International Journal of Economics and Financial Issues
Vol. 2, No. 2, 2012, pp.141-178
ISSN: 2146-4138
www.econjournals.com

Theoretical and Empirical Review of Asset Pricing Models: A Structural Synthesis

Şaban Çelik
Deparment of International Trade and Finance, Yasar University,
Izmir, Turkey. Tel: +90-232-4115343;
Fax: +90-232-4115020. E-mail: saban.celik@yasar.edu.tr

ABSTRACT: The purpose of this paper is to give a comprehensive theoretical review devoted to asset pricing models by emphasizing static and dynamic versions in the line with their empirical investigations. A considerable amount of financial economics literature devoted to the concept of asset pricing and their implications. The main task of asset pricing model can be seen as the way to evaluate the present value of the pay offs or cash flows discounted for risk and time lags. The difficulty coming from discounting process is that the relevant factors that affect the pay offs vary through the time whereas the theoretical framework is still useful to incorporate the changing factors into an asset pricing models. This paper fills the gap in literature by giving a comprehensive review of the models and evaluating the historical stream of empirical investigations in the form of structural empirical review.

Keywords: Financial economics; Asset pricing; Static CAPM; Dynamic CAPM; Structural empirical review
JEL Classifications: G00; G12; G13

1. Introduction

In order to simplify the concept of asset pricing, it needs to give a snapshot of the literature and a brief overview of perspectives in the field in addition with to describe what it is meant by an asset. The assets, financial or nonfinancial, will be defined as generating risky future pay offs distributed over time. Pricing of an asset can be seen as the present value of the pay offs or cash flows discounted for risk and time lags. However, the difficulties coming from discounting process is to determine the relevant factors that affect the pay offs. Navigating the market signals and inferring their impacts on the pay offs are the main task of asset pricing and required to implement the strategic implications. It is highly important in decision making process at the firm level and also at the macro level. When we consider "asset" pricing we often have in mind stock prices. However, asset pricing in general also applies to other financial assets, for instance, bonds and derivatives, to non-financial assets such as gold, real estate. Models that are developed in the field of asset pricing shares the positive versus normative tension present in the rest of economics. When we consider a model[1] by which we predict the future, we usually rely on the underlining assumptions behind it. If the underlining assumptions are true after evaluation process of normative tests, their predictions should be true which can be examined through positives tests. However, what we do is in fact not more than putting everything in one simplified settings.

In most cases, the underlining assumptions of given model do not pass the normative tests. Even if it is so, we can not hold the impacts of factors affecting the pay offs constant between the two periods. On the other hand, there is another possibility that the way we describe the world should work is not overly simplified but the world is wrong that some assets are mispriced and the models need improvements. Cochrane (2005) states that this latter use of asset pricing theory accounts for much of its popularity and practical application. Also, and perhaps most importantly, the prices of many assets

[1] A model consists of a set of assumptions, mathematical development of the model through manipulations of these assumptions and a set of predictions (Bodie et al., 2008:309).

or claims to uncertain cash flows are not observed, such as potential public or private investment projects, new financial securities, buyout prospects, and complex derivatives. We can apply the theory to establish what the prices of these claims *should* be as well; the answers are important guides to public and private decisions. Asset pricing theory all stems from one simple concept: *price equals expected discounted payoff*. The rest is elaboration, special cases, and a closet full of tricks that make the central equation useful for one or another application.

The distinctiveness of the study is that this is the first attempt to review literature written on asset pricing models and the empirical investigation conducted in the form of structural empirical review. In doing so, the historical perspective of the concept and the place it will take in future are clarified and the way further researches conducted will be explored.

2. Theoretical Framework

In the scope of the paper, we will explain the models that are classified in the framework of neoclassical finance[2] and evaluate the empirical investigations conducting a structural empirical review. In neoclassical finance, the models can be grouped into absolute and relative asset pricing models. We mean by absolute pricing that each asset is priced by reference to its exposure to fundamental sources of macroeconomic risk. The consumption-based and general equilibrium models are the purest examples of this approach. The absolute approach is most common in academic settings, in which we use asset pricing theory positively to give an economic explanation for why prices are what they are, or in order to predict how prices might change if policy or economic structure changed. In relative pricing, a less ambitious question is answered. We ask what we can learn about an asset's value given the prices of some other assets. We do not ask where the prices of the other assets came from, and we use as little information about fundamental risk factors as possible. Black—Scholes (1973) option pricing is the classic example of this approach and its extension Contingent Claim Analysis (CCA) developed for crediting a country's default risk. Notwithstanding, there is no solid line between absolute and relative asset pricing models at least in application[3]. The problem is how much relative and how much absolute model may explain asset pricing fundamentals.

Figure 1 outlines the theoretical development and the root of asset pricing in short. The main distinction starts with the notion that how individual preferences over the distribution of uncertain wealth are taken place. Financial economists have different views on this ground which can be classified as neoclassical based[4] and behavioral based[5]. The rational notion behind this paradigm shift is coming from the way individuals make their decisions. Individuals, in a simplified manner, make observations, process the data coming out from these observations and come to point in concluding the results. As Shefrin (2005) pointed out that in finance, these judgments and decisions pertain to the composition of individual portfolios, the range of securities offered in the market, the character of earnings forecasts, and the manner in which securities are priced through time. In building a framework for the study of financial markets, academics face a fundamental choice. They need to choose a set of assumptions about the judgments, preferences, and decisions of participants in

[2] The reason for this limitation is about giving as much intiutive background of central theories as possible while being informed about the full literature written on asset pricing. We simply cannot explain every single models developed in the field of asset pricing in a paper.

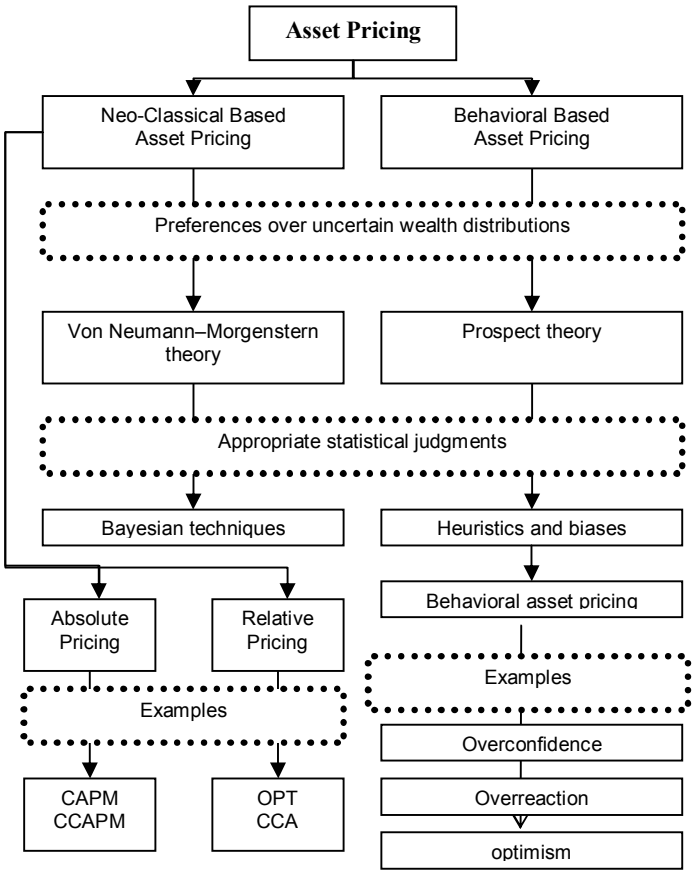
[3] Cochrane (2005) explains that asset pricing problems are solved by judiciously choosing how much absolute and how much relative pricing one will do, depending on the assets in question and the purpose of the calculation. Almost no problems are solved by the pure extremes. For example, the CAPM and its successor factor models are paradigms of the absolute approach. Yet in applications, they price assets ''relative'' to the market or other risk factors, without answering what determines the market or factor risk premia and betas. The latter are treated as free parameters. On the other end of the spectrum, even the most practical financial engineering questions usually involve assumptions beyond pure lack of arbitrage, assumptions about equilibrium ''market prices of risk.''

[4] Interested readers may consult Cochrane (2005) for the neoclassical based models whereas Contingent Claim Analysis (CCA) is not extended to macro level in this book. For useful explanations about CCA applied in macro level see Gray, et.al., (2007) for theoretical explanations and also Keller, et.al., (2007) for an application made on Turkey.

[5] Interested readers may consult Shefrin (2005) for the behavioral based models. In the scope of the present paper we will not cover in depth analysis made on the bevarioral contourparts.

financial markets. In the neoclassical framework, financial decision-makers possess von Neumann–Morgenstern preferences over uncertain wealth distributions, and use Bayesian techniques to make appropriate statistical judgments from the data at their disposal.

