rather than on valuations which capture “the prospective yield of an investment over a long term of years” (p.155). Prices are determined more by “*speculation ... the activity of forecasting the psychology of the market*” than by “*enterprise ... the activity of forecasting the prospective yield of assets over their whole life*” (p.158).

Though both Keynes and Knight have been duly recognized for examining the role of uncertainty on random economic outcomes, the predictions made about *the impact of uncertainty* on the evolution of financial markets are at odds. Knight argues that increasing the scale of activities and the liquidity of markets will permit firms to increasingly specialize and manage risks, permitting a reduction in the scope of uncertainty. Keynes (1936, p.158) has the opposite view: “As the organization of investment markets improves, the risk of the predominance of speculation does, however, increase.” For Knight, the impact of uncertainty is dissipating over time; for Keynes, it is increasing as equity security markets get more liquid. Even among those willing to recognize the significance of ‘true uncertainty’, agreement over the implications of uncertainty are difficult to obtain. Yet, the implications of uncertainty for ‘real time’ equity security valuation remain. The key point to take away at this point is that the handling of true uncertainty is an essential element in equity security analysis.

Early in chapter 12 (p.149) Keynes hints at a fundamental pricing model which can be used to value equity securities: “The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. Our knowledge of factors which will govern the yield of an investment some years hence is usually very slight and often negligible ... those who seriously attempt to make any such estimate are often so much in the minority that their behaviour does not govern the market.” In this context, the market is “the Stock Exchange” which “revalues many investments every day” (p.151). After observing that, due to the separation of ownership from management, the price of shares on the Stock Exchange will be determined by stock traders rather than by the “professional entrepreneur” who has direct knowledge of the underlying business, Keynes asks a key question (p.151): “How then are these highly significant daily, even hourly, revaluations of existing investments carried out in practice?” The answer provided to this question encompasses the philosophical foundations of the impact that uncertainty has on the human condition.

McKenna and Zannoni (1993, p.400-1) capture the basic issue where equity valuation decisions are concerned: “situations may arise in which individuals may not have any knowledge at all concerning the probability distribution function of future outcomes.” Yet, decisions have to be made and “economic agents must create alternative mechanisms that enable decisions to be made in the face of uncertainty.” Confronted with uncertainty, the crux of the decision making process relies on **convention**. In a remarkable precursor to the modern EMH, Keynes observes that in the face of uncertainty the investor accepts the prevailing evaluation of market prices (p.152): “... the existing market valuation, however arrived at is uniquely *correct* in relation to our existing knowledge of the facts which will influence the yield of the investment, and that it will change in proportion to changes in this knowledge”. In following this convention, “the only risk (an investor) runs is that of a genuine change in the news *over the near future*, as to the likelihood of which he can attempt to form his own judgment” (p.153).

C. *The Efficient Markets Hypothesis*

Basic Insights

INSERT Philosophy of Investing (417_Phil.pdf) Figure 1.2-b

As illustrated in Figure 1.2.b, the degree of belief in the efficient markets hypothesis (EMH) is a philosophical position that divides the various possible approaches to equity security valuation. Those who are the strongest believers in the EMH also adopt the ‘scientific’ approach to equity security valuation and argue strongly for optimal diversification strategies such as two fund separation. Despite a number of apparent setbacks on the empirical front, ***strong proponents of the EMH continue to be unmoved***. For example, after reviewing the accumulating evidence of regularities and anomalies in stock prices, Malkiel (2003, p.60) still claims: “The evidence is overwhelming that whatever anomalous behavior of stock prices may exist, it does not create a portfolio trading opportunity that enables investors to earn extraordinary risk adjusted returns.” Equity markets are not perfect at determining prices but the mis-pricing does not provide systematically exploitable trading opportunities. In such a philosophical world, there is only value in the pursuit of optimal diversification; attempts at making gains through predicting returns will ultimately be futile.

The roots of the EMH are as murky as the hypothesis itself. There are hints of the EMH as far back as de la Vega with both J.M. Keynes (1936, ch.12) and Irving Fisher (1930, ch.13) having well developed notions that could qualify as precursors of the EMH. The reference to ‘efficiency’ is misleading, as this term is also used to refer to a number of related concepts. For example, there is the ‘efficient frontier’ associated with the Markowitz optimization model and there is ‘Pareto efficiency’ associated with the properties of a perfectly competitive equilibrium in theoretical microeconomics. As presented by Fama (1970, 1976) and by numerous others, the efficient markets hypothesis is related to information processing. “An efficient capital market is a market that is efficient in processing information. The prices of securities observed at any time are based on the ‘correct’ evaluation of all information available at that time. ***In an efficient market, prices ‘fully reflect’ available information***” (Fama 1976, p.133, emphasis added).

Perhaps the defining moment for the EMH came with Samuelson (1965). By proving that

"properly anticipated prices fluctuate randomly", Samuelson brought the theory of security pricing into congruence with a myriad of statistical results about security prices that had been developing since the early 1950's. An early example of this work, Kendall (1953) found that stock prices had no identifiable pattern. *Prices evolve in a random fashion*, with no predictable component. More precisely, successive changes in security prices were independent of each other. More recent research, e.g., Lo and MacKinlay (1988), has found some evidence of positive serial correlation in common stock returns over short intervals. In some cases, the evidence is only weak and does not extend much beyond weekly sampling intervals.¹⁹ However, using CRSP value weighted and equally weighted indexes, Campbell et al. (1997) provide somewhat stronger evidence of generally positive serial correlation for daily, weekly and monthly stock returns (1962-1994). Lo and MacKinlay (1999) extend these results even further. This line of research on the randomness properties of stock prices speaks to one form of the EMH, whether current prices fully reflect the information in past prices. In this form, the EMH is often reformulated as the 'random walk hypothesis', e.g., Malkiel (1990).

Different versions of the EMH are associated with different possible types of information sets which are 'fully reflected' in security prices. Three versions are usually identified: *weak* form, where the information set is the past history of the security price (sometimes this form includes all market generated data such as up/down volume, number of 52 week highs and lows, etc.); the *semi-strong* form, where the information set is publicly available information, such as firm accounting data, newspaper articles, analysts recommendations and so on; and, *strong* form, where the information set is all publicly and privately available information, including insider information. If the EMH is correct, then it is not possible to achieve abnormal returns from trading on the available information set. When the weak form information set is defined to be a subset of the semi-strong form which is also a subset of the strong form, it follows that a strong form efficient market is also semi-strong form and weak form efficient. Similarly, it does not follow that a weak form efficient market will be semi-strong or strong form efficient. As will be discussed shortly, because the EMH is a joint hypothesis, rejection of any version of the EMH could be due to a rejection of the return generating model rather than the EMH.

The focus on information processing provides a direct connection between security pricing and the evaluation of a conditional expectation. Specifying the security price, or some appropriate transformation of the security price, as the conditional expectation evaluated with respect to a particular conditioning information set makes a direct connection to the theory of stochastic processes, including results on *martingale* processes. Under the assumption of ergodicity, the connection to stochastic processes provides a structure for the statistical testing of hypotheses about security prices. The connection to martingale theory can be used to motivate the correspondence between trading of securities and gambling. More precisely, a martingale process can be identified with the *fair game* model that Feller (1957, p.233-5) and many others use to motivate the law of large numbers. In turn, closer examination of the fair game model is useful in establishing a precise connection between gambling theory and the security pricing models used in Finance.

Martingale theory has been something of a revolution in a number of areas of mathematics and mathematical statistics, including the solving of partial differential equations.²⁰ The most basic definition of a martingale is (Karlin and Taylor 1975, p.238):

Definition: The Elementary Martingale Process

A stochastic process $\{X(t): t = 0, 1, 2, \dots\}$ is a martingale if, for $t = 1, 2, \dots$:

- i) $E[|X(t)|] < \infty$
 - ii) $E[X(t+1) | X(0), X(1), X(2), \dots, X(t)] = X(t)$
-

Condition i) is a restriction on the probability distribution from which the $\{X(t)\}$ can be drawn, the unconditional expected value of $X(t)$ has to be finite. This rules out processes with infinite mean values, such as the Cauchy process, but does admit processes with infinite variance, such as the stable processes with characteristic exponent between one and two. Condition ii) is the martingale property which says that, given the information on the $\{X(t)\}$ up to time t , the best prediction of the next $(t+1)$ observation is the current (t) observation.

The conditioning information set can be expanded considerably to be, say, $\{Y(0), Y(1), Y(2) \dots Y(t)\}$ where $\{Y(t)\}$ is some stochastic process or set of stochastic processes which could include $\{X(t)\}$. In this case ii) can be expressed as $E[X(t+1) | Y(0), Y(1), Y(2) \dots Y(t)] = X(t)$, i.e., $\{X(t)\}$ is a martingale with respect to conditioning information set $\{Y(t)\}$, where $X(t)$ is a function of $\{Y(0), Y(1), Y(2) \dots Y(t)\}$.²¹ Within this framework, the strong, semi-strong and weak form versions of the efficient markets hypothesis can be represented by expanding the appropriate conditioning information set associated with the conditional expectation. For the weak form, the past history of prices is the conditioning information set; for the semi-strong form, the information set is potentially all publicly available information; and, for the strong form, the information set is all available information, public and private. However, while this interpretation of the EMH is appealing, a substantial amount of development is required. A useful starting point for this development is the fair game model.

The **connection of a martingale with a fair game arises** when $\{X(n)\}$ is the amount of money that a player has after $n \in \{1, 2, \dots, N\}$ trials when playing a fair game. The game involved here is a repeated trial of some game of chance, e.g., throwing dice or flipping a coin. Following Feller, the fair game model requires two key assumptions: that the gambler has unlimited capital, i.e., no amount of loss can force termination of the game; and, that the total number of trials (N) is fixed at the start of the game and independent of the way the game develops, i.e., the gambler cannot terminate the game at a favorable point. The first assumption prevents the game being reduced to the gambler's ruin problem. The second assumption prevents the game from being an optional sampling problem where the gambler has the ability to terminate the game after a run of good luck.

Given these two assumptions, the **definition of a fair game** follows by letting μ be the expected payoff from a winning gamble where $\mu = E[X(k)] < \infty$. Letting γ = the cost (entrance fee, ante) required to undertake a single trial of the game, then it is often said that a "fair" game occurs when $\gamma = \mu$, though Feller wrangles at the use of this name because it is still possible for $\gamma = \mu$ and for the accumulated winnings to be positive or negative. For a game played to the fixed termination time, the expected winnings would be $S(N) = X(1) + X(2) + \dots + X(N)$. Observing that the cost of achieving these winnings is $N\gamma$, then the net gain from playing the game would be $S(N) - N\gamma$. Recognizing that the law of large numbers says $S(N) - N\mu$ will become small as the number of trials

gets large, it follows that when $\gamma = \mu$ the net gain or loss from playing the game will be small relative to N as N gets large. As Feller observes, it is possible for the net gain or loss of a fair game to be non-zero as long as the gain or loss is small when N gets large.

To see the connection between the fair game model and a martingale, consider the expectation of $S(n+1)$ given the information on accumulated winnings up to time n :

$$E[S(n+1) \mid S(n), S(n-1) \dots S(0)] = E[S(n+1) \mid X(n), X(n-1) \dots X(0)] = S(n)$$

This result captures the essence of Feller's (1966, p.211, emphasis added) observation about the fair game model: "The idea of a fair game is that the **knowledge of the past should not enable the gambler to improve on his fortunes**. Intuitively, this means that an absolutely fair game should remain absolutely fair under any system of gambling, that is, under rules of skipping individual trials." (For example, betting rules in a fair game such as 'bet on tails after k heads in a row occur' will not be successful.) The fair game model, the martingale process, and the expected value conditional on the past history of the random variable all come together to provide a foundation for the weak form of the efficient markets hypothesis. In the weak form version, the securities market is being modeled as a fair game.

While it may be intuitively appealing to model the weak form of the EMH by taking the current price for a security to be a martingale with respect to the past history of security prices, the actual formulation of the hypothesis is more complicated. For example, consider the price of a non-dividend paying stock where: $P(t+1) = (1 + R(t+1)) P(t)$. It follows that this price process will not follow a martingale unless expected returns are zero. More precisely, the price process will follow a submartingale:

Definition: The Submartingale Process

A stochastic process $\{X(t): t = 0, 1, 2, \dots\}$ is a submartingale with respect to $\{Y(t): t = 0, 1, 2, \dots\}$ if, for $t = 1, 2, \dots$:

- i) $E[X(t)^+ \mid Y(0), Y(1), \dots, Y(t)] < \infty$ where $X(t)^+ = \max[0, X(t)]$
 - ii) $E[X(t+1) \mid Y(0), Y(1), Y(2) \dots Y(t)] \geq X(t)$
 - iii) $X(t) = f[Y(0), Y(1), \dots, Y(t)]$
-

Basically, a submartingale is a martingale with the \geq replacing $=$ that applies to the martingale definition, condition ii). It follows that $E[P(t+1) \mid Y(0), Y(1) \dots Y(t)] \geq P(t)$ whenever $E[R(t+1) \mid Y(0), Y(1) \dots Y(t)] \geq 0$, i.e., prices for non-dividend paying securities follow a submartingale. This result explains the reliance on returns, as opposed to prices, in testing asset pricing models.

To see the statistical advantages of using returns instead of prices observe that if $R(t+1) = (P(t+1) - P(t))/P(t)$ then, evaluating the expectation conditional on information available at $t=0$, $E[R(t+1)] = (E[P(t+1)] - P(t))/P(t)$. Observing that $R(t) = (P(t) - P(t-1))/P(t-1)$, then the requirement that security returns follow a martingale becomes $E[R(t+1)] = (E[P(t+1)] - P(t))/P(t) = R(t) = (P(t) - P(t-1))/P(t-1)$.

$1)/P(t-1)$. This reduces to the condition that $E[P(t+1)]/P(t) = P(t)/P(t-1)$. (By taking logs, this condition can be formulated in terms of the log differences in prices.) It follows that, if the return generating process is ergodic, then ***it is returns, not prices, that follow a martingale***. Various generalizations of this basic result have been explored. Recognizing that the return to holding a security is associated with compensation for invested capital, the relevance of using returns instead of prices may not extend to futures and forward contracts that, ignoring the opportunity cost of margin funds, do not require a cash outflow when created.

Because of the key role that empirical testing plays in the methodology of modern Finance, it becomes imperative to identify a procedure or rationale for converting the stochastic price process to a martingale, if only because of the importance that martingale difference sequences can have in testing theory, e.g., Hendry (1995, p.733-8). The ***theory of classical hypothesis testing*** involves the laws of large numbers and the central limit theorem, results that rely on iid or, with appropriate adjustments, independent random variables. These results can be generalized using martingale limit theory that, in turn, depends on the properties of martingale difference sequences. These generalizations permit the assumption of independence to be relaxed to where the random variables are uncorrelated. Recognizing that sums of independent (and iid) random variables, expressed as deviations from the mean value, are martingales, it follows that the classical statistical results can also be formulated and derived using the properties of martingale difference sequences.

A ***martingale difference sequence*** is constructed by differencing a martingale process. (In time series econometrics, martingale differences are referred to as "innovations".) More precisely, if $\{X(t)\}$ is a martingale with respect to $\{Y(t)\}$, then the martingale difference process $\{Z(t)\}$ can be constructed by defining $Z(t) = X(t) - X(t-1)$. It follows that $\{Z(t)\}$ has the property that $E[Z(t+1) | Y(0), Y(1) \dots Y(t)] = 0$. The analytical advantages of the using the martingale difference process is that standard results such as versions of Chebychev's inequality and the laws of large numbers can be derived for $\{X(t)\}$ with finite second moments, permitting asymptotic distributions to be derived for cases where the independence assumption is relaxed to require only uncorrelated random variables. The asymptotic distribution theory follows from the associated central limit theorem for the martingale difference sequence. (A fair game can be expressed as a martingale difference sequence where $Z(t) = E[S(N+1) | X(0), X(1) \dots X(N)] - S(N)$.)

Testing the Efficient Markets Hypothesis

From a testing perspective, it is essential to recognize that the EMH necessarily involves a ***joint hypothesis***. Any empirical test of the EMH, a hypothesis that is concerned with the efficient processing of information into market prices, is also a test of the model being used to generate returns (prices). Empirical rejection of the EMH could be due to a rejection of the model for the return generating process, to a rejection of the EMH, or both. To see this, observe that, if the EMH is true, then it is not possible to generate (positive) abnormal returns from trading on the strategies exploiting the relevant information set. At any time t , this requires some hypothesis about the return generating process for $E[R(t+1) | Y(0), Y(1) \dots Y(t)]$ in order to determine when a return is abnormal, i.e., where the actual return minus the predicted return is positive, $R(t+1) - E[R(t+1) | Y(0), Y(1) \dots Y(t)] > 0$. Where applicable, the trading strategy is associated with the model used to specify $R(t+1)$ while $E[R(t+1) | Y(0), Y(1) \dots Y(t)]$ is the expected return that the return generating model indicates

is appropriate.

Following Fama (1976), *the range of possible return generating models* include: simple models, where the only restriction is that expected returns are positive; models of expected return resulting in the restriction that expected returns are constant over time, i.e., the conditional and unconditional means are equal; more sophisticated models that require expected returns to conform to the “market model” (see sec. 3.2); and, models that require expected returns to “conform to a risk return relationship”. In this classification, there is a progressive nesting of the model types. For example, the models that imply expected returns are constant over time also impose the restriction that expected returns are positive. Similarly, requiring expected returns to follow the market model is imposed when a time series of observations on $\{R(t+1) - E[R(t+1) | Y(0), Y(1) \dots Y(t)]\}$ is used to test market efficiency. Because expected returns are associated with the conditional distribution, the market model is used to update the conditional expectation to account for the market risk inherent in the strategy. Tests of market efficiency based on constancy of the expected return are typically based on an information set that only considers the history of past returns.

While accurate processing of information is a noble goal for a security market, there are real difficulties in specifying tests of the EMH. Testing of efficiency also requires the ‘correct’ evaluation method to be specified. Hence, the EMH is inherently a joint hypothesis of efficiency and a return or profit generating model. To this end, Jensen (1978, p. 96) developed a more empirically testable definition of efficiency: “A market is efficient with respect to information set θ_t if it is impossible to make economic profits by trading on the basis of information set θ_t ”. Since economic profits are risk-adjusted returns after deducting transaction costs, Jensen’s definition allows market efficiency to be tested by considering the net profits and risk for trading strategies employing the information set θ_t . Jensen’s definition is further extended by Timmermann and Granger (2004, p. 25) where a more precise statement is given as to how the information variables in θ_t are used to generate forecasts: a market is efficient with respect to information set θ_t , a set of search technologies S_t and a set of forecasting models M_t if it is not possible to make economic profits by trading on the basis of signals produced from a forecasting model in M_t , defined over predictor variables in the information set θ_t and selected using a search technology in S_t .

While definitions of EMH stress the relevance of trading rule performance, some empirical tests examine the time series of the abnormal returns, other tests examine the properties of the sum of abnormal returns over some time period (cumulative abnormal returns). For example, consider empirical tests of the weak form EMH based on the significance of serial correlation coefficients of returns, e.g., Lo and MacKinlay (1988, 1999). If there are identifiable trends in returns, then time series models, such as the ARMA(p,d,q) models popularized by Box and Jenkins (1970), could be used to predict next period’s return from the history of current and past returns, including previous errors in forecasting past returns. The ARMA model would provide an atheoretical return generating model. However, if it was possible to use ARMA models to predict security returns, then under the EMH rational traders would seek out the profit opportunities by fitting the time series model and initiating a price adjustment process that would eliminate the predictable trends. If returns are not predictable using ARMA models, then returns are serially uncorrelated “white noise”. Hence, a test of weak form efficiency is that returns be serially uncorrelated.

In general, the return generating model is used to determine if the return from the trading strategy is actually abnormal, e.g., accounts for systematic risk and provides an adequate return on invested

capital. Given that the return generating model predicts that returns follow a martingale, empirical tests can be conducted by examining the statistical properties of $R(t+1) - E[R(t+1) | Y(0), Y(1) \dots Y(t)] = R(t+1) - R(t) = Z(t+1)$. Recognizing that the null hypothesis of no abnormal returns requires that $E[Z(t)] = 0$, the EMH can be tested by determining whether $E[Z(t+1) | Y(0), Y(1) \dots Y(t)] = 0$, i.e., the tests can be conducted on the martingale difference sequence $\{Z(t)\}$. Which specific version of the EMH is tested depends on the information set that is used in the return generating model to determine $E[R(t+1) | Y(0), Y(1) \dots Y(t)]$. In practice, the econometric approach selected does not directly employ the martingale approach but, rather, will use an approach that possesses the martingale property in addition to imposing additional conditions. For example, tests of the weak form EMH can use a random walk model instead of a martingale.

The random walk or "unit root" process is a useful econometric model for testing the EMH, if only because of the substantial statistical theory that has been developed for this model. Different variations of the random walk are available. The basic random walk model is specified: $X(t+1) = \mu + X(t) + u(t+1)$, where μ is the constant 'drift' in the process and the $u(t)$ is a random variable with a conditional mean of zero. Different versions of **the random walk model** can be formulated depending on the process being 'driftless' ($\mu = 0$), whether $\{u(t)\}$ is assumed to be iid (σ_u is constant over time) or independent (σ_u is not constant over time) or uncorrelated (requires only that $E[u(t)u(t+1)] = 0$ and allows for higher moments of the distribution to be dependent). A specific distributional assumption such as normality may also be imposed on $\{u(t)\}$ for testing purposes. Because of the failure to distinguish the specific form of the model being used, the random walk hypothesis has been the subjected of considerable misinterpretation.