Figure 1. Stems of Asset Pricing Perspectives



On the other spectrum, behavioral finance is the study of how psychological phenomena impact financial behavior. Behavioralizing asset pricing theory means tracing the implications of behavioral assumptions for equilibrium prices. Psychologists working in the area of behavioral decision making have produced much evidence that people do not behave as if they have von Neumann–Morgenstern preferences, and do not form judgments in accordance with Bayesian principles. Rather, they systematically behave in a manner different from both. Notably, behavioral psychologists have advanced theories that address the causes and effects associated with these systematic departures. The behavioral counterpart to von Neumann–Morgenstern theory is known as prospect theory. The behavioral counterpart to Bayesian theory is known as "heuristics and biases." Evidences that are against Efficient Market Hypothesis developed by behavioral finance as follows: *High volume anomaly* (Shiller, 1998); *Equity Premium Puzzle* (Mehra and Prescott, 1985); *Volatility* (Shiller, 1998); and *Predictability* (Fama and French, 1988). One of the central themes of behavioral finance is the psychological phenomenon people faced with (Shiller, 2003; Thaler, 2000; Kahneman and Tversky, 1979; Tversky and Kahneman, 1974). These are *Overconfidence* (Daniel, et.al., 1998; Lord, et.al., 1979; Daniel and Titman, 1999; Barber and Odean, 1999); Barber and Odean, 2001); *Overreaction* (DeBondt and Thaler, 1985, 1987; *Optimism* (Weinstein, 1980; Taylor and Brown, 1988; Statman, 2002); *Availability Heuristic* (Barberis and Thaler, 2003); *Regret Aversion* (Statman, 2002; Bar-Hillel and Neter, 1996; Shefrin and Statman, 1985; Shiller, 1998); *Representative Heuristic* (Tversky and Kahneman, 1971; Tversky and Kahneman, 1973) ; *Anchoring Heuristic* (Tversky and Kahneman, 1974); *Ambiguity Aversion* (Ellsberg, 1961; Barberis and Thaler, 2003; French and

Poterba, 1991; Baxter and Jermann, 1997; Benartzi, 2001); *Impossibility of applying optimization in practice* (Camerer, 1997; Benartzi and Thaler, 2001); *Misattribution* (Johnson and Tversky, 1983; Saunders, 1993); *Social events* (Shiller, 1998; Hong, et.al., 2004; Bikhcandani and Sharma, 2000; MacGregor, 2002).

More importantly the source of factors that affect the risk premium may also play a role to classify the models such as the models based on macro economic or firm specific factors depending upon the underlying assumptions behind. However, there is a clear argument to classify the models on theoretical ground that generalizing the findings from an empirical investigation is much reasonable than doing that by data mining. Table 1 reports the main development of Capital Asset Pricing Models which were explained in the scope of the paper. Starting from Markowitz mean-variance algorithm, we will explain the models into two main categories as static and dynamic models.

Table 1. Theoretical Development of CAPM

	Model	Originator(s)
	Markowitz Mean-Variance Algorithm	Markowitz (1952;1959)
Static Models	Sharpe-Lintner CAPM	Sharpe (1964), Lintner (1965), Mossin (1966)
	Black Zero-beta CAPM	Black (1972)
	The CAPM with Non-Marketable Human Capital	Mayers (1972)
	The CAPM with Multiple Consumption Goods	Breeden (1979)
	International CAPM	Solnik (1974a), Adler and Dumas (1983)
	Arbitrage Pricing Theory	Ross (1976)
	The Fame-French Three Factor Model	Fama and French (1993)
	Partial Variance Approach Model	Hogan and Warren (1974) and Bawa and Lindenberg (1977) Harlow and Rao (1989)
	The Three Moment CAPM	Rubinstein (1973), Kraus and Litzenberger (1976)
	The Four Moment CAPM	Fang and Lai (1997), Dittmar[6] (1999)
Dynamic Models	The Intertemporal CAPM	Merton (1973)
	The Consumption CAPM	Breeden (1979)
	Production Based CAPM	Lucas (1978), Brock (1979)
	Investment-Based CAPM	Cochrane (1991)
	Liquidity Based CAPM	Acharya and Pedersen (2005)
	Conditional CAPM	Jagannathan and Wang (1996)

The main reasons behind the classification[7] and formation of the model exhibited in Table 1 are historical development of the advances in asset pricing and theoretical extensions which are built on Sharpe-Lintner CAPM. To divide the models into framework of static and dynamic structure is useful on the theoretical ground to demonstrate how to generalize the model from discrete time process to continuous. The models exhibited in Table 1 are just a model in one way or another to give a simplified description of complex reality and are not free of incomplete justifications. Even tough a model that is not an exact description of reality, it is still useful and in most cases better than a simple average of sample return.

3. Research Methodology

This part is a complemented section to part 2 in which an extensive theoretical review made on asset pricing models. The empirical research conducted on asset pricing literature is presented here on systematic based selection criteria so called Structural Empirical Review (SER). In fact, SER is a technique specifically designed and developed for the present paper to analyze research papers' evidence and interpreting the results on more robust framework. At the first stage, we selected the

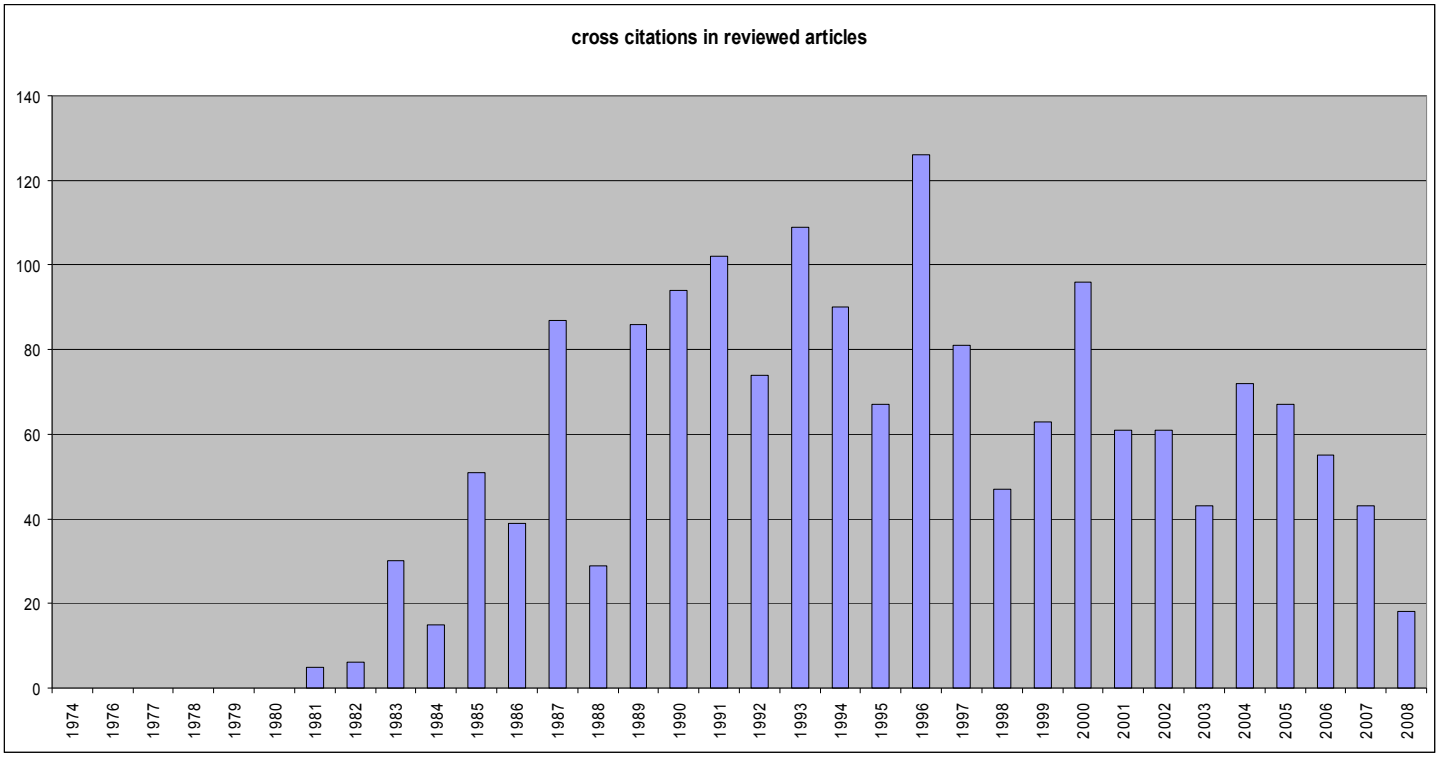
[6] This is Dittmar working paper whereas article form is published in 2002.

[7] Cochrane (2005) induced every asset pricing model into a consumption based asset pricing framework and explained the dynamics of asset pricing model from different order.

most appropriate journals through ISI WEB of Knowledge database and sorted articles based on the field such as economics, finance in addition with the total number of citations and impact factors of the journals. In doing this, we reached 43 journals and around 2000 articles (see table 2 for details). The first elimination criterion we employed is that an article should contain an empirical investigation of asset pricing models. This elimination reduced the number of articles to 416. At this stage we explore one of the main concerns for the field of asset pricing that how much attention is paid to asset pricing models in literature. The question is partially answered by showing the numbers of inter-citations among the 416 articles.

Graph 1 shows the total number of citations made by the articles to themselves on annual basis. For example, there are more than 120 citations made by the articles to the other articles in the pool in 1996. The most interesting conclusion coming out from the inter-citation statistics is that there is a decreasing trend on asset pricing models. However, the results have two important constraints: (i) these articles do contain at least an empirical investigation employed on asset pricing models. There are many theoretical articles left not to be taken into account for this question. Even in this analysis we exclude about 1600 articles; (ii) the results are limited to 43 highly cited journals. However, there are a considerable amount of journals published in field of finance and economics.

Graph 1. Cross citations in reviewed articles



The second elimination criterion is that an article should primarily investigate an asset pricing model and their assumptions or predictions. This elimination criterion reduced the number of articles to 136 that are deserved to be reviewed for section six (structural empirical review of asset pricing studies). The main purpose of the review process can be classified as follows: (i) To explore the process of asset pricing literature; (ii) To examine the results of empirical examination made on static and dynamic asset pricing models; (iii) To document the estimation techniques employed in the articles and (iv) To document the main problems developed in the field and their empirical findings.

Table 2 depicts the first 25 finance journals sorted on total citation which also include the first 15 finance journals sorted on impact factor classified by ISI Web of Knowledge. This ensures the quality of the journals. Table 3 shows the first 20 economics journals based on impact factor classified by ISI Web of Knowledge. Two journals are classified in both searching process so that in total, 43 highly cited journals are reviewed.