Early tests of the statistical properties of security prices, such as the studies in Cootner (1965), often employed the random walk model. By taking an expectation conditional on the information available at $t=0$ it possible to show that the driftless random walk obeys the martingale property, i.e., $E[X(t+1) | Y(0), Y(1) \dots Y(t)] = X(t)$. But if returns are positive, modeling the statistical behavior of security prices with a driftless random walk is incorrect. If returns are assumed to be positive and constant than **a random walk with drift is required**. If returns are only constant then it is possible that the estimate of the drift may be biased because the return is time varying. In most cases, a more appropriate formulation is to specify the log of prices as following a driftless random walk: $\ln[P(t+1)] = \ln[P(t)] + u(t)$. Allowing $u(t)$ to be only independent instead of iid allows for the time varying volatility that is a commonly observed characteristic of security returns.

In general, there are a myriad of possible methods of testing the EMH. Because of the pervasive use of market efficiency in specifying asset pricing models, tests of such models are also indirectly tests of market efficiency. More immediate **tests of the semi-strong form** can be examined using event-study methodology, e.g., Campbell et al. (1997, ch. 4). Other tests use grouping methods and test for significant differences between groups using techniques such as regression analysis or variance ratio tests, e.g., comparing the returns from the month of January with other months or from the returns from low capitalization firms with the returns from firms not in that group. It is even possible to use anecdotal studies, e.g., to examine the investment performance of successful individual investors such as Warren Buffett or Li Ka Shing or Ben Graham to identify heuristic characteristics not associated with lucky guessing or high initial wealth levels.

Whatever the methodology selected, the acid test of market efficiency is the requirement that investors cannot make profits from exploiting the relevant information set after deducting all the

costs of trading and making the appropriate adjustments for risk. This means that *tests of market efficiency have to be, either directly or indirectly, related to trading rules*. In most situations, it is possible to account for the risk in a trading rule by discounting the expected profit at an interest rate that is sufficient to account for the risk. The appropriately discounted expected profit can then be compared to the initial capital required to implement the strategy. Costs of trading are incorporated in the trading rule. There are various sources of trading costs such as commissions, bid/offer spreads, asynchronous prices and ‘shoe leather’. It is not enough to show that the relevant information is not fully incorporated in prices, e.g., by estimating a statistically significant serial correlation coefficient for returns. It is also necessary to demonstrate that it is possible to generate risk adjusted net profits from the market’s slow interpretation of the relevant information.²²

Evidence of Anomalies

For Elton and Gruber (1984, p.379): “The efficient market hypothesis had a strange beginning.” This is because the initial development of the EMH did not follow the prescribed ‘scientific’ approach where a theory is initially suggested, followed by extensive empirical testing to see if the theory describes reality better than previously accepted theories. The EMH developed in the opposite way. Initially, extensive empirical tests were undertaken that demonstrated: “contrary to popular belief, certain types and ways of using information (usually past prices) did not lead to superior profits”. *The EMH was developed to explain the empirical findings*. This description captures many essential features of the process by which knowledge is ‘created’ in modern Finance. The epistemology that is prescribed in modern Finance requires that a theory or model is “suggested” using logical deduction from stated assumptions. “Extensive tests” of the model are then conducted to establish empirical validity. If the model is supported by the data it becomes part of received theory until a “better”, more empirically descriptive model is developed. If the model is rejected, the process of logical deduction is iterated until a model is identified that explains the ‘stylized facts’.

In contrast to the prescribed epistemology, the EMH developed inductively. Initial results, such as those presented in Fama (1965) and Cootner (1965), provided ‘strong empirical evidence’ that changes in security prices, particularly *common stock prices, were random or, at least, random enough*. The empirical tests usually involved an examination of the serial correlation coefficients for the difference in the log of prices though, in some cases, the serial correlation for the difference in prices was examined. Recognizing that serial correlation tests can be affected by a small number of large observations (outliers), some studies also provided results for runs tests, e.g., Fama (1965). Though such tests typically have low power to reject the null hypothesis of random behavior, runs tests assess whether there are an inordinate number of positive or negative changes that occur in sequence. Results from the runs tests were much as with the serial correlation tests, daily time intervals indicated a slight positive relationship with longer intervals appearing random.

Serial correlation and runs tests only examine statistical properties without making a direct connection to the evaluation of trading rules designed to exploit the potential profitability of non-random behavior. This issue was addressed in other early tests, such as those of Fama and Blume (1966), that compared *the profitability of filter rules* to buy-and-hold strategies. The filter trading rules examined in the early studies were relatively simple. For example, a k percent filter rule would

be: if the price of a security rises k percent, buy the security and hold it until it drops k percent from a subsequent high. At that time the security is sold and a short position is established and held until the price rises k percent at which time the short is covered and a long position is again established. This process is continued until the end of the trading horizon is reached at which time the profits from the filter rule are compared with the return from buying the security at the beginning of the horizon and holding it until the end.

Early tests of filter rules generally found that buy-and-hold was at least as profitable as pursuing a **filter rule trading strategy**. However, when k was small and the trading intervals were for daily or intra-daily moves then there was sometimes a small advantage in favor of the filter rule. Because small $k\%$ filter rules generate a large number of trades, these small profits would aggregate into sizable total profits. Fama (1976, p.142) discusses this evidence: “When one takes account of even the minimum trading costs that would be generated by small filters ... their advantage over a buy-and-hold strategy disappears”. At the time, this was taken to be conclusive evidence against the profitability of technical analysis-- the use of market generated data, such as prices and volume, to forecast future security price movements. Over time, the conclusion that technical analysis is a profitless exercise has become less certain to the point where Park and Irwin (2007, p.804) find: “the number of studies that identify positive technical trading profits is far greater than the number of studies that find negative profits.”

The early evidence on the serial correlation of security returns (price changes), runs tests and filter rules facilitated an inductive process that led to the formulation of the hypothesis that the observed **randomness is the outcome of efficient processing of information** by the securities market. Though the use of induction in hypothesis development is an essential element of the scientific approach, the economic positivism expounded in modern Finance prescribed the initial development of a theory using logical processes, confronting the theory with empirical evidence and iterating as appropriate. Though this did not happen with the EMH, by the time of Fama (1976, p.142) the inconsistency was largely ignored: “no null hypothesis, such as the hypothesis that the market is efficient, is a literally accurate view of the world. It is not meaningful to interpret the tests of each hypothesis on a strict true-false basis. Rather, one is concerned with testing whether the model at hand is a reasonable approximation to the world, which can be taken as true, at least until a better approximation comes along.” It seems that, through the empirical analysis of selected data, an agreeable method for determining when “a better approximation comes along” is available. The possibility that ideas become entrenched and complicated issues cannot be resolved empirically is not part of the philosophy: “What is a reasonable approximation depends on the use to which the model is to be put.”

Fama (1976, p.142) uses the example that, since traders cannot use filters to beat buy and hold, it is reasonable for them to assume that traders would behave as if the market were efficient, at least for the purposes of trading on information in past prices. Yet, despite the ‘overwhelming’ academic evidence that stock markets are efficient with respect to the information available in past prices, **technical analysts continue to flourish** in the equity securities industry. Oddly enough, a detailed empirical study of the use of technical analysis by stock market participants is unavailable, there is only anecdotal evidence about the widespread use of technical analysis, e.g., Lo and Hasanhodzic (2009). There is considerably more evidence that the use of technical analysis is widespread in other areas of the financial markets. In the related commodity and foreign exchange markets, where the

pool of traders is much smaller and easier to survey than the stock market, studies examining the use of technical analysis stretch back to Smidt (1965). In foreign exchange markets, a number of surveys find about 30% to 40% of foreign exchange traders employ technical analysis to forecast exchange rates up to a 6 month horizon (e.g., Taylor and Allen 1992; Cheung and Chinn, 2001).

INSERT Park-Irwin Table 3 (park-Irwin_Table-3.pdf) (Table 1.3.a)

Park and Irwin (2007) divide studies of technical analysis into “*early studies*” and “*modern studies*” with Lukac et al. (1988) being selected as the dividing line. This division seems to be roughly reflected in the variety of technical trading systems in use by practitioners. For example, Billingsley and Chance (1996) find about 60% of commodity trading advisors rely heavily or exclusively on computer-guided technical trading systems. The ability to use such systems increased significantly with the availability of desktop computing power. As reflected in Table 1.3.a, this enhanced computing power also facilitated a substantive increase in the statistical sophistication of both the technical trading rules being tested, such as neural network or nearest neighborhood regression from non-linear programming, and the procedures being used to evaluate the trading rules, such as the “reality check bootstrap” (White 2000) or the genetic programming technique (Koza 1992) used to assess the degree of ‘data snooping’. As indicated in Table 1.3.b, there has also been a modern resurgence in studies of the technical trading rule performance.

INSERT Park-Irwin Table 1 (park-Irwin_Table-1.pdf) (Table 1.3.b)

Over time, an increasing number of empirical studies have presented various types of evidence in favor of rejecting the null hypothesis of the EMH. Traditionally, these results are classified according to whether it is the weak form or semi-strong form versions of EMH that has been rejected. Such *rejections of the EMH are classified as “anomalies”* associated with the particular type of information considered. In contrast, rejections of the strong form version of EMH are not considered as anomalous where trading on insider information is the relevant information variable.

As the weak form tests relate to ‘technical analysis’ and the semi-strong form tests relate to ‘fundamental analysis’, the empirical results for the two versions are typically considered separately, though there are good reasons to try to reconcile the results of the two versions. Rejections of the weak form include the January effect, as well as other calendar and seasonality effects such as the day-of-the-week effects, the weekend effect and the daylight-savings-time effect. Rejections of the semi-strong form include the small firm effect, the book-to-market effect, the neglected firm effect and the P/E ratio effect.

INSERT Table 2 Park and Irwin (2007) (park-Irwin_Table-2.pdf) Table 1.3.c

By introducing a distinction between early and modern studies, Park and Irwin (2007) provide another approach to classifying empirical studies of EMH. Though only concerned with the profitability of technical analysis, a similar dichotomy could be developed for EMH studies of fundamental analysis. Park and Irwin identify a number of *limitations in the early studies of technical analysis*: a small number of trading systems were usually considered, often only one or

two trading rules; statistical significance tests were not conducted on technical trading returns²³; the riskiness of technical trading rules was often ignored; the performance of trading rules was reported in terms of an ‘average’ across all trading rules, rather than best-performing rules or individual securities, e.g., Fama and Blume (1966); and, some of the substantial technical trading profits found in early studies are attributable to data snooping (selection) biases. A number of fascinating studies have appeared since Lukac et al. (1988) that address the limitations of the early studies (see Table 1.3.c).

Summarizing the results of ‘modern studies’ of technical trading rules applied to stock markets, Park and Irwin (2007) find *conflicting, sample dependent evidence*. For US stock markets, technical trading rules appear to be economically profitable through the late 1980s, but such rules fail to be profitable thereafter (Bessembinder and Chan 1998; Sullivan et al. 1999; Ready 2002). Similar results apply to stock markets in other developed countries. A number of studies find technical trading rules generated economic profits in emerging stock markets regardless of the sample periods considered (Bessembinder and Chan 1995; Ito 1999; Ratner and Leal 1999). Considerable interest in technical trading rules was created by Brock et al. (1992) which Park and Irwin describe as “one of the most influential works on technical trading rules”. Brock et al. (1992) find strong and consistently positive results for the forecasting power of technical trading rules, using a 90 year sample for the DJIA. The model-based bootstrap method is used to evaluate trading rule performance.

Because the EMH is a joint hypothesis, it follows that rejection of the EMH could be due to inadequate specification of the return generating process, rather than a violation of the accurate processing of information. An example of this is provided by the P/E ratio effect proposed by Basu (1977, 1983). The P/E ratio plays an important role in a number of the rules-of-thumb suggested by fundamental analysts, e.g., Graham (1949) suggests a criterion for buying a security is that the price does not exceed 20 times the average earnings over the previous 6 years (Oppenheimer 1981, p.9). Using a sample of NYSE stocks, Basu presented empirical evidence that *portfolios of low P/E stocks have higher average returns than portfolios of high P/E stocks*, after appropriate adjustment is made for systematic risk of the portfolios using the capital asset pricing model (CAPM). Is this result due to a violation of EMH or to the inadequacy of the CAPM to adjust for risk or both? Perhaps the result could be proxying for some other type of anomaly such as the small firm effect?

One characteristic of studies that reject EMH is the lack of persistence in such results. Of all the various effects, the *January or turn-of-the-year effect* – risk-adjusted returns are systematically higher in January than in other months – has had the strongest level of empirical support. As Haug and Hirschey (2006, p.78) claim: “After a generation of intensive study, the January effect continues to present a serious challenge to the efficient markets hypothesis.” Heston and Sadka (2008) generalize the January effect to the ‘seasonality effect’ where returns for a given stock are higher in the same calendar month each year, again claiming strong explanatory power for this effect in the cross section of stock returns. In addition to firms with a January seasonal, this extends the result to firms that have a systematically higher return in a month other than January, expanding the universe of trading rules beyond the narrow possibility of exploiting the once a year January effect.

Because it is a statistical result, there is no guarantee that the January effect will appear in any given year. In particular, *Sullivan et al. (2003, 2001)* is a ‘modern study’ of technical analysis that uses the bootstrap reality check methodology of White (2000) to examine the calendar frequency

rules designed to exploit calendar effects: the Monday effect, the holiday effect and the January effect. Using a 1897-1998 sample for the DJIA, Sullivan et al. are able to identify a best trading rule with a bootstrap reality check p -value of zero, indicating the trading rules significantly outperform a buy-and-hold strategy. However, when the sample is restricted to the most recent observations, 1987–1996, the best trading rule is changed and the return is statistically insignificant with a bootstrap reality check p -value of 0.98. Similar results are found for the S&P 500 futures data. Hence, Sullivan et al. (2003) find that it is premature to conclude that both technical trading rules and calendar rules outperform a buy-and-hold benchmark in the stock market. Dimson et al. (2001, p.136) provide further confirmation: “For US large-caps, there is no turn-of-the-year effect. Returns are not low in December, and January does not have the highest return, but ranks fifth.” Similar results are reported for the UK (if one “outlier” is removed).

Another example of an effect that appeared to be there but, in the end, appears not to be is the *small firm effect* – small firms have systematically higher risk-adjusted returns than large firms. This effect was initially proposed by Banz (1981) and Reinganum (1981). Despite considerable initial fanfare, Reinganum (1992) reexamines the empirical evidence and finds that small capitalization portfolios do outperform large capitalization portfolios, but this return behavior was volatile and reversible. Using a 1928-88 sample, Bhardwaj and Brooks (1993) find contrary evidence: small firm stocks underperform large firm stocks. It is possible the small firm effect is compounded by the January effect. Dimson et al. (2002, p.8) make the following observation about the size or small firm effect: “A frustrating feature of the size effect is that soon after its discovery the size premium went into reverse with smaller companies subsequently underperforming their larger counterparts. We show that this reversal was a worldwide phenomenon.”

Where does all this to-and-fro on the EMH lead? The epistemology of modern Finance suggests that, if the evidence of anomalies is correct, new hypotheses will be formed that are “a better approximation” to the world. However, such hypotheses would represent an assault on received knowledge. Academics who have invested large amounts of human capital in the ‘old theory’ would be faced with personal obsolescence and the battle lines would be drawn. Such is the case with the now emerging theory of behavioral finance. As a leader of the old guard, Fama (1998) is not persuaded either by the bulk of the evidence on market anomalies or by the evidence being provided by behavioral finance. Fama claims that behavioral finance does not impose adequately defined alternative hypotheses to market efficiency. A similar comment is also advanced to explain much of the evidence on market efficiency anomalies: there is inadequate specification of alternative hypotheses.

1.3 Fact, Conjecture and Rhetoric

A. The Epistemology of Equity Valuation

Modern Finance academics face an enigma surrounding common stock valuation. Confronted with *the practical difficulties of determining an ex ante value of a common stock*, academics have found comfort in an analytical perspective based on investor rationality and market efficiency. Recognizing that market efficiency dictates against systematic abnormal gains to individual security selection, the upshot is an approach to equity security analysis which emphasizes an investment

strategy based on optimal diversification and risk management. Analysis of the heterogeneous characteristics of individual stocks is avoided in favor of the search for sources of homogeneity (factors) across stocks.

In Finance, various philosophical approaches compete to explain what constitutes knowledge and objective truth in valuing an equity security or determining an equity investment strategy.²⁴ Finance is, at root, a human science, concerned with explaining and predicting that aspect of human behavior associated with financial activities. Much of interest has appeared in the epistemological debates about *knowledge and objectivity in the human sciences* since, say, Hayeks' The Counter-Revolution of Science (1955) or Gadamer's Truth and Method (1960). Unlike the natural sciences, what is required in the human sciences is recognition that there are differing approaches to what constitutes knowledge when human behavior is involved. It is naive and intellectually chauvinistic to believe the route to knowledge and truth in, say, valuing equity securities is unproblematic, provided that one adheres to the analytical approach of modern Finance: it is inappropriate to conclude that deviations from the narrow parameters of the prevailing epistemology are 'unscientific' nonsense not worthy of academic consideration.

Knowledge appears in various guises: empirical observations, logical deductions and informed conjectures can all be part of the final picture. Making sense of the different facets requires that careful attention be given to the language being used. For example, a logical relationship derived from a theoretical model may have only limited empirical applicability. Yet, the logical relationship may be presented as though it has a strong 'factual' basis. This may confuse an uninitiated audience into concluding that the factual basis, which is logical, extends into the empirical realm. Academics in modern Finance are inherently attracted to logical facts, such as the capital asset pricing model or the Markowitz mean-variance portfolio optimization model. Whether logical facts have any *ex ante* empirical validity requires careful analysis that extends beyond the theoretical structure used to develop the model. Though this point may seem obvious, the resulting confusions are apparent even in introductory investments textbooks where logical relationships, such as the CAPM, are presented as though there were an empirical validity which corresponds to the logical validity.

The term ***epistemology*** comes from the Greek word for knowledge. Simply put, epistemology is the philosophy of knowledge. The central question of epistemology is how individuals come to know or, in slightly different terms, how knowledge is created. Methodology is concerned with the methods that are used in creating knowledge and, as such, is more practical in nature. Positivism is

In a widely used and admired investments text, two of the leading figures in modern Finance Elton and Gruber (1995, p.449) observe:

The search for the "correct" way to value common stocks, or even one that works, has occupied a huge amount of effort over a long period of time. Attempts have ranged from simple mechanical techniques for picking winners to hypotheses about the broad influences affecting stock prices. At one extreme, the attempt to find a simple rule for selecting stocks that will have above-average performance can be likened to the search for a perpetual motion machine ... At the other extreme the determinants of common stock prices are quite easy to specify in general terms. The price of common stock is a function of the level of a company's earnings, dividends, risk, the cost of money and future growth rate. While it is easy to specify these broad influences, the implementation of a system that uses these concepts to successfully value or select common stocks is a difficult task.

a philosophical movement, concerned with epistemology, characterized by an emphasis upon science and scientific method as the only sources of knowledge. Though the roots of positivism can be traced back to Francis Bacon (1561-1626), the beginnings of the movement are usually credited to Auguste Comte (1798-1857). Over time, positivism evolved substantively to the point where, in the 1920's, a new version, known as **logical positivism** (also known as logical empiricism, logical neopositivism, neopositivism) emerged. Reflecting the German and Austrian roots of the so-called Vienna school, the leading founding figure is usually identified as Rudolf Carnap (1891-1970). However, the English philosopher A.J. Ayer (1910-1989) is usually credited with the most influential contribution Language, Truth and Logic (1936). The branch of positivism reflected in modern Finance can be traced to Friedman (1953).

Comte argued the search for knowledge had gone through three historical phases: the theological, that was concerned with obtaining knowledge about God and spirituality; the metaphysical, where the search was for philosophical truths; and, the positive or scientific phase, that involved the search for objective facts or 'positive truths'. It was this last phase that Comte associated with positivism. As initially conceived by Comte, the positivist approach to knowledge made **a sharp distinction between the realms of fact and value**. There was also a strong hostility toward religion and traditional philosophy, in general, and metaphysics, in particular. The positivist philosophy maintained that all sciences rely upon the same methodology for determining facts about the physical and material world. As such, there are no important differences between, say, biology, physics or economics. This was referred to as the so-called 'unity of science project'. Facts are to be collected and summarized through a process of induction.

Echoes of positivism constantly resonate through modern Finance. Elton and Gruber (1984, p.273) provide an excellent example: "***As the physicist builds models of the movement of matter in a frictionless environment, the economist builds models where there are no institutional frictions to the movement of stock prices***" (emphasis added).²⁵ The epistemology of modern Finance can be traced to Friedman (1953) where the distinction between fact and value appears as a distinction between "positive economics" and "normative economics" (p.4):

Positive economics is in principle independent of any particular ethical position or normative judgments ... it deals with "what is" not with "what ought to be". Its task is to provide a system of generalizations that can be used to make correct predictions about the consequences of any change in circumstances. Its performance is to be judged by the precision, scope, and conformity with experience of the predictions it yields. In short, positive economics is, or can be, an "objective" science, in precisely the same sense as any of the physical sciences.

Much of Friedman (1953) is concerned with the issue whether a theory with unrealistic assumptions, even "wildly inaccurate descriptive representations of reality" can be "important and significant". For Friedman, the ultimate test of a theory was "whether it yields sufficiently accurate predictions", not whether the assumptions are realistic.