Table 2. Reviewed Journals and the Relevant Statistics (2006): Sorted by impact factor and total citation

	Sorted by total citation (2006)			Search for 'CAPM'			Serach for 'CAPM test'			Search for 'Capital Asset Pricing Models' (CAPM)		
	Journal Name	Data Interval	Database	Full Text	Abstract	Title	Full Text	Abstract	Title	Full Text	Abstract	Title
1	JOURNAL OF ACCOUNTING & ECONOMICS	1979-2008	sciencedirect	36	2		34	0		176	1	
2	JOURNAL OF FINANCE	1946-2004	Jstor	477	43	14	345	7	1	1049	9	0
3	REVIEW OF ACCOUNTING STUDIES	1996-2008	Springerlink	13	0		12	0		82	0	
4	JOURNAL OF FINANCIAL ECONOMICS	1974-2008	sciencedirect	191	34		174	13		616	48	
5	JOURNAL OF ACCOUNTING RESEARCH	1963-2002	Jstor	32	0	0	29	0	0	136	0	0
6	ACCOUNTING REVIEW	1926-2002	Jstor	37	2	0	28	1	0	173	1	0
7	REVIEW OF FINANCIAL STUDIES	1988-2004	Jstor	107	6	1	84	1	0	268	4	0
8	JOURNAL OF MONETARY ECONOMICS	1975-2008	sciencedirect	23	3		19	2		5	0	
9	JOURNAL OF CORPORATE FINANCE	1994-2008	sciencedirect	11	0		9	0		69	0	
10	ACCOUNTING ORGANIZATIONS AND SOCIETY	1976-2008	sciencedirect	10	0		8	0		102	0	
11	FINANCIAL MANAGEMENT	1973-2007	Proquest	65	34		0	0		76	47	
12	FINANCE AND STOCHASTICS	1997-2008	ebsco host	3	1		0	0		0	0	
13	WORLD BANK ECONOMIC REVIEW	1998-2008	abi/inform	0	0		0	0		0	0	
14	JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS	1966-2003	Jstor	189	14	5	131	0	0	409	5	1
15	JOURNAL OF FINANCIAL INTERMEDIATION	1990-2008	sciencedirect	3	0		2	0		46	0	
16	JOURNAL OF MONEY CREDIT AND BANKING	1969-2004	Jstor	29	0	0	14	0	0	171	0	0
17	JOURNAL OF INDUSTRIAL ECONOMICS	1952-2002	Jstor	10	1	0	8	0	0	38	0	0
18	MATHEMATICAL FINANCE	1997-2008	ebsco host	16	3		0	0		16	3	
19	AUDITING-A JOURNAL OF PRACTICE & THEORY	1995-2008	Na	0	0		0	0		0	0	
20	JOURNAL OF FINANCIAL MARKETS	1998-2008	sciencedirect	14	1		12	0		33	0	
21	QUANTITATIVE FINANCE	2001-2008	informaworld	9	3		7	0		20	0	
22	JOURNAL OF RISK AND UNCERTAINTY	1988-2008	ebsco host	5	0		0	0		9	0	
23	JOURNAL OF INTERNATIONAL MONEY AND FINANCE	1982-2008	sciencedirect	60	13		53	5		233	9	
24	CONTEMPORARY ACCOUNTING RESEARCH	1984-2007	ebsco host	30	5		0	0		29	0	
25	JOURNAL OF BANKING & FINANCE	1977-2008	sciencedirect	183	26		160	7		769	29	
	Total			1553	191	20	1129	36	1	4525	156	1

	Sorted by impact factor (2006)			Search for 'CAPM'			Serach for 'CAPM test'			Search for 'Capital Asset Pricing Models' (CAPM)		
	Journal Name	Date Interval	Database	Full Text	Abstract	Title	Full Text	Abstract	Title	Full Text	Abstract	Title
1	AMERICAN ECONOMIC REVIEW	1911-2005	Jstor	56	1	0	37	0	0	248	0	0
2	ECONOMETRICA	1933-2005	Jstor	27	3	0	15	0	0	113	1	0
3	JOURNAL OF POLITICAL ECONOMY	1892-2006	Jstor	27	4	0	23	0	0	143	0	0
4	QUARTERLY JOURNAL OF ECONOMICS	1886-2002	Jstor	10	0	0	7	0	0	91	0	0
5	JOURNAL OF FINANCIAL ECONOMICS	1974-2008	sciencedirect	191	34		174	13		616	48	
6	JOURNAL OF ECONOMETRICS	1973-2008	sciencedirect	36	5		32	1		73	4	
7	REVIEW OF ECONOMIC STUDIES	1933-2004	Jstor	15	4	1	9	1	0	90	1	0
8	REVIEW OF ECONOMICS AND STATISTICS	1919-2002	Jstor	35	5	0	32	1	0	92	1	0
9	ECONOMIC JOURNAL	1891-2002	Jstor	24	1	0	21	0	0	102	0	0
10	JOURNAL OF ECONOMIC THEORY	1969-2002	sciencedirect	12	4		4	0		78	7	
11	JOURNAL OF ECONOMIC PERSPECTIVES	1987-2005	Jstor	6	0	0	4	0	0	75	0	0
12	JOURNAL OF MONETARY ECONOMICS	1975-2008	sciencedirect	23	3		19	2		5	0	
13	WORLD DEVELOPMENT	1973-2008	sciencedirect	3	0		1	0		263	1	
14	JOURNAL OF ECONOMIC LITERATURE	1969-2005	Jstor	11	0	0	9	0	0	87	0	0
15	ECOLOGICAL ECONOMICS	1989-2008	sciencedirect	5	0		4	0		78	0	
16	JOURNAL OF PUBLIC ECONOMICS	1978-2008	sciencedirect	9	0		5	0		104	2	
17	AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS	1965-2008	ebsco host	19	6		1	0		25	8	
18	EUROPEAN ECONOMIC REVIEW	1969-2008	sciencedirect	32	2		19	0		157	6	
19	RAND JOURNAL OF ECONOMICS	1984-2005	Jstor	15	1	0	10	0	0	91	1	0
20	ECONOMICS LETTERS	1978-2008	sciencedirect	36	8		25	4		78	11	
	Total			592	81	1	451	22	0	2609	91	0

4. Theoretical Framework of Static Asset Pricing Models

This section gives short descriptions of static asset pricing models whereas the list is limited to literature review made in the scope of the paper. Therefore any skipped resemble models within this category is a reason of our structural literature review constraints.

Sharpe-Lintner CAPM

$$E[R_X] = r_f + \left[\frac{COV[R_{Xi}, R_{Mi}]}{VAR[R_{Mi}]}\right][E[R_M] - r_f] \quad \text{.....(1)}$$

Where; $\frac{COV[R_{Xi}, R_{Mi}]}{VAR[R_{Mi}]} = \beta_X$

CAPM states that expected return ($E[R_X]$) of an asset is equal to risk free rate (r_f) plus asset's risk premium ($\beta_X(E[R_M] - r_f)$). ($E[R_M]$ is the expected return of hypothetical market portfolio return which consists of all assets.)

Black Zero-beta CAPM

$$E[R_X] = E[R_Z] + \left[\frac{COV[R_{Xi}, R_{Mi}]}{VAR[R_{Mi}]}\right][E[R_M] - E[R_Z]] \quad \text{.....(2)}$$

Following Black (1972), the expression (2) is known as Zero Beta CAPM. Contrary to S-L CAPM, the difference is that risk free rate is replaced by return of portfolio Z which is uncorrelated with market portfolio. Portfolio Z technically can be called as companion[8] portfolio for market portfolio since it is uncorrelated. As Black explained that the model in expression (2) can explain why average estimates of alpha values are positive for low beta securities and negative for high beta securities contrary to the prediction of S-L CAPM.

The CAPM with Non-Marketable Human Capital

$$E[R_X] = r_f + \left[\frac{P_M COV[R_{Xi}, R_{Mi}] + P_H COV[R_{Xi}, R_{Mi}]}{P_M VAR[R_{Mi}] + P_H COV[R_{Mi}, R_{Hi}]}\right][E[R_M] - r_f] \quad \text{.....(3)}$$

Where:

P_M : total value of all marketable assets

P_H : total value of all nonmarketable assets

R_H : one period rate of return on nonmarketable assets

Expression (3) indicates that nevertheless asset pricing is still independent of individual preferences. Even tough unsystematic risk of the nonmarketable assets will affect individual preferences on portfolio choices; it is only the systematic, economy-wide, component of non marketable asset returns that matters. Asset pricing is still affected by covariance risk but it is now an asset's covariance with the market as well as its covariance with the systematic non-market asset return that matters.

[8] This is a technical property of efficient frontier. See Merton (1972) and Roll (1977) for details.

The CAPM with Multiple Consumption Goods

$$E[R_X] = r_f + \beta_{XM}\left[E[R_M] - r_f\right] + \beta_{XP}\left[E\left[R_P - r_f\right]\right] \quad \ldots\ldots(4)$$

Where:

$$\beta_{XM} = \frac{VAR[R_P]COV[R_X, R_M] - COV[R_M, R_P]COV[R_X, R_P]}{VAR[R_P]VAR[R_M] - (COV[R_M, R_P])^2}$$

$$\beta_{XP} = \frac{VAR[R_P]COV[R_X, R_P] - COV[R_M, R_P]COV[R_X, R_M]}{VAR[R_P]VAR[R_M] - (COV[R_M, R_P])^2}$$

The expression (4)[9] depicts the expected return on asset X with market portfolio returns and portfolio P which can be seen as a perfectly correlated portfolio with a composition of multiple consumption goods.

International CAPM

$$E[R_X] = r_{fX} + \left[\frac{COV[R_X, R_{WM}]}{VAR[R_{WM}]}\right]\left[E[R_{WM}] - r_{fW}\right] \quad \ldots\ldots(5)$$

Where

$$\frac{COV[R_X, R_{WM}]}{VAR[R_{WM}]} = \beta_X$$

β_X denotes the international systematic risk of security *I*, i.e. calculated in relation to the worldwide market portfolio;
r_{fX} denotes the rate of the risk-free asset in the country of security *I*;
r_{fW} denotes the rate of the average worldwide risk-free asset; and
R_{WM} denotes the return on the worldwide market portfolio.
All the rates of return are expressed in the currency of the asset *I* country.