The concern of Friedman (1953) with the form of the theory being examined is consistent with the evolution of positivist epistemology. Initially, positivism placed heavy reliance on the inductive process of collecting facts. Spurred by the remarkable successes of the natural sciences during the late 19th and early 20th centuries, this view evolved into logical positivism, an epistemology that placed emphasis on theories and the logical deduction of hypotheses to test those theories as well

as the collection of facts. *The epistemology of logical positivism* allows only two grounds for truth: there are deductive truths such as those in mathematics and formal logic, e.g., $12 - 3 = 9$; and inductive statements that match reality precisely. As a consequence, truthful statements have to be verifiable to be meaningful. In logical positivism, statements have meaning relative to the conditions under which the statement can be verified. Friedman adapts this approach to where the test of verification for a hypothesis is the ability to predict. That is consistent with the tenet of logical positivism that a statement that does not describe an 'experiential proposition' carries no significance, i.e., it is not knowledge.

Friedman (1953, p.7) clearly reflects these tenets of logical positivism in what Boland (1991) has termed *economic positivism*: "theory has no substantive content; it is a set of tautologies ... Factual evidence alone can show whether the categories of the 'analytical filing system' have a meaningful empirical counterpart, that is, whether they are useful in analyzing a particular class of concrete problems." Statements that are verifiable provide a basis for building a science. Under positivism, science is the source of knowledge. As such, both positivism, in general, and economic positivism, in particular, share a fundamental commitment to empiricism, an epistemology where claims that have no empirical consequences are without meaning. Economic positivism extends empiricism by arguing that science can also seek to build theories to describe the regularities of cause and effect in order to explain the world. This requires theories to be expressed as a set of axioms or, less formally, basic assumptions. These theories have rules to systematically link the predictions with objective measurements of the real world. The connection to Friedman (1953), von Neumann and Morgenstern (1947) and innumerable other projects in positivist economics and modern Finance is apparent.

At this point, the proponent of modern Finance is compelled to ask: so what is wrong with economic positivism? There are a number of answers to this question, some of which are given in the latter parts of this section. At this point, it is relevant to observe that *positivism maintains that science is the only way to create knowledge*, to allow individuals to understand the world well enough to predict and control outcomes. In the positivist framework, the objective world is viewed as deterministic, operated by laws of cause and effect that can be identified if the unique approach of the scientific method is correctly applied. Science is conceived as a mechanistic operation. It is possible to use deductive reasoning to postulate theories that can be empirically tested. Based on the results of these empirical tests, it is determined whether a theory 'fits the facts' or whether the theory needs to be revised in order to provide better predictions of reality. Ultimately, there is an objective reality that can be discovered if there is sufficient empirical information available to verify the 'true' deductive hypotheses.

Criticisms of economic positivism are numerous. One type of criticism focuses on the misunderstanding of the process by which science is conducted. Is there really a unity of science? Are the procedures used in physics and chemistry directly applicable to economics or psychology? Do scientists really develop deductive hypotheses that are then 'verified' on empirical data? Another related criticism observes that economic positivism says little or nothing about how axioms (or Friedman's assumptions) are translated into possible testable hypotheses. In other words, positivism has no substantive insight into the process by which knowledge is created. Positivism is only interested in specifying the scientific process, without recommending criteria for selecting among permitted ideas. This leads to Friedman (1953) and the criteria of predictive ability. But, this leads

to the problem of measuring predictive ability. The distinction between *ex ante* and *ex post* predictability is one key example of this type of problem in modern Finance.

Positivism proposes that there is a unity of science. Certain developments in epistemology after positivism deny this proposition. As such, schools of thought have emerged that are concerned specifically with the epistemological problems arising in the human sciences. One such epistemology is ***critical realism, a school that observes all measurement is fallible in some way***, e.g., Bhaskar (1978). For example, critical realists maintain that all observations are theory-laden and that individuals, in general, and scientists, in particular, are inherently biased by their cultural experiences, world views, and so on. Friedman (1953, p.4-5) recognizes this issue but does not view it as a basis for “a fundamental distinction” between economics and the natural sciences. For critical realists the challenge is how to move from a notion of objectivity that is inherently a social phenomenon to the identification of knowledge. If objectivity is not perfect, then how are these separate and imperfect individual interpretations of reality to be combined?

Friedman (1953) provides a window to the 20th development of the philosophy of the social sciences. In this development, words like “hermeneutics” and “ontology” are essential to the discussion, though references to notions such as “the questionableness of romantic hermeneutics” require knowledge of the philosophical developments to be correctly interpreted. ***Hermeneutics*** has a long history in philosophy, starting with problems of biblical exegesis. During the 18th and early 19th century, hermeneutics evolved into a more general theory of textual interpretation, aiming to provide a set of rules that for accurate interpretive practice applying to a wide range of subject matter. Taking hermeneutics as the relevant method for the recovery of meaning, Wilhelm Dilthey (1833-1911) broadened hermeneutics to represent a methodology for the recovery of meaning that is central to understanding knowledge within the ‘human’ or ‘historical’ sciences.

Strongly influenced by Martin Heidegger (1889-1976), ***Hans-Georg Gadamer (1900-2002)*** is “the decisive figure in the development of twentieth century hermeneutics” (Stanford Encyclopedia of Philosophy). Gadamer is part of a long line of thought that questions the ability to apply techniques of the natural sciences to the human sciences, e.g., (p.6): “the real problem that the human sciences present to thought is that one has not properly grasped the nature of the human sciences if one measures them by the yardstick of an increasing knowledge of regularity. The experience of the socio-historical world cannot be raised to a science by inductive procedure of the natural sciences.” Though Gadamer’s notion of the human sciences may seem to have more applicability to, say, political science or sociology, it is difficult to evade the observation that the prices of securities are set in markets and are the outcome of a social interaction. Security analysis lies within the domain of the human sciences.

Unlike the natural sciences, the human sciences have to allow for prejudice derived from authority. In contrast, methodologically disciplined use of reason cannot accept arguments based on authority for that involves not using one’s reason to reach conclusions. “If the prestige of authority takes the place of one’s own judgment, then authority is in fact a source of prejudices”. But the approach toward the human sciences proposed by Gadamer (1960, p.249) does not view prejudice either negatively or positively. As such, authority as a positive prejudice provides a basis for knowledge:

... the recognition of authority is always connected with the idea that what authority states is not irrational or arbitrary, but can be seen, in principle, to be true. This is the essence of the authority

claimed by the teacher, the superior, the expert. The prejudices that they implant are legitimized by the person who presents them. But this makes them then, in a sense objective prejudices, for they bring about the same bias in favor of something that can come about through other means. e.g., through solid ground offered by reason.

The process of interpretation and understanding is fundamental to the human sciences. While knowledge about an object in the natural sciences gets progressive deeper over time, the same is not true about the human sciences where great achievements of the past "hardly ever grow old".

For Gadamer, the interpreter is an essential component of knowledge in the human sciences: "the object appears truly significant only in the light of him who is able to describe it to us properly. Thus it is certainly the subject that we are interested in, but the subject acquires its life only from the light in which it is presented to us." Subjects appear historically "under different aspects at different times or from a different standpoints" (p.252). Insightful interpretations require the past to be echoed in the present. As such, the human sciences are involved not only in the accumulation of empirical results but in the transmission of an important source of authority: tradition. "That which has been sanctioned by tradition and custom has an authority that is nameless, and our finite historical being is marked by the fact that always the authority of what has been transmitted – and not only what is clearly grounded – has power over our attitudes and behavior" (p.249).

Gadamer sees an essential role for *tradition in the human sciences* (p.251-2): "That there is an element of tradition active in the human sciences, despite the methodological nature of its procedures, an element that constitutes its real nature, and is its distinguishing mark, is immediately clear if we examine the history of research and note the difference between the human and natural sciences with regard to their history". For Gadamer: "the natural scientist writes the history of his subject in terms of the present stage of knowledge. For him errors and wrong turnings are of historical interest only, because the progress of research is the self-evident criterion of his study ... the human sciences cannot be described adequately in terms of this idea of research and progress." Knowledge in the human sciences does not proceed by distancing and freeing ourselves from what has been transmitted through tradition. Rather, the problem is to find the relationship of the present with the traditions of the past.

The positivist foundation of modern Finance depends on the premise that *knowledge in the subject is obtained solely from the methodology of the natural sciences*. Somehow, increasingly greater knowledge is obtainable about the natural phenomena of security markets, such as prices or returns, as increasingly larger amounts of data are examined or more precisely mathematical theories are derived. The historical evolution of markets is unimportant. The views of writers in the past, such as Graham and Dodd or J.M. Keynes or Irving Fisher, are only of historical interest, useful illustrations of how far knowledge has progressed since that time. Gadamer, and other philosophers of his ilk, would argue that this approach is predicated on the supposition that Finance is a natural science. However, the objects of interest in Finance are the result of human interactions and, as such, belong in the realm of the human sciences. If correct, knowledge of the subject could be substantively increased by proceeding beyond the scientific process to incorporate the notion of tradition and appreciate the contributions of authorities from the past.

B. The Rhetoric of Finance

It is difficult to be an ardent practitioner of any branch of academic or vernacular Finance and not be at least slightly disturbed by the arguments put forth in McCloskey (1985, 1994), especially the frightening “American question”:²⁶

If you’re so smart, why aren’t you rich?

McCloskey observes: “The American question embarrasses anyone claiming *profitable* expertise who cannot show a profit”. Though McCloskey is concerned with reinterpretation of economic science as rhetoric, the arguments can be readily extended to Finance. In particular, economists have been quick to embrace modern Finance as part of their discipline under the guise of ‘financial economics’. Examples provided by McCloskey critiquing economic theory also extend readily to modern Finance. The American question is particularly biting for Finance academics who answer this question by claiming the search for abnormal returns is futile; those who have been successful have just been lucky, someone has to win the horse race.²⁷

As evidenced in the awarding of the Nobel prize in economics to a number of important modern Finance researchers such as M. Scholes, R. Merton and H. Markowitz, there is considerable overlap between the subjects of *Economics and Finance* (Poitras and Jovanovic 2007). Many academic institutions feature the two subjects combined into a Department of Economics and Finance or some other such administrative configuration. There are also a number of journals with titles such as the Journal of Financial Economics or the International Review of Economics and Finance, reflecting the symbiosis of the two subjects. Despite the overlaps, there are distinct differences in the subjects. These differences extend beyond obvious observations such as economics is concerned with GNP, fiscal policy and trade theory while Finance is concerned with security returns, corporate capital structure and investment policy. This difference is reflected in a competing configuration for academic departments combining accounting and finance and in journal titles such as the Journal of Business Finance and Accounting or Accounting and Finance.