Several authors have developed international versions of the CAPM. Among these, we could mention Solnik's model[10] (1974a), which is called the International Asset Pricing Model (IAPM). This model uses a risk-free rate from the country of asset *I* and an average worldwide risk-free rate, obtained by making up a portfolio of risk-free assets from different countries in the world. The weightings used are again the same as those used for the worldwide market portfolio.

Arbitrage Pricing Theory

Ross (1976) introduced The Arbitrage Pricing Theory (hereafter APT) showing how to approximate equilibrium rate of returns using arbitrage portfolios in the framework of factor models. Factor models of asset prices postulate that rates of return can be expressed as linear functions of a small number of factors.

$$E[R_X] = \lambda_0 + \lambda_1\beta_{X1} \qquad X = 1,2,\ldots,n \quad \ldots\ldots(6.1)$$

[9] Derivation of expression (4) can be found in Balvers (2001). As Balvers underlined that such case is overlooked in the literature whereas the dinamic version of the model can be found in Breeden (1979, section 7).
[10] See equation 16 in Solnik (1974).

where the values of λ_0 and λ_1 are the same for every asset. Expression (6.1) holds as a strict equality only for an exact single-factor model. If risk free asset is present, its return, r_f, equals λ_0. Alternatively if the factor model is constructed to explain excess returns, $R_X - r_f$ then $\lambda_0 = 0$. When $\lambda_0 = r_f$, the APT predicts:

$$E[R_X] = r_f + \lambda_1 \beta_{X1} \qquad X = 1,2,....,n \quad \text{.....(6.2)}$$

The weight λ_1 is interpreted as the risk premium associated with the factor – that is, the risk premium corresponds to the source of the systematic risk. In similar vein, if there are multifactor specification:

$$E[R_X] = r_f + \lambda_1 \beta_{X1} + \lambda_2 \beta_{X2} + ... + \lambda_K \beta_{XK} \qquad X = 1,2,....,n \quad \text{.....(6.3)}$$

The Fame-French Three Factor Model

$$E[R_X] = r_f + \beta_{X1}[E[R_M - r_f]] + \beta_{X2}[E[SMB]] + \beta_{X3}[E[HML]] \quad \text{.....(7)}$$

Where the model says that the expected return on a portfolio in excess of the risk-free rate [E(Ri) – Rf] is explained by the sensitivity of its return to three factors: (i) the excess return on a broad market portfolio (RM- Rf); (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low). Fama and French (1992; 1993; 1996) assume that the financial markets are indeed efficient but the market factor does not explain all the risks on its own. They concluded that a three factor model does describe the assets return whereas they specify that the selection of the factors is not unique. In addition to the factors that are contained in three factors model they postulate additional factors that also have explanatory power.

Partial Variance Approach Model

$$E[R_X] = r_f + \frac{CLPM_{r_f}(R_M, R_X)}{LPM_{r_f}(R_M)}[E[R_M] - r_f] \quad \text{.....(8.1)}$$

Where

$E[R_X]$ is the equilibrium expected rate of return on asset i;

$E[R_M]$ is the equilibrium expected rate of return on the market portfolio;

$LPM_{rf}(R_M)$ is the lower partial moment of returns below risk free rate on the market portfolio;

$CLPM_{rf}(R_M, R_X)$ is the co-lower partial moment below risk free rate on the market portfolio with returns on security X.

$$f(R_M, R_X) = \int_{-\infty}^{\infty} \int_{-\infty}^{rf} (R_M - r_f)(R_X - r_f) df(R_X, R_M)$$

$f(R_M, R_X)$ is joint probability density function of returns on asset X and on the market portfolio.

Hogan and Warren (1974) and Bawa and Lindenberg (1977) independently developed a mean-lower partial moment capital asset pricing model (EL-CAPM). In deriving expression (8.1), the target rate in all cases was set equal to the risk free rate. Systematic risk indicator beta is measured by CLPM/LPM on the contrary to COV/VAR in S-L CAPM. The authors suggest that the replacement of this change should be employed when there are distinct and significant differences between the two measurements. Harlow and Rao (1989) generalize Hogan and Warren (1974) and Bawa and

Lindenberg (1977) and attempt for nth order lower partial moment and show in general that in this scenario a one-beta CAPM obtains as follows:

$$E[R_X] = r_f + \beta_X^{MLPM_n^{(\tau)}}\left[E[R_M] - r_f\right] \quad \text{.....(8.2)}$$

Where

$$\beta_X^{MLPM_n^{(\tau)}} = \frac{\int_{-\infty}^{\tau}\int_{-\infty}^{\infty}(\tau - R_M)^{n-1}(r_f - R_X)df(R_X, R_M)}{\int_{-\infty}^{\infty}(\tau - R_M)^{n-1}(r_f - R_M)df(R_M)}$$

The Three Moments CAPM

$$R_{Xi} - r_f = c_{0i} + c_{1i}(R_{Mi} - r_f) + c_{2i}(R_M - \overline{R}_M)^2 + \varepsilon_i \quad \text{.....(9)}$$

where the error term, ε_i, is assumed to be homoscedastic, independent of the excess rate of return on the market portfolio, $R_M - r_f$, independent of the squared deviation of the excess rate of return on the market portfolio from its expected value, $(R_M - \overline{R}_M)^2$, and to have an expected value of zero. Taking expected values in (9) and subtracting, to express the quadratic market model in deviation form, then multiplying both sides by $R_M - \overline{R}_M$, taking expected values and dividing through by $\sigma_{R_M}^2$ yields an expression for the beta of the ith risk asset:
$\beta_X = c_{1i} + c_{2i}\frac{(R_M - \overline{R}_M)^3}{\sigma_{R_M}^2}$. Similarly, multiplying both sides of the deviation form of the quadratic market model by $(R_M - \overline{R}_M)^2$, taking expected values and dividing through by $(R_M - \overline{R}_M)^3$, yields en expression for the gamma of the ith risk asset:

$$\gamma_X = c_{1i} + c_{2i}\left\{\frac{\left(K_M^4 - \left(\sigma_{R_M}^2\right)^2\right)}{\left(R_M - \overline{R}_M\right)^3}\right\} \qquad where \qquad K_M^4 = E\left[\left(R_M - \overline{R}_M\right)^4\right]$$

The forth central moment of the rate of return on market portfolio
By restricting investor preferences, Rubinstein [1973a] and Kraus and Litzenberger[11] [1976] extended the traditional Sharpe-Lintner mean-variance capital asset pricing model to incorporate the effects of skewness on equilibrium expected rates of return.

The Four Moments CAPM

$$E[R_X] - r_f = \varphi_1 COV(R_{M,}, R_X) + \varphi_2 COV(R_M^2, R_X) + \varphi_3 COV(R_M^3, R) \quad \text{.....(10)}$$

Where $R_M^2\left(R_M^3\right)$ is the square (cube) of the standardized market portfolio return R_M; $\varphi_{1,}\varphi_2, \varphi_3$ are the market prices of systematic variance, systematic skewness and systematic kurtosis respectively. Expression (10) is the four moments CAPM which shows that in the presence of kurtosis, the expected excess rate of return is related not only to the systematic variance and systematic skewness but also to the systematic kurtosis. The higher the systematic variance and systematic kurtosis, the higher the expected return. The higher the systematic kurtosis, the lower the expected return. Fang and Lai (1997) incorporated the effect of kurtosis into the asset pricing model. A four moment CAPM is derived in which systematic kurtosis in addition to systematic variance and systematic skewness, contributes to the risk premium of an asset.

[11] See equation 6 in Kraus and Litzenberger (1976).

5. Theoretical Framework of Dynamics Asset Pricing Models

The Intertemporal CAPM

$$E(R_X) - r_f = \lambda_{1X}\left(E(R_M) - r_f\right) + \lambda_{2X}\left(E(R_{NF}) - r\right) \quad \text{.....(11)}$$

where

$$\lambda_{1X} = \frac{\beta_{X,M} - \beta_{X,NF}\beta_{NF,M}}{1-(\rho_{NF,M})^2} \qquad AND \qquad \lambda_{2X} = \frac{\beta_{X,NF} - \beta_{X,M}\beta_{NF,M}}{1-(\rho_{NF,M})^2}$$

$$\beta_{X,Y} = \frac{COV[R_X, R_Y]}{VAR[R_Y]} \qquad AND \qquad \rho_{NF,M} = \frac{COV[R_{NF}, R_M]}{\sqrt{VAR[R_{NF}]}\sqrt{VAR[R_M]}}$$

$E(R_{NF})$ denotes the expected rate of return of a portfolio that has perfect negative correlation with the risk-free asset r_f . All the rates of return are used in this model are continuous rates. If the risk-free rate is not stochastic, or if it is not correlated with the market risk, then the third fund disappears, $\beta_{X,NF} = \beta_{NF,M} = 0$.. We then come back to the standard formulation of the CAPM, except that the rates of return are instantaneous and the distribution of returns is lognormal instead of being normal.

The Consumption CAPM

$$E(R_X) - r_f = \beta_{X,C}\left(E(R_C) - r_f\right) \quad \text{.....(12)}$$

Where

$E[R_C]$ is return obtained by creating a mimicking portfolio with stochastic return

$$\beta_{X,C} = \frac{COV[R_X, R_C]}{VAR[R_C]}$$

Breeden (1979) derives a single beta asset pricing model in multi-good, continuous-time model with uncertain consumption goods prices and uncertain investment opportunities. In Consumption CAPM[12], the equity premium is proportional to a single beta, which is the covariance with consumption (usually replaced with consumption growth per capita in empirical tests) rather than to the market portfolio.

Production Based CAPM

$$E\left[R_{t+1}^X\right] - r_t^f = \beta_{Xy}(E\left[R_{t+1}^y\right] - r_t^f) \quad \text{.....(13)}$$

where

$$\beta_{iy} = Cov_t(r_{t+1}^y, r_{t+1}^i) / Var_t(r_{t+1}^y)$$

Here r_{t+1}^y may represent either the return on an asset perfectly correlated with aggregate production or the growth rate of aggregate production itself[13]. Lucas (1978) examined the stochastic behavior of equilibrium asset prices in a one-good, pure exchange economy with identical consumers. The single good in this economy is (costlessly) produced in a number of different productive units; an asset is a claim to all or part of the output of one of these units. Productivity in each unit fluctuates stochastically through time, so that equilibrium asset prices will fluctuate as well. Lucas's objective

[12] See equation 21 in Bredeen (1979).

[13] Balvers (2001) derives the expression (13) based on the equation 6 in Lucas (1978).

was to understand the relationship between these exogenously determined productivity changes and market determined movements in asset prices and usually used to explain the equity premium puzzle[14]

Investment-Based CAPM

$$R^I\left(s^{t+1}\right)=\left(f_k\left(t+1\right)+\frac{g_k\left(t+1\right)}{g_I\left(t+1\right)}\right)g_I\left(t\right) \quad \text{.....(14)}$$

Where

R^I is the investment return from state s^t to state s^{t+1}

f (.) is production function

g (.) is function for adjustment costs to investment

The notation (t) means 'evaluated with respect to the appropriate arguments at time t in state s^t', and subscript denote partial derivatives. Cochrane derived the expected return and investment relationship in a non standard asset pricing equation with functional form. Cochrane (1991) obtained equation[15] (14) in the specific context of a complete markets economy. It can be interpreted as the physical investment return of a firm. It is obtained from a within-firm type of arbitrage: invest in the current period and then withdraw enough investment in the next period to keep the capital stock for future periods equal to what it would have been without the current period investment; the net payoff per unit extra investment in the current period is the investment return.

Liquidity Based CAPM

$$E\left(R_t^X-r_t^f\right)=E\left(c_t^X\right)+\lambda\beta^{1X}+\lambda\beta^{2X}-\lambda\beta^{3X}-\lambda\beta^{4X} \quad \text{.....(15)}$$

Where

$$\beta^{1X}=\frac{COV\left[R_t^X,R_t^M-E_{t-1}\left(R_t^M\right)\right]}{VAR\left[R_t^M-E_{t-1}\left(R_t^M\right)-\left(c_t^M-E_{t-1}\left(c_t^M\right)\right)\right]}$$

$$\beta^{2X}=\frac{COV\left[c_t^X-E_{t-1}\left(c_t^X\right),c_t^M-E_{t-1}\left(c_t^M\right)\right]}{VAR\left[R_t^M-E_{t-1}\left(R_t^M\right)-\left(c_t^M-E_{t-1}\left(c_t^M\right)\right)\right]}$$

$$\beta^{3X}=\frac{COV\left[R_t^X,c_t^M-E_{t-1}\left(c_t^M\right)\right]}{VAR\left[R_t^M-E_{t-1}\left(R_t^M\right)-\left(c_t^M-E_{t-1}\left(c_t^M\right)\right)\right]}$$

$$\beta^{4X}=\frac{COV\left[c_t^X-E_{t-1}\left(c_t^X\right),R_t^M-E_{t-1}\left(R_t^M\right)\right]}{VAR\left[R_t^M-E_{t-1}\left(R_t^M\right)-\left(c_t^M-E_{t-1}\left(c_t^M\right)\right)\right]}$$

$$\lambda=E\left(\lambda_t\right)=E\left(R_t^M-c_t^M-r^f\right)$$

Acharya and Pedersen (2005) present a simple theoretical model that helps to explain how asset prices are affected by liquidity risk and commonality in liquidity. The model provides a unified theoretical framework that can explain the empirical findings by pricing market liquidity, average liquidity, and liquidity that co-moves with returns and predicting future returns. In the liquidity based CAPM[16], the expected return of a security is increasing in its expected illiquidity and its ''net beta,'' which is proportional to the covariance of its return, r^i; net of its exogenous illiquidity costs, c^i, with the

[14] Mehra and Prescott use the Lucas Model to explain the theoretical discussion behind the puzzle. (cited in Constantinides, et.al., (2003, chapter 14))

[15] See equation 12 in Cochrane (1991) in addition with some specific functional form given for operational purposes in emprical tests.

[16] See equation 8 for the conditional version of expression (5) and equation 12 for unconditional version, the one explained here, in Acharya and Pedersen (2005).

market portfolio's net return $r^M - c^M$. The net beta can be decomposed into the standard market beta and three betas representing different forms of liquidity risk. These liquidity risks are associated with: (i) commonality in liquidity with the market liquidity, $COV\left[c^i, c^M\right]$; (ii) return sensitivity to market liquidity, $COV\left[r^i, c^M\right]$; and, (iii) liquidity sensitivity to market returns, $COV\left[c^i, r^M\right]$.

Conditional CAPM

$$E\left[R_{Xt}|\Theta_{t-1}\right] = \lambda_{0t-1} + \lambda_{1t-1}\beta_{Xt-1} \quad \text{.....(16.1)}$$

where

β_{Xt-1} is the conditional beta of asset i and in each period t,

$$\beta_{Xt-1} = \frac{COV\left[R_{Xt}, R_{Mt}|\Theta_{t-1}\right]}{VAR\left[R_{Mt}|\Theta_{t-1}\right]}$$

λ_{0t-1} is the conditional expected return on a 'zero-beta' portfolio,

λ_{1t-1} is the conditional market risk premium.

The subscript t indicates the relevant time period. R_{Xt} denotes the gross return on asset X in period t and in similar manner, R_{Mt} is the gross return on the aggregate wealth portfolio of all assets in the economy in period t. Explaining cross sectional variations in the unconditional expected return on different asset, take the unconditional expectation of both sides of expression (16.1):

$$E\left[R_{Xt}\right] = \lambda_0 + \lambda_1 \overline{\beta}_X + COV\left[\lambda_{1t-1}, \beta_{Xt-1}\right] \text{.....(16.2)}$$

where

$\lambda_0 = E\left[\lambda_{0t-1}\right]$, $\lambda_1 = E\left[\lambda_{1t-1}\right]$ **and** $\overline{\beta}_X = E\left[\beta_{Xt-1}\right]$

Here, λ_1 -lamdal is the expected market risk premium, and β_X is the expected beta. If the covariance between the conditional beta of asset X and the conditional market risk premium is zero (or a linear function of the expected beta) for every arbitrarily chosen asset X, then expression (16.1) resembles the static CAPM, i.e., the expected return is a linear function of the expected beta. One of the assumptions of S-L CAPM is that the behavior of investors is estimated for one period. This is why it is necessary to make certain assumption that the betas of assets remain constant through the time in empirical examination of the CAPM. Jagannathan and Wang (1996) propose this model that includes this assumption for the reason that the relative risk of a firm's cash flow is likely to vary over the business cycle.