McCloskey interprets economics as rhetoric – the art of persuasion. This approach to rhetoric follows Aristotle, as opposed to the Platonic interpretation that views rhetoric as flattery and cosmetics. Recognizing this distinction is fundamental to the points that McCloskey is making (p.40) as *rhetoric has two definitions*: one narrow and the other broad. The narrow definition originates with Plato and was made popular by the 19th century Romantics who elevated sincerity to the chief virtue. In the Platonic definition, rhetoric is cosmetic and superficial. An example of common usage is where the newspapers write: “Presidential Primary Campaign Mired in Rhetoric” or in academic usage where rhetoric characterizes “the meretricious ornament obscuring the clear and distinct idea” (McCloskey 1985, p.40). The Platonic notion of rhetoric is sharply different than the Aristotelan where rhetoric is “an ability to see the available means of persuasion.” This ability has considerable value and applications.

Whereas Platonic rhetoric is without virtue, the classical Greeks saw persuasion (*peitho*) as a means to counter-act violence (*bia*): “All that moves without violence, then, is persuasion, *peitho*, the realm of rhetoric, unforced agreement, mutually advantageous intellectual exchange.” As such, rhetoric encompasses the use of logic and fact as well as metaphor and story. What is “logical” is not without dispute. ‘A *fact is a fact*’ is *only relative to a conceptual scheme*. As McCloskey points out, these points have been well known since Kant. Studies of science have shown repeatedly

that facts are constructed by words. To summarize McCloskey's point about the Aristotelian definition of rhetoric: "In this definition, a science as much as a literature has a 'rhetoric'". Whether the argument or discussion is made mathematically, verbally or metaphorically, the use of rhetoric is involved.

With this definition of rhetoric in hand, McCloskey sets about to engage in a "conversation about conversation". For McCloskey, the 'rhetorical approach' is concerned with how academics and practitioners in a specific discipline persuade each other and the world. For academics, the conversations are found in journals, monographs and textbooks. For McCloskey the conversations in journals raise "*the puzzle of publication*". Speaking about economics, McCloskey describes the puzzle (p.31-2):

Even the most influential articles are puzzling. In Gary Becker's article on "A Theory of the Allocation of Time" (1965) the Knowledge is presented in the rhetoric of the hypothetico-deductive model of science ("little systematic testing of the theory has been attempted ... The theory has many interesting ... implications about empirical phenomena"), but it looks more like a metaphor, an analogy between budgets of income and budgets of hours. In Robert Lucas' article on "Some International Evidence of Output-Inflation tradeoffs" (1973) Knowledge is presented in the rhetoric of the Empirical Finding, but looks more like a reading of history, one of the many possible readings permitted by the data. One wonders whether economists could agree on what constituted the remarkableness of these remarks in the scientific conversation..

In considering the extensive journal debate over monetarism versus Keynesianism McCloskey wonders: "What would be the point of publishing one's prior convictions dressed up as 'findings'?"

Similar comments could readily be made about much of the journal literature in Finance. For example, consider the numerous articles on empirical tests of the CAPM that appeared during the 1970's, e.g., Fama and Macbeth (1973), and the studies on the cross section of expected stock returns during the 1990's, e.g., Fama and French (1992). Though dressed up in the rhetoric of the Empirical Finding, seeing the evidence from the the 1970's as one of the "many possible readings of the data" is apparent in the articles from the 1990's. Throughout the conversations, it is apparent that the contributors have been strongly persuaded by the rhetoric of the hypothetico-deductive model of science that formulated and promoted the capital asset pricing model. The methods of persuasion involve the use of *the metaphor of "the model"* and the active use of an authoritative style to suppress alternative stories. As with scientists and scholars in other disciplines, academics in Finance "use analogies, tell stories and adopt a persona" (p.36). There is value in determining why some arguments work and others do not.

Much like economists, academics in modern Finance are neurotic about "science". "They think that knowing, really knowing, means following something called 'scientific Method'. They think that if you don't know it that way then you don't know much" (p.55). This is, more or less, the point being explored by Gadamer. McCloskey goes beyond the academic boundaries of Gadamer's conversation to explore *the pervasiveness of "Scientism" in society*. "Resistance to reason is dogma. It is unoriginal and uncontroversial to point out that Science is the modern dogma, and that after the sea of religious faith receded another religion flooded in: Scientism" (p.64). The grip of Scientism "in the modern world is well illustrated in the service industries of Science, staffed by

deans, journalists, publishers, foundation executives and grant administrators.” McCloskey observes: “In the dogma of Scientism, it is today’s credo, in substance or method or Nobel laureates, that is timelessly True. The service people protect the orthodoxy with a fierce devotion” (p.68). Yet: “The service people of science forget that the only certitude is that yesterday’s timeless orthodoxy in science will become tomorrow’s laughingstock”.

Being an economist, McCloskey is motivated by concerns in that discipline. His conversation often extends well beyond the limits of economics proper and issues that are essential in Finance do appear in flashes, comments made in the process of discussing some issue that is not quite so important in the context of economics. The problem of prediction is one such issue. Economists are concerned with prediction, in a way, but much of the core theory is developed using models without randomness. This tendency is evident in McCloskey’s (p.72) description of the “**American question**”:

The philosophical prestige of prediction probably arises from a still dominant but “discredited empiricist conception of science”. The economist’s response to the empiricist conception of science is the American question: if you’re so smart, oh predictor of human events, why ain’t you rich? The American question cuts deeper than most intellectuals and experts care to admit. The test of riches is perfectly fair if the expertise claims to deliver actual riches, in gold or glory.

Prediction is, or ought to be, the central concern of academic Finance. The core theory is concerned with decision making under uncertainty. Variables of interest, such as security prices and portfolios, are the outcome of social activity aimed at making profits or, more precisely, maximizing the expected utility of terminal wealth. To deal with the “American question” Finance academics developed the EMH, a body of theory and empirical results designed to demonstrate ‘why we ain’t rich’. The core theory developed ‘rational, expected utility maximizing’ strategies for portfolio selection. The pervasive *ex post* empirical testing of these portfolio selection strategies again belies an avoidance of the American question.

If the American question makes the economist uncomfortable, it makes Finance practitioners, i.e., those in the ‘vernacular’ Finance tradition, absolutely queasy. The level of concern between academic Finance, where the EMH provides some comfort, and vernacular Finance, where the appearance of superior performance is desired, has resulted in a divergence of both theory and practice. Whereas the academic Finance approach to equity valuation claims to be based on ‘rigorous mathematical theories and carefully documented empirical studies’, **vernacular Finance has glorified inductive techniques** that have achieved at least *ex post* success in predicting the future market prices of: individual stocks; or, specific stock indexes. As a consequence, vernacular Finance has adopted valuation techniques, such as technical analysis, that academic Finance adherents have claimed with some authority to have no validity. However, driven perhaps by the American question, academic Finance has slowly backed away from a strict EMH position.

This queasiness about the American question within the academic Finance community is apparent in those **proponents of anomalies in security prices, the students of behavioral finance**. An anomaly in market prices is, by construction, an inefficiency, i.e., an opportunity to earn an abnormal return. Yet, in answer to the American question, proponents of behavioral finance are evasive (Shefrin 2000, p.70):

Knowing that prices are inefficient and exploiting that inefficiency are two different things. A lot of people seem to think that the message of behavioral finance is that beating the market is a no-brainer because errors cause mispricing. Well, it's not easy money; just the opposite, in fact. One of the main messages of behavioral finance is that heuristic-driven bias and frame dependence get in the way. There was a lot of California gold waiting to be discovered in 1849, but how many prospectors actually got rich? Precious few.

Using the 1849 analogy, is not an anomaly evidence that gold had been discovered in a particular location? It seems that prospectors of behavioral finance have found the gold, in the form of anomalies, but are unable to convert it to riches because of "heuristic-driven bias and frame dependence".

The solution that McCloskey provides to the American question is comforting for economists:

No one can be embarrassed by the American question who retains a proper modesty about what observation and recording and story-telling can do. We can observe the history of economics or the history of painting, and in retrospect tell a story about how security of commercial property or the analysis of vanishing points made for good things. An expert such as an economist is an expert on the past, and about the future that can be known without divine and profitable possession. Human scientists and critics of human arts, in other words, write history, not prophecy. Economics teaches this, the limit on social engineering. It teaches that we can be wise and good but not profitably foresighted in detail, even if we are economists.

Unfortunately for those involved in Finance, especially the practitioners in the vernacular Finance community, the subject is directly concerned with social engineering, with out-performing through more accurate predicting. The limits on social engineering are real constraints, the grist for a range of conversations. This explains the fundamental need to deal with the problem of uncertainty. The 'rational' predictive part of human behavior is insufficient to provide explanations that can adequately address the American question. Much of the rhetoric in modern Finance reflects the comfort of the "wise and good" academics with the rational explanations. However, having the deal with the American question on a daily basis, most Finance practitioners have to strive to answer the question by being, or at least appearing to be, rich.

Recognizing that an adequate definition of 'rich' is needed, this book seeks to answer the American question by providing a detailed examination of the valuation techniques proposed by those who have been recognized for becoming 'rich' in terms of wealth accumulation through equity security valuation and selection.²⁸ A colloquial statement of this method of answering the American question is: 'identify those who are rich and see why they are so smart'. Included on the 'smart' list are predominately those from the vernacular Finance realm: Warren Buffett; Benjamin Graham; Alfred Cowles; Roger Babson; and, Philip Fisher. On the smart list from the academic realm are: J.M. Keynes; Irving Fisher; and, Frederick Macaulay. Though some of names included in this listing are well known, it is less well known that Keynes derived the bulk of his income from securities trading, e.g., Moggridge (1983, Table 1, p.2). While Keynes was also involved in commodities speculation, it was in US equities trading where Keynes had the biggest financial success. Though Irving Fisher did have an abysmal record at predicting equity values, contributions to the creation

of the Cowles Commission and in developing a successful card indexing business warrant inclusion.

All this supposes that rich means something like, ‘made lots of money’, which is not a particularly good yardstick. In particular, this ignores: the impact of initial and subsequent endowments; and, the inherent riskiness of the equity selection strategies employed. There are also those that, for whatever reason, developed equity valuation methods that have considerable predictive power without taking the next step to translating the model success into market profits.²⁹ In effect, there is a speculative element in equity valuation that presents a real constraint for those with higher levels of loss aversion, such as those with limited endowments. In addition, success within the academic realm is predicated on different norms than the amount of money a valuation methodology has generated. As such, academic contributions can have insight into the equity valuation process without, somehow, being legitimized by producing ‘lots of money’. This leaves considerable scope for the inclusion of a range of interesting contributions on equity valuation by the likes of: David Durand; George Shackle; and, the modern Finance school.