6. Structural Empirical Review of Asset Pricing Studies

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	Conclusion
1	Solnik (1974b)	Can a single world index model give a realistic description of the international structure of asset prices?	US and European data— [1966 – 1971]	CAPM and IAPM	OLS	*An international market structure of price behavior appears to exist.*
2	Lessard (1974)	What is the impact of the existence national factors in returns generating process?	16 National Market Indices and 30 International Market Indices — [1959 – 1973]	CAPM and IAPM	OLS	*Only a small proportion of the variance of national portfolios is common in an international context which gives rise to considerable risk reduction through international dimension.*
3	Pogue and Solnik (1974)	How market model performs on European common stocks returns?	US and 7 European countries — [1966 – 1971]	CAPM	OLS	*The whole evidence does not show substantial differences between the United States and the four major European markets. Some cases can be made for the three smaller markets being less efficient.*
4	Pettit and Westerfield (1974)	Can CAPM explain the structure of conditional predicted portfolio returns?	US Data — [1926 – 1968]	CAPM	OLS	*The conditional predictions of the CAPM provide nonstationary, biased estimates of actual returns. The single-factor market model does not properly adjust for market-wide effects in assessing security performance.*
5	Solnik (1977)	Is it very unlikely that an empirical mean-variance analysis will ever be able to discriminate between the various views of the world?	US and 7 European countries — [1966 – 1974]	IAPM	OLS	*As soon as the MV framework is used on ex post data, the separation property will hold internationally even if all the data come from tables of random numbers and no one holds foreign stocks.*
6	Finnerty (1976)	Do the insiders earn more than the market on average?	US Data — [1969–1972]	CAPM	OLS	*Insiders can outperform the market in their stock selections.*
7	Griffin (1976)	Are there any differences in the association between each informational variable and security returns?	US Data — [1953 – 1973]	CAPM	OLS	*The behaviour of the cumulative average residual-per-share, dividends-per-share and forecasts of earnings-per-share on the assessment of expected return is significant.*
8	Arbel, et.al., (1977)	What is the relationship between default risk and return on equity?	US Data — [1965 – 1973]	CAPM	OLS	*Results support the usefulness of the capital asset pricing model and suggest that the magnitude of the cost of default when combined with the probability of occurrence is insignificant as an independent variable in generating stock returns.*
9	Lee (1977)	How possible factors affecting the second-pass regression results in capital asset pricing?	US Data — [1965 – 1972]	CAPM	MLE	*The functional form, the skewness effect, and the change of market condition are the most important factors in affecting the empirical conclusions in testing the bias of composite performance measure and the risk-return relation.*
10	Levhari and Levy (1977)	How deviation from the "true" horizon causes a systematic bias in the regression coefficient?	US Data — [1948 – 1968]	CAPM	OLS	*The investment horizon for which data are collected plays a crucial role and has a great impact on both the regression coefficients and the performance indices.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
11	Brenner and Smidth (1977)	Are betas stationary?	US Data — [1963 – 1968]	CAPM	OLS	*The slight difference between models (employed) that does exist tends to favor the hypothesis of constant beta coefficients.*
12	Lloyd and Shick (1977)	Is Stone's Two-Index Model of returns valid to explain cross-sectional excess returns?	US Data — [1969 – 1972]	Stone's Two- Index Model	OLS	*The results are mixed, but generally favor the model.*
13	Goldberg and Vora (1977)	Is CAPM predictive power of practical use in evaluating the returns to equity of public utility?	US Data — [1936 – 1972]	CAPM	OLS (Bivariate spectral analysis)	*Portfolio returns were independent of time. SIM (Single Index Model) worked well in explaining the returns on the control securities for all regulated firms, electric, and combination gas and electric portfolios, but did not explain the returns on any of the regulated firm portfolios themselves.*
14	Friend, et.al, (1978)	Can direct test decrease the gab between theory and evidence?	US Data — [1974 – 1977]	CAPM	OLS	*Findings are inconsistent with Sharpe-Lintner theory if it is appropriate to use for empirical testing the one factor return-generating function relating actual to expected return.*
15	Goldberg and Vora (1978)	How CAPM performs if spectral analysis is used in testing procedures?	US Data — [1926 – 1972]	CAPM	OLS and spectral analysis	*the market "index" does not perfectly explain individual portfolio movements for all portfolios and that despite cyclical betas that are fairly stable over time, the true value of beta appears to be different for cycles of differing durations.*
16	Grauer (1978)	How to measure 'aggregate' or 'composite' individual's utility function based on the observed market behavior of investors.	US Data — [1934 – 1971]	CAPM (utility based)	OLS	*There was a slight indication that the more risk averse models better described security pricing.*
17	Bachrach and Galai (1979)	Is the economic rationale for the existence of specific characteristics for groups of securities in "low" and "high" price ranges?	US Data — [1926 – 1968]	CAPM	OLS	*Low price stocks are riskier than high price stocks. In the long run, the compensation is the same, on the average, for the two mutually exclusive price groups. Only part of the relatively high average rate of return on the low price stocks can be explained by their relatively high systematic risk.*
18	Fowler, et.al., (1979)	How residual behavior exists?	US Data — [1965 – 1976]	CAPM	OLS	*It is found that there is evidence of heteroscedasticity and low R2 and a noticeable dependence of these with frequency of trading in the underlying stock.*
19	Baesel and Stein (1979)	Do insiders earn more than uninformed investors?	US Data — [1968 – 1972]	CAPM	OLS.	*. Both ordinary insiders and bank directors earned positive premium returns relative to an uninformed trading strategy.*
20	Brown, (1979)	Are the market imperfection (autocorrelation) associated with misspecification of the CAPM?	US Data — [1955 – 1973]	CAPM	OLS	*There is an association between the level of autocorrelation and the level of beta. The CAPM is the least misspecified in those subsamples where autocorrelation is essentially neutral.*
21	Schallheim and Demagistris (1980)	Is Fama-Macbeth procedure efficient than Random Coefficient Regression?	US Data — [1935 – 1974]	CAPM and Zero beta CAPM	OLS and Random coefficient regression	*The simple Fama-MacBeth (averaging procedure) appears to be sufficient. However the evidence exhibited by the percentage differences suggests that the RCR procedure does make a difference especially over the long periods.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
22	Scott and Brown (1980)	Are betas stable?	US Data — [1967 – 1971]	CAPM	OLS and modified OLS	*Results demonstrate that changes in estimated betas are significantly associated with changes in the product of the estimates of autocorrelations for residuals and the estimates for intertemporal market-residual covariances.*
23	Levy (1980)	How CAPM performs with the data taken from Israel market?	Israel Data— [1965 – 1980]	CAPM	OLS	*The CAPM explains about 40 percent of the variability of the average rates of return; the coefficients of the regression are not far from the observed variables.*
24	Friend and Westerfield (1980)	How CAPM and Three Moment CAPM perform?	US Data — [1968 – 1973]	CAPM, Three Moment CAPM	OLS	*The Kraus-Litzenberger attempt to develop and substantiate a modified form of the Sharpe-Lintner CAPM is not successful.*
25	Cheng and Grauer (1980)	How CAPM perform under the different tests?	US Data — [1926 – 1977]	CAPM	OLS and (Orcutt regression)	*There are predominantly statistically significant trends in the estimated values of the intercept as regressors are added. There is a statistically significant increase in the adjusted coefficient of determination as the number of regressors increases.*
26	Barry (1980)	How CAPM performs on the farm real estate firms?	US Data — [1950 – 1977]	CAPM	OLS and cochrane-Orcutt regression	*For the period, returns data, and market index, investments in farm real estate by well-diversified investors appeared to outperform the market and most individual assets too.*
27	Roll and Ross (1980)	How APT performs?	US Data — [1962 – 1972]	APT	Factor analysis and OLS	*The empirical data support the APT against both an unspecified alternative-a very weak test-and the specific alternative that own variance has an independent explanatory effect on excess returns.*
28	Merton (1980)	How the three models developed in the paper estimate the expected return on the market?	US Data — [1926 – 1978]	Three Empirical (unspecifie d) models	OLS	*First, it has been shown that in estimating models of the expected return on the market, the non-negativity restriction on the expected excess return should be explicitly included as part of the specification. Second, estimators which use realized return time series should be adjusted for heteroscedasticity.*
29	Miller and Gressis (1980)	How to dealing with risk-return relationship in the presence of nonstationarity?	US Data [1973 – 1974]	CAPM	OLS	*Results indicate the existence of a good deal of nonstationarity in the risk-return relationships. When there are changes in beta, investors are interested in whether such changes have beneficial or perverse effects on a shareholder's wealth.*
30	Collins And Rozef (1981)	How common stock performance of firms are affected in the fight of modified investor theory, contracting cost theory and estimation risk theory?	US Data[1976 – 1977]	CAPM (CAR)	OLS	*The FASB's proposal had a measurable negative effect on the equity values of affected firms. The set of variables which was hypothesized to measure the increased contracting costs and/or estimation risk associated with the FASB's proposed elimination of FC accounting was found to explain a significant proportion of the cross-sectional variation in abnormal return performance of our sample firms in the two weeks centered on the Exposure Draft issuance.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
31	Oldfield and Rogalski (1981)	How the factors that affect treasury bill influence the common stocks?	US Data — [1964 – 1979]	APT	Factor analysis, OLS	*Treasury bill returns provide a source for identifying statistical factors that influence common stock returns.*
32	Brewer (1981)	Is there any difference in the SMLs for MNCs and NATLs?	US Data — [1963 – 1975]	CAPM	OLS	*There seems to be no statistical difference in the risk-adjusted performance of MNC and NATL common stocks. MNCs provide no discernable advantage over nationals with respect to an investor's quest for the risk/return benefits of international portfolio diversification*
33	Fogler, et.al., (1981)	If there are multiple factors what might they be?	US Data — [1959 – 1977]	Multi factor model	OLS	*The returns from stock groups such as Farrell's stables-cyclical-and-growth were shown to relate to returns in the Government bond market and to corporate bonds with default risk*
34	Reinganum (1981)	Are variations in estimated betas systematically related to variations in average returns?	US Data — [1926 – 1979]	CAPM	OLS+ Scholes Williams and Dimson estimates	*The evidence indicates that NYSE-AMEX stock portfolios with widely different estimated betas possess statistically indistinguishable average returns.*
35	Reinganum (1981)	Is CAPM misspecified or market inefficient?	US Data — [1962 – 1978]	CAPM	OLS,	*The evidence in this study strongly suggests that the simple one-period capital asset pricing model is misspecified. The set of factors omitted from the equilibrium pricing mechanism seems to be more closely related to firm size than E/P ratios.. The misspecification, however, does not appear to be a market inefficiency in the sense that 'abnormal' returns arise because of transaction costs or informational lags.*