C. Ergodicity and True Uncertainty

The use of *ex post* parameter estimates of means, variances and regression coefficients as **proxies for *ex ante* parameters or variables** such as expected returns, volatility and beta is a key feature in the practical implementation of economic theories, in general, and of modern Finance, in particular. A useful example is the use of the CAPM to estimate the expected return on a stock. Estimates of beta and the equity risk premium are obtained by taking as long a sample period as possible in order to obtain the highest degree of precision in the estimate. Some studies, e.g., Dimson et al. (2002)(101 Years of Global Investment Returns), use the length of the sample as evidence of importance of the results. In terms of estimating the mean for, say, the equity premium, the underlying logic is that the longer is the sample for the time average, the more accurate is the estimate for the future ensemble average of interest. A similar logic applies to increasing the number of firms used in a cross-section or increasing the sampling frequency in a time series.

The validity of this rationale for using *ex post* estimates to proxy *ex ante* variables is embedded in the type of ergodicity assumption used to justify time reversible stationary distributions employed in arriving at the theoretical results. More precisely, if stationary distributions are time reversible: there is a **homogeneity in the time paths** such that it does not matter where in the time path an observation is located, it is only the distance between observations that matters. The possibility that there may be a heterogeneity of paths is also not permitted. For example, starting from $S(0)$ if *ex ante* future paths that start by going up have a greater tendency to continue going up (success breeds success) and paths that start by going down have a greater tendency to continue going down (failure is contagious), the resulting *ex ante* ergodic distributions will be time irreversible, bimodal and dependent on the selection of $S(0)$. Do results such as the mean-square ergodic theorem apply to this relatively simple type of heterogeneous process?

Empirical limitations of the time reversible ergodic framework are well known, e.g., Samuelson (1976). Without being subjected to a continuous series of shocks, the time paths for ***an ergodic process will ‘damp down’ over time***, generating insufficient action to be consistent with observed time series for financial variables, in general, and equity security prices, in particular. Attempts to mitigate this damping behavior, such as imposing a GARCH variance process or adding a Poisson

error process, are usually insufficient to generate the type and degree of observed volatility in equity prices. 'Flexible' estimation techniques, such as GMM, are employed to estimate model parameters because the underlying density functions are too complicated or ill-behaved to use maximum likelihood, the most powerful weapon in the statistical arsenal of time reversible ergodic process analysis. It is still not clear whether stock prices have unit roots or are fractionally integrated after suitable detrending, e.g., Gil-Alana (2006). The considerable efforts that have been expended on extending the ergodic model are still a work in progress.

In response to the persistent inability to accurately model stock price processes, defenders of modern Finance observe that *alternative hypotheses are insufficient and vague*. For example, responding to accumulating evidence against the EMH, Fama (1998, p.284) observes:

A problem in developing an overall perspective on long-term return studies is that they rarely test a specific alternative to market efficiency. Instead, the alternative hypothesis is vague, market inefficiency. This is unacceptable. Like all models, market efficiency (the hypothesis that prices fully reflect available information) is a faulty description of price formation. Following the standard scientific rule, however, market efficiency can only be replaced by a better specific model of price formation, itself potentially rejectable by empirical tests.

The positivist epistemology requires that "the standard scientific rule" produce a progression of knowledge to "a better specific model of price formation". This presumes that human behavior can be modeled in a more precise and scientific manner, if only "better" statistical techniques are applied to 'the data' or "better" mathematical techniques are used to formulate 'the model'. Perhaps a "vague" alternative hypothesis is all that is possible. The calculations involved in determining the value of an equity security use future variables that are impacted by human behavior. Perhaps the complexity of these calculations defy a solution obtainable using time reversible ergodic processes?

All this is not meant to imply that the subject of modern Finance has not made substantive contributions to understanding various aspects of equity security value; quite the contrary. Rather, the perspective and approach to what constitutes knowledge in modern Finance differs from those directly involved in the markets that determine prices for equity securities, such as security analysts and portfolio managers, and most of the investing public. Following Stickney (1997), academics involved in modern Finance focus on *the average relationship* between selected accounting information and stock prices across a large number of firms. The objective is to uncover commonality or factors of homogeneity across firms. Those directly involved in making transactions in equity markets, such as equity research analysts, examine accounting information and other data sources seeking *individual* firms that are incorrectly valued. It is *the heterogeneity of firm characteristics* that drives the analysis. As such, "inherent differences will always exist between research conducted across large sets of firms and that conducted on individual firms."

Accept the hypothesis that the valuation problem for equity securities involves analyzing sources of firm heterogeneity rather than finding sources of firm homogeneity. Confronted with the problem of determining in a particular "instance" whether the 'true value' of the equity security differs from the market price, the words of Frank Knight (1921) ring clearly: "The essential and outstanding fact is that the 'instance' in question is so entirely unique that there are no others or not a sufficient number to make it possible to tabulate enough like it to form a basis for any inference of value about

any real probability of the case we are interested in.” Applied to the problem at hand this implies: ***heterogeneity breed true uncertainty***. As evidenced in Kelsey and Quiggin (1992), considerable attention has been given extending the traditional theory of decision making under uncertainty to incorporate situations where probability distributions over future outcomes are not known. However, there is a considerable distance to travel before the additional complexity required, , e.g., Quiggin (2007), translates into well defined decision rules applicable to practical situations of equity security valuation.

While acknowledging practical limitations of key theories, advocates of modern Finance respond that ***alternative approaches are poorly specified*** and have more serious difficulties in both theoretical development and practical implementation. This position is only correct if the yardstick of positivism is used to measure performance. By design, the heterogeneous outcomes associated with the true uncertainty in equity security valuation defy techniques designed to identify elements of systematic homogeneity across securities. Keynes detailed how the use of ‘conventions’ to make decisions in the face of uncertainty can suddenly generate periods of excessive volatility in stock market prices when prevailing conventions are confounded by a change circumstances, e.g., Poitras (2002a). Modern finance would use a Markov regime-switching stochastic process to model the resulting non-linearity. This would provide a potentially acceptable *ex post* method of finding a switch point and fitting the distribution of returns without providing much *ex ante* insight into when such a switch will occur, how large and how long the period of excess volatility will be and, most importantly, whether the direction of the move in prices will be up or down.

Writing on the occasion of Franco Modigliani receiving the Nobel Memorial Prize in Economics, Merton (1987) observes (emphasis added):

The Modigliani-Miller work stands as the watershed between ‘old finance’, an essentially loose connection of beliefs based on accounting practices, rules of thumb and anecdotes, and modern financial economics, with its rigorous mathematical theories and carefully documented empirical studies.

The possibility that ‘rules of thumb’ and ‘anecdotes’ may be the best method of dealing with the type of true uncertainty involved in arriving at a valuation for a specific equity security is not admitted. Such a possibility lies within the scope of rational intuitionism, a school of philosophy with roots in the work of Henry More (1614-87), Samuel Clarke (1675-1729), and Richard Price (1723- 91).

In the 20th century intuitionism has impacted both moral philosophy and mathematics through the work of H.A Prichard (1871–1947), G.E. Moore (1873-1958), and L.E.J. Brouwer (1881-1966).

Intuitionism is an intellectual enigma. The basic notion is that intuition can be used to determine the truth of important propositions. How this is done, and why this is important, depends on the situation. In the 18th century, revelation of the ‘divine mind in the human mind’ supplied a solution not available to modern academics.³⁰ In addition to the underlying vagueness inherent in intuitionism, the general belief that truth can be determined independently of logical and empirical inference is unacceptable to positivists. Despite this, intuitionism has produced some valuable insights. For example, in mathematics Brouwer argued that the primary objects of mathematical discourse are mental constructions governed by self-evident laws. Mathematics is not concerned with developing from basic axioms the deep properties of existence but, rather, with the application of internally consistent methods to develop more complex mental constructs. It is well known that

G.E. Moore was an important influence on Keynes and hints of rational intuitionism echo in The General Theory.

The ‘years of high theory’ from 1926-39 (Shackle 1967) produced a number of insightful approaches to resolving the difficult quandaries surrounding the distinction between risk and uncertainty identified by Knight (1921) and the use of subjective probability by Keynes (1921) to motivate the distinction. The impact of *uncertainty and expectations* play a fundamental theoretical role in tackling the profound macroeconomic problems of the Great Depression that eventually inspired the appearance of Keynes (1936). Though tremendous effort was given to working out the implications of uncertainty and expectation for macroeconomic problems, central issues such as the determination of liquidity preference or the marginal efficiency of investment have direct theoretical and practical connections to the equity valuation problem. Significantly, included in the contributions seeking to clarify and elucidate Keynes (1936) was Myrdal (1931; 1939) that clarified the economic significance of distinguishing between *ex post* and *ex ante* outcomes. It was George Shackle (1903-1992) that made the most substantive contributions to this line of inquiry in the era after WWII.³¹

There are a number of reasons why Shackle has been largely forgotten, outside of a small cadre of dedicated adherents. One reason is timing. The axiomatic approach to decision making under uncertainty introduced by von Neumann and Morgenstern (1947) was like an academic tidal wave that engulfed almost all competing approaches. “Shackle was the single critic of the probabilistic approach to decision making under uncertainty and of its crucial hypothesis of the additivity of probability distributions” (Meacci 2009, p.226). Following Ford (1993, p.697) “George Shackle believed passionately that economics was a subject whose substance had to be conveyed by language; the only flexible, versatile, means of expression”. Though sometimes sophisticated mathematics do appear in Shackle’s contributions, a convincing mathematical formalization was lacking. It was not until after his death that Gilboa and Schmeidler (1994) made substantive progress in formalizing non-additive probability. Earlier contributions to evidence theory going back to Shafer (1974) that deal explicitly with the element of ‘surprise’ in probability assessments have only recently been connected with Shackle.

Shackle was an academic economist, with no ties to the world of ‘high finance’ or to a prestigious business school, concerned with issues such as the dynamic properties of an economic system. As such, it is understandable that modern Finance makes no reference to Shackle. Yet, there is so much of relevance in Shackle that can explain the *ex post* to *ex ante* gap that confounds the central models of modern Finance. Consider the following from Shackle (1958, p.23):

In the classical dynamics of the physicist time is merely and purely a mathematical variable. The essence of his scheme of thought is the fully abstract idea of function, the idea of some working model or coded procedure which, applied to any particular or specified value or set of values of one or more independent variables, generates a value of a dependent variable. For the independent variable in a mental construction of this kind, *time* is a misnomer ... The solution to the differential equation, if it can be found, is complete in an instantaneous and timeless sense.

As Harcourt (1981, p.144) observes, in Shackle’s world “it is better to be vaguely right than precisely

wrong!”

NOTES

1. Liquidation refers only to the winding up of the firm. It is possible for a firm to be liquidated that has a healthy surplus of marketable assets over liabilities due. In the event of bankruptcy, i.e., a surplus of liabilities over marketable assets, a liquidation means no payments will be available to equity holders, though in some jurisdictions exceptions may be made for small payments made to speed up legal proceedings.

2. The corporate governance methods and procedures available to corporations is an issue for corporate securities law. Allowable limits will be determined by the law associated with jurisdiction of incorporation. The ‘best’ method for achieving effective corporate governance outcomes has been attracted considerable attention, especially since passage of Sarbanes-Oxley, e.g., Jiraporn et al. (2009).

3. Prior to the Nov. 2007 change by the SEC, a process of convergence in the accounting rules used in most international jurisdictions, set by the International Accounting Standards Board (IASB), and GAAP rules determined by the US Financial Accounting Standards Board (FASB) had commenced in Oct. 2002 and is currently ongoing. More information can be obtained from either the FASB (www.fasb.org) or IASB (www.iasb.org.uk) websites.

4. The 2008 Annual Report by Boeing uses the 10-K filing information to provide financial information. Additional information is available in the Annual Report about the products Boeing produces and the people involved in making those products. There is also visually appealing summaries of the financial highlights in the 10-K.

5. The NYSE requires contingent voting rights as a provision for listing ‘nonvoting’ preferred shares. In the event of unpaid dividends, a range of possible voting provisions are possible. For example, some preferred shares are restricted to only electing two members to the board of directors while preferred shares of other companies have the same one vote per share rule as common stock.

6. In a large study of 3042 US preferred share issues from 1980-1999, Bajaj et al. (2002) found 682 convertible issues and 2360 non-convertible issues. As a measure of the completeness of this sample, between 1985-1999 there were 2636 total preferred share issues raising \$324.63 billion. In comparison, there were 7017 seasoned equity offerings raising \$606 billion.

7. Another form of dividend provision arises with participating preferred stock. This type of preferred stock is rare in modern financial markets, though the provision has appeared in isolated historical instances usually associated with mergers and acquisitions activity. Typically, a participating preferred has a prior claim to the initial round of dividends. After a certain amount of earnings has been paid as dividends to common stock, usually the same per share amount as the preferred dividend, then preferred and common stock share equally in any remaining dividend payments. While such an arrangement may seem disadvantageous to common shareholders, the

absence of voting rights for preferred stock combined with a preferred redemption provision may provide sufficient offset in situations involving corporate takeovers.

8. There are exceptions to this rule. For example, IRC §247 provides for a partial dividends paid deduction for ‘old money’ preferred stocks issued by public utilities. In turn, the investors in these old money preferred shares are subject to a reduced dividend received tax credit under IRC §244, e.g., Atwood (2002). Old money preferred stocks include public utility preferreds outstanding on Oct. 1, 1942 and all subsequent preferred issues by that public utility used to replace these issues, including subsequent issues made through a tax-free reorganization.

9. Institutional information on Canadian securities markets, including topics such as relevant tax rates on securities, can be obtained from material distributed by the Canadian Securities Institute (www.csi.ca).

10. For up to date changes to relevant US securities laws, see the United States Code Classification Tables published by the Office of the Law Revision Counsel of the House of Representatives at <http://uscode.house.gov/uscct.htm>. For information on the various forms that are required to be filed with the SEC, see <http://www.sec.gov/info/edgar/forms/edgform.pdf>. Most filing requirements fall under Regulation S-T, General Rules and Regulations for Electronic Filings, which identifies filings are mandated for electronic filing. As a consequence of the regulation, all important SEC filings are available on-line, substantively easing the burden of collecting information required for equity valuation.

11. The distinction between seasoned and unseasoned issues is blurred in certain cases. For example, consider a company with publicly traded common stock and no debt on the balance sheet. Would a new issue of bonds by this company be a seasoned or unseasoned issue? Because there is no market price available for the bonds, the issue would typically be considered as unseasoned. Now consider a company with outstanding issues of both straight debt and common stock that is seeking to make a new convertible bond issue. Is this a seasoned or unseasoned issue?

12. Open-ended funds are distinguished from the two other types of funds groups specified in the Investment Company Act (1940) which are closed end funds and unit investment trusts (unit trusts). These types of funds are publicly traded on the stock exchanges or OTC.

13. It is also possible to make other similar assumptions. For example, it can be assumed that there is a dividend reinvestment plan. This requires that shares can be traded in fractional increments. Similarly, it can be assumed that the dividend payment is reinvested in a fixed income security with a time to maturity equal to the holding period for the underlying equity security. This poses problems because the expected return on the stock will depend on an unknown interest rate to be earned on the fixed income security.

14. Various interesting internet searches could be done to show the pervasiveness of risk and return in the teaching of Finance, in general, and investment analysis, in particular. For example, in Yahoo, try the search “Bodie, Kane and Marcus & Risk and Return”. This will generate well over 1000 hits for course outlines and descriptions which use this popular textbook and emphasize risk and return

in the course content. The universities involved extend globally and include some of the most prestigious, e.g., Princeton, MIT and Chicago.

15. An excellent source on detailed information about risk and return calculations across every conceivable scenario is Ibbotson and Associates (www.ibbotson.com), a division of Morningstar. As for the precise relationship between risk and return, it is possible to pick specific sample periods where expected results do not apply. For example, taking a 1974-2001 sample for Canadian data, the ranking is reversed to have Government of Canada treasury bills with the highest return, followed by long-term bonds and then common stocks.

16. These estimators for the expected return and standard deviation are a function of the time series sample that is selected. Different samples will likely produce somewhat different results. Because the calculation of returns involves taking a difference of prices at different points in time. The sampling frequency will also be relevant. For example, for annual data, the introduction of ERISA in 1974 will impact the results when estimating the expected return over a 1972-2002 sample of annual returns.

17. In numerous applications, such as the dynamic investment strategies (Grauer and Hakanson 1993) and in moving average systems in technical analysis (Poitras 2005, ch.9), moving average windows are used to generate a time series of estimates for expected returns and standard deviations. In this case, the sample size T is fixed and parameter estimates are updated as every new observation is added. For example, if the sample size is 40 quarters and the total sample is 100 observations then the first mean estimate uses the first 40 quarters ($t = 1, 2 \dots 40$) of data. The next mean estimate replaces the oldest ($t=1$) observation with the newest ($t = 41$) and generates the estimate with the ($t = 2, 3, \dots 41$) quarters of data. This continues until there is a time series of 60 moving average estimates.

18. This subsection is based on Poitras (2002a).

19. There is disagreement about whether the Lo and Mackinlay (1988) results are evidence against the EMH. For example, Conrad and Kaul (1993) argue the results can be explained by other factors such as bid/ask spreads. The evidence about the random properties of successive price changes typically involves the use of closing prices. When intra-day transaction to transaction prices are used, there is stronger evidence in favor of short-term trending in prices.

20. The name ‘martingale’ is derived from a French acronym for a gambling strategy which involves doubling up bets until a win is achieved.

21. In more advanced mathematical treatments, the approach is to define $\{Y(t)\}$ as a σ -field of an appropriately defined probability space, e.g., Karlin and Taylor (1975, p.297-325). Because the σ -field for a stochastic process increases as t increases, ergodicity conditions on the stochastic process can be satisfied. If, however, information is lost or is decreasing over time in some fashion, then ergodicity is problematic.

22. It is well known that conventional statistical criteria, such as minimizing mean square error, may be inappropriate for identifying trading rules that are profitable. For example, the observation of statistically significant serial correlation in price changes or returns may still produce negative trading rule profits. Leitch and Tanner (1991) suggest the use of trading rule profitability as an alternative measure of parameter significance.

23. Park and Irwin qualify this point by observing that, while there were some ‘early studies’ that measured statistical significance, this was done using tests that assumed trading rule returns were normally distributed. This is probably invalid since the distribution of these returns under the null hypothesis of an efficient market is not known. Furthermore, various studies report that technical trading returns are positively skewed and leptokurtic and, as a consequence, past applications of *t*-tests to technical trading returns may be biased.

24. Much of modern Finance lies within the realm of positivism, also referred to as logical positivism or economic positivism, Friedman (1953), Boland (1991), Blaug (1992). Positivism strives to achieve a scientific approach, divorced from normative values, emphasizing quantification, measurement and empirical verification of hypotheses. Competing approaches include structural realism, critical realism, post-modernism and pragmatism, e.g., Lawson (1997).

25. Other examples abound. Consider the following quote from John Cochrane, Myron S. Scholes Professor of Finance at the University of Chicago Booth School of Business, made in an early 2009 debate over the proposition, ‘This house believes that we are all Keynesians now’, sponsored by the *Economist* magazine(<http://www.economist.com/debate/days/view/283>): “Of course we are not all Keynesians now. Economics is, or at least tries to be, a science, not a religion. Economic understanding does not lie in a return to eternal verities written down in long, convoluted old books, or in the wisdom of fondly remembered sages, whether Keynes, Friedman or even Smith himself. Economics is a live and active discipline, and it is no disrespect to Keynes to say that we have learned a lot in 70 years. Let us stop talking about labels and appealing to long dead authorities. Let us instead apply the best of modern economics to talk about what has a chance of working in the present situation and why.”

26. Other contributions to the rhetorical approach include Klammer, Solow and McCloskey (1988) and Weintraub (1991).

27. Such bias is evident by examining the index for any of a number of textbooks used in introductory Investments courses, e.g., Bodie, Kane and Marcus (1999, 4th ed.; 2009, 8th ed.; 1989 1st ed.). The name index to the 2nd ed. has one listing each for Warren Buffett and Benjamin Graham – associated with two passing references made in the text. In contrast, Eugene Fama has twelve and Fischer Black has nine. Given Buffett’s reputation as “the world’s greatest investor”, such discrepancies are revealing of the type of bias found in academic treatments of equity valuation.

28. Another potential answer is to claim, ‘I am rich, so listen to me’. This again illustrates why an adequate definition of rich is needed to avoid difficulties in determining which equity valuation techniques to emphasize. Individuals with relatively limited material wants and substantial labour

income can achieve more than sufficient terminal portfolio values with equity valuation and selection methods that would be inconsistent with the objectives of a more hedonistic person. It is also important to avoid confusing riches obtained through the sale of equity valuation methods with those obtained through the application of such methods to security selection. For example, brokers at large investment banks generate sizeable bonus income associated with firm performance. In the near term, such bonuses are tied more to the ability to sell valuation techniques and associated information to clients rather than to the actual performance of the techniques.

29. For example, the *ex ante* performance of an initially destitute person who is able to build a portfolio of, say, a half million dollars over a lifetime by successfully reinvesting meager savings from a minimum wage job could be compared favorably to the performance of Buffett who, by starting with much more, and being able to pursue strategies that were unavailable to the meager investor, was able to generate a much larger terminal portfolio value.

30. For example, in moral philosophy, this permitted Richard Price to rely on the ‘moral certainty’ of Christian teaching as revealed in the Bible to argue against Hume’s attack on the truth of Christian miracles.

31. Also important in developing alternative approaches to uncertainty is Nicholas Georgescu-Roegen (1906-1994). Similar to Shackle, expectations in the Georgescu-Roegen framework “cannot be reduced to any probabilistic decision-making model” (Fontini 2009, p.324).