36	Reinganum (1981)	Does APT explain the differences in average returns of firms?	US Data — [1962 – 1978]	APT	Factor analysis	*The evidence in this paper indicates that a parsimonious APT fails this test. That is, portfolios of small firms earn on average 20% per year more than portfolios of large firms, even after controlling for APT risk.*
37	Weinstein (1981)	Do bonds exhibit systematic risk/to which extent interest rate and default risk explain cross sectional variation of bond's risk?	US Data — [1962 – 1974]	CAPM	OLS,	*Beta and interest rate risk are positively related. The bond market is amenable to the same types of analyses as have been done in recent years on the stock market.*
38	Roll (1981)	Do small firms have higher returns even when their measured risk is no greater than that of large firms?	US Data — [1962 – 1977]	CAPM	OLS, autocorrelation regression + Dimson beta estimator	*The mis-assessment of risk has the potential to explain why small firms, low price/earnings ratio firms, and possibly high dividend yield firms display large excess returns (after adjustment for risk). Positive auto-correlation induced in portfolios of such firms because of infrequent trading results in downward biased measures of portfolio risk and corresponding overestimates of "risk adjusted" average returns.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
39	Grauer (1981)	Do mean variance and Linear Risk Tolerance CAPM distinguishable?	US Data — [[1934 – 1971]	CAPM	OLS	*At the macro level, the primary results are: (1) judged by the generalized SML tests, the MV and a very wide variety of power utility LRT models are indistinguishable; (2) in a pragmatic but somewhat limited sense, in light of Roll's critique, the results are not affected by the choice of either an equally or value-weighted proxy for the market portfolio.*
40	Banz (1981)	Are returns and market value of common stocks related?	US Data — [1926 – 1975]	CAPM	OLS and GLS	*The CAPM is misspecified. On average, small NYSE firms have had significantly larger risk adjusted returns than large NYSE firms over a forty year period.*
41	Chen (1981)	Do betas follow stationary process over time?	US Data — [1966 – 1975]	CAPM	OLS ,Optimal Bayesian estimator	*The OLS method is not an appropriate method to be used to estimate portfolio residual risk if the beta coefficient is changing over time. The use of the OLS method will overestimate portfolio residual risk and lead to the incorrect conclusion that larger portfolio residual risk is associated with higher variability in beta coefficient.*
42	Figlewsk (1981)	Do informational effects of restrictions affect the stock returns?	US Data —[1973–1979]	CAPM	OLS	*The hypothesis that prices of stocks for which there was relatively more adverse information among investors would tend to be too high, received empirical support from the tests conducted in the paper.*
43	Downes and Heinkel (1982)	Are the entrepreneurial ownership retention hypothesis and the dividend signaling hypothesis related to firm value?	US Data — [1965 – 1969]	Leland and Pyle model	OLS	*Results offer strong support for the LP hypothesis. Firms in which entrepreneurs retain high fractional ownership do indeed have higher values, as the theory predicts. On the other hand, the BH dividend signaling hypothesis is rejected by the data. The significant negative role found for dividends suggests that this may be attributable to omitted, not readily observable, variables from the valuation equation*
44	Alexander, et.al., (1982)	Can the systematic risk of mutual funds theoretically be modeled?	US Data — [1965 – 1973]	CAPM	Regression, Markov process, Lamotte-Mcwhorter	*Mutual fund systematic risk theoretically can be modeled as a first - order Markov process when fund managers do not actively engage in timing decisions.*
45	Price, et.al., (1982)	Are there systematic differences in the two risk measures?	US Data — [1927 – 1968]	CAPM and lower partial CAPM	OLS	*At any rate, the results do not allow us to rest easy with the assumption that CLPM/LPM = COV/V, and hence that the latter, more familiar, measure can be used as our measure of systematic risk.*
46	Reinganum (1982)	Is average return of small firm statistically different than big firms?	US Data — [1963 – 1970]	CAPM	OLS and Dimson beta	*The test results indicate that precise estimates of betas for small firms may be difficult to obtain. Nonetheless, even the highest point estimate for the beta of the small firm portfolio did not seem to account for its superior performance.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
47	Gibbons (1982)	How a newly developed methodology performed in application.	US Data — [1926 – 1975]	CAPM	OLS	*With no additional variable beyond, the substantive content of the CAPM is rejected for the period 1926-1975 with a significance level less than 0.001.*
48	Casabona and Vora (1982)	Does the adjusted risk premium perform better than conventional use at risk premium in empirical test of CAPM	US Data — [1926 – 1972]	CAPM	OLS	*The use of conventional risk premiums, calculated in the manner suggested by Roll may cause significant bias in the estimates of the parameters of the market model.*
49	Standish and Swee-Im Ung (1982)	Do corporate signaling impact the stock price?	UK (United Kingdom) — [1964 – 1973]	CAPM	OLS	*Results indicate that, on average, there were positive unexpected returns from investment in the sample of British companies which announced revaluations of fixed assets.*
50	Klemkosky and Jun (1982)	Are there any relationship between monetary changes and CAPM parameters?	US Data — [1954 – 1980]	CAPM	OLS	*The wealth effect and the return variability effect of money are shown to be the two important channels of the monetary impact on the market risk premium for three representative classes of utility functions.*
51	Whaley and Cheung (1982)	How earning announcements are anticipated in stock price?	US Data — [1973 – 1977]	CAPM	OLS	*The evidence reported in this study indicates that the CBOE is an efficient market. No profits net of transaction costs can be earned in the option market by trading on the basis of firms' earnings announcements.*
52	Stambaugh (1982)	How CAPM performs when different sets of asset return included in market portfolio?	US Data — [1953 – 1976]	CAPM	OLS and MLE	*Inferences based on the most inclusive set of assets - common stocks, bonds, and preferred stocks - reject the Sharpe-Lintner version of the CAPM but do not reject the more general Black version.*
53	McDonald (1983)	What is the functional form of CAPM and their effects on empirical evidence?	US Data — [1973 – 1979]	CAPM	MLE	*For the researcher and the practitioner, the findings of this study support the validity of applying the linear or logarithmic CAPM in estimating systematic risk, versus a methodology that could vastly complicate the estimation process.*
54	Carter, et.al., (1983)	Is future market efficient?	US Data — [1966 – 1976]	CAPM	OLS, GLS	*For an efficient portfolio and an application of the CAPM to futures contracts that allows for changing speculative position, our analysis supports the generalized Keynesian theory of normal backwardation.*
55	Keim (1983)	Are size related anomalies and stock return seasonality persisted and stable over time ?	US Data — [1963 – 1979]	CAPM	OLS, scholes williams beta, dimson beta	*Evidence indicates that daily abnormal return distributions in January have large means relative to the remaining eleven months, and that the relation between abnormal returns and size is always negative and more pronounced in January than in any other month – even in years when, on average, large firms earn larger risk-adjusted returns than small firms.*
56	Dimson and Marsh (1983)	Are the UK risk measures stable over time ?	UK Data — [1955 – 1979]	CAPM	OLS, Adjusted betas	*Thin trading can lead to serious bias in risk measures. Furthermore, since trading frequency is stable over time, this bias will be persistent, and will impart a spurious stability to estimates of beta and other risk measures.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
57	Elton and Gruber (1983)	Does the impact of dividend yield explain the deviations from returns CAPM produced?	US Data — [1927 – 1976]	Zero beta CAPM	OLS	*There seems to be persistent patterns in excess returns which are related to dividend yield. Some of these differences may be due to tax effects. Others have not as yet been adequately explained.*
58	Hansen and Singleton (1983)	How intertemporal relation of asset returns exists?	US Data — [1959 – 1979]	CAPM	MLE	*Maximum likelihood estimation of the free parameters of most of the monthly models yielded point estimates of the coefficients of relative risk aversion that were between zero and two. The test statistics provided little evidence against the models using the value-weighted return on stocks listed on the New York exchange.*
59	Kryzanowski and Chau To (1983)	Is there a common factor affecting stock returns?	US Data — [1948 – 1977]	APT	Factor analysis (Rao's factor analysis alpha factor analysis)	*It seems reasonable to hypothesize that a factor structure of five factors is sufficient from an economic perspective.*
60	Chen, Nai-Fu (1983)	How APT and CAPM perform?	US Data — [1963 – 1978]	CAPM and APT	Factor analysis, OLS	*Based on the empirical evidence gathered so far, the APT cannot be rejected in favor of any alternative hypothesis, and the APT performs very well against the CAPM as implemented by the S&P 500, value weighted, and equally weighted indices. Therefore, the APT is a reasonable model for explaining cross-sectional variation in asset returns*
61	Schultz (1983)	Is transaction cost important factor for the anomaly of small firm effect?	US Data — [1962 – 1978]	CAPM	Dimson beta	*The anomalous behavior of small firm returns cannot be explained solely on the basis of differences in transaction costs between small and large firms.*
62	Brown and Kleidon (1983)	Do small firms have tended to yield returns than those predicted by traditional CAPM?	US Data — [1967 – 1975]	CAPM	OLS,SURM	*There are three new results here concerning size-related anomalies in stock returns. First, we have shown that the relation between excess returns and firm size can be regarded as linear in the log of size. Second, the ex ante excess returns attributable to size are not constant through time. Third, different estimation methodologies can lead to different conclusions about the size effects.*
63	Stambaugh (1983)	How the excluded return in indexes for real estate and durables estimated and affect the mean variance theory?	US Data — [1953 – 1976]	CAPM	MLE	*None of the statistics rejects linearity at conventional significance levels, and the statistics and p-values are quite similar across indexes.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
64	Bey (1983)	Is CAPM in the form of market model stationary over time?	US Data — [1960 – 1979]	CAPM	OLS	*The behavior of the market model for individual securities, utilities, and non-utilities varied considerably over time and was dependent on the time period studied.*
65	Basu (1983)	How is the empirical relationship among earnings' yield, firm size and returns of common stocks?	US Data — [1962 – 1978]	CAPM	OLS , Dimson beta	*The empirical findings reported in this paper indicate that, at least during the 1963-80 time period, the returns on the common stock of NYSE firms appear to have been related to earnings' yield and firm size. In particular, the common stock of high E/P firms seem to have earned, on average, higher risk-adjusted returns than the common stock of low E/P firms. On the other hand, while the common stock of small NYSE firms appear to have earned considerably higher returns than the common stock of large NYSE firms, the size effect virtually disappears when return are controlled for differences in risk and E/P ratios.*
66	Brown and Weinstein (1983)	Are the common factors that affect stocks returns constant over time?	US Data — [1962 – 1972]	APT	Factor analysis (Jöreskog algorithm) OLS,GLS	*With very many observations it is possible to reject any hypothesis at one's favorite level of statistical significance. When we adjust the size of the test to take this into account, our results are consistent with the three factors APM.*
67	Cho, et.al., (1984)	How zero beta and APT performs?	US Data — [1973 – 1980]	Zero-beta CAPM,APT	Factor analysis ,GLS	*In two simulation experiments, we find that while Roll and Ross (1980) procedure has a slight tendency to overstate the number of factors at work in the market, this tendency cannot account for the large number of factors they found in their original article.*
68	Cho (1984)	Is APT valid model?	US Data — [1962 – 1982]	APT	GLS, factor analysis (inter-battery)	*Results indicate that there are five or six inter-group common factors that generate daily returns for two groups and that these inter-group common factors do not depend on the size of groups. Also, the APT could not be rejected in the sense that the risk-free rate and the risk premium are the same across groups and that the risk-free rate is different from zero.*
69	Bower, et.al., (1984)	Which model is better to estimate the expected returns: APT or CAPM?	US Data — [1971 – 1979]	APT and CAPM	OLS (Theil measure)	*APT does do better CAPM in explaining and conditionally forecasting return variations through the time and across assets.*
70	Dhrymes, et.al., (1984)	Are the numbers of factor increasing as the numbers of securities increase in testing APT through factor analysis?	US Data — [1962 – 1972]	APT	Factor analysis	*Results show that how many factors one "discovers" depends on the size of the group of securities one deals with.*
71	Hazuka (1984)	Is there a linear relationship between risk premiums and consumption beta?	US Data – [not stated]	C-CAPM	OLS	*Both the intercept and the slope coefficients were significantly positive, as the theory predicted; however, the magnitude of the intercept was smaller and that of the slope greater than predicted.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
72	Dhrymes, et.al., (1985)	Can the ability of risk measures from one period to another explain returns?	US Data — [1962 – 1981]	APT	Factor analysis (GLS)	*Test results appear to be extremely sensitive to the number of securities used in the two stages of the tests of the APT model. New tests also indicate that unique risk is fully as important as common risk. While these tests have serious limitations, they are inconsistent with the APT.*
73	Amsler and Schmidt (1985)	How artificial returns work in context of CAPM test?	Artificial (random) data	CAPM	Monte Carlo experiment	*The main results of our experiment are clear and easily summarized: 1. The Wald test is unreliable. 2. Shanken's tests are unreliable. 3. The LR test is better than the tests in 1 and 2, but it is still unreliable unless the sample size is very large. Its problem is that it rejects the null hypothesis too often (when it is true). 4. The LM test is considerably better than the tests in 1, 2 and 3. It is reasonably reliable except when T is small or K is relatively large, in which case it exhibits a tendency to reject the null hypothesis too seldom. 5. Shanken's CSR test and Jobson and Korkie's LR test are quite reliable under all circumstances which we consider. 6. There is no basis in our results to prefer the CSR test to the LR test, or vice versa.*
74	Brown and Gibbons (1985)	Which estimation method, parametric or non-parametric is better?	US Data — [1926 – 1981]	Utility based asset pricing models	Method of moment and parametric estimation	*The results from the overall period suggest no statistically significant departure from log utility. The economic distinction between RRA equal to one versus (say) two may not be very important given the behavior of an individual to a timeless gamble.*
75	Barone-Adesi (1985)	How arbitrage equilibrium with skewed asset returns existed?	US Data — [1926 – 1970]	Three moment CAPM	OLS (likelihood ratio)	*Empirical tests try to relate ex post returns to ex ante expectations. Their results are, therefore, sensitive to the specification of this link. With this caveat, it appears that the arbitrage equilibrium associated with the quadratic market model is not a complete description of empirical security returns, even though this arbitrage model appears to be of some utility in understanding security pricing.*
76	Ang and Peterson (1985)	How is the role of yield (dividend) in explaining stock returns?	US Data — [1973 – 1983]	CAPM(after tax adjusted)	Maximum likelihood	*Results from the estimation of the after-tax CAPM indicate a general positive and significant relationship between return and yield, although there are years in which the relationship is insignificant.*
77	Shanken (1985)	How zero beta CAPM performs?	US Data — [1959 – 1971]	Zero-beta CAPM	OLS,+ GLS	*The CRSP equally weighted index is inefficient, but that the inefficiency is not explained by a firm size-effect from February to December.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
78	Yagil (1985)	Is Index-Linked bond efficient in the content of CAPM?	Israel Data — [1981 – 1984]	CAPM	OLS	*The empirical results indicated that the model presented was somewhat successful in identifying incorrectly valued index bonds, implying that this market is not perfectly efficient, at least in the case of the Israeli index bond market.*
79	Chan, Chen and Hsieh (1985)	Is there a firm size effect in the context of multifactor models?	US Data — [1953 – 1977]	Multi-factor pricing models (CAPM)	OLS	*Among the economic variables included, the measure of the changing risk premium explained a large portion of the size effect.*
80	Best and Grauer (1985)	How the relation between MV based CAPM and observed market value weights is?	US Data — [1935 – 1979]	CAPM	Mean variance optimization	*The result highlights a number of inconsistencies involved in MV modeling.*
81	Gibbons and Ferson (1985)	How financial models perform when risk premium is relaxed to be changing?	US Data — [1962 – 1980]	CAPM ,multi factors	OLS	*Asset pricing models can be estimated and tested without observing the market portfolio or state variables. Avoiding a specification of these is a by-product of relaxing the assumption that risk premiums are constant. While changing risk premiums does require a model for conditional expected returns, a regression model permits standard specification tests and is robust to missing information.*
82	Gultekin and Rogalski (1985)	How is the bond's risk evaluated in context of APT and CAPM in addition with the interest rate?	US Data — [1960 – 1979]	APT, CAPM	OLS + factor analysis +seemingly unrelated regression + GLS +	*It is found that at least two factors are linearly related to mean bond portfolio returns. We did not, however, uncover a linear relation between mean bond returns and various portfolio proxies. Furthermore, multivariate test results are not supportive of the APT or the Sharpe Lintner and Black versions of the CAPM.*
83	Jagannathan (1985)	Can future prices be modeled by consumption based intertemporal model?	US Data— [1960 – 1978]	CCAPM	GMM	*The model was rejected. It is possible that the asymptotic inference theory was not justified in our case due to the small sample size. It is also possible that some of the underlying assumptions were not satisfied.*
84	Swidler (1985)	How is the role of analyst' forecasts taken place in the context of CAPM?	US Data — [1982 – 1983]	CAPM	OLS	*Firms neglected by analysts have greater divergence of opinion about the mean forecast.*
85	Sweeney and Warga (1986)	Are the firms required to pay investors *ex ante premium* for bearing this risk of interest-rate changes?	US Data — [1960 – 1979]	APT and CAPM	MLE	*Changes in government bond yields clearly affect ex post returns to electric utilities, and that this phenomenon is concentrated to a much larger extent in this particular industry than in NYSE firms as a whole.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
86	Korkie (1986)	Is size anomaly related to a sample inefficient index?	US Data— [1951 – 1980]	CAPM (zero beta CAPM)	MLE	*The index lies on the efficient set hyperbola, the Black version of the asset-pricing model is not rejected, and the small firm anomaly disappears.*
87	Dimson and Marsh (1986)	How size effect is analyzed with event study methodology?	US Data — [1975 – 1982]	CAPM	*OLS + Event study*	*Overall performance can appear significantly positive or negative, depending on the choice of index and methodology.*
88	Mankiw and Shapiro (1986)	How Consumption CAPM and CAPM performs ?	US Data — [1959 – 1982]	CAPM and CCAPM	OLS + GLS	*The data examined in the paper provide no support for the consumption CAPM as compared to the traditional formulation.*
89	Jorion and Schwartz (1986)	How Canadian stock market integrated with NYSE?	Canadian Data — [1963 – 1982]	CAPM and lAPM	MLE	*An international CAPM was not a good description of the pricing of Canadian securities for the period from 1968 through 1982. The joint hypothesis of integration of the North American equity market combined with the CAPM it is rejected. There is evidence of segmentation in the pricing of Canadian stocks.*
90	Litzenberger and Ronn (1986)	How utility based model performs?	US Data — [1926 – 1982]	Utility based model	OLS, MLE, method of moments	*Over the same holdout period, the utility-based model correctly predicts the direction of aggregate common stock price movements 70% of the time, which compares with a 55% for the risk-neutral model, for the Williams-Gordon-Rubinstein model, for the simple technical model.*
91	Tinic and West (1986).	How CAPM performs?	US Data — [1935 – 1982]	CAPM	OLS	*The results do not support the important implications of the CAPM.*
92	McInish and Wood (1986)	What is the extent of bias in beta estimates due to thin trading and price adjustment delays?	US Data — [1971 – 1972]	CAPM	Linear programming model to estimate betas	*Evidence is provided that bias due to thin trading and price adjustment delays is substantial for NYSE stocks when daily returns are used*
93	McDonald (1987)	How to deal with the abnormal returns when systems method is used in addition with event study?	US Data — [1961 – 1985]	CAPM	OLS+GLS+IGLS(iterated GLS)	*Although systems methods have various characteristics that are amenable to event study applications, the promise of these methods is not supported by a variety of empirical tests.*
94	MacKINLAY (1987)	How to distinguish CAPM from other asset pricing model through multivariate tests?	US Data — [1954 – 1983]	CAPM	Multivariate tests	*The tests can have reasonable power if the deviation is random across assets. But if the deviation is the result of missing factors (as is the case in many competing models), the tests are quite weak.*
95	Corhay, et.al., (1987)	How seasonality differs among stock exchanges?	US, UK and France Data [1969 – 1983]	CAPM	OLS	*Empirical evidence reveals a common characteristic across the four stock exchanges: the presence of persistent seasonalities in these markets' risk premium and stock returns*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
96	Cho and Taylor (1987)	Do returns and correlation coefficients, correlation matrices and covariance matrices, the number of return-generating factors differ and pricing relationships differ across calendar months and groups?	US Data — [1973 – 1983]	APT	Factor analysis (maximum likelihood) + modified GLS	*The results show that there is a January effect and a small-firm effect in stock returns. Correlation matrices are more stable than covariance matrices, but both types of matrices are not stable across months and across the sample groups. The number of return-generating factors is rather stable most of the time and for most of the sample groups, but there is some significant instability that is related to the average correlation coefficients among stocks. The APT pricing relationship does not seem to be supported by the two-stage process using the maximum-likelihood factor analysis*
97	Collins, et.al., (1987)	Is there a broader and richer information set available about the activities of larger firms vis-à-vis smaller firms?	US Data — [1968 – 1980]	CAPM	OLS (random walk model valuation model + RWM with drift)	*Price-based earnings will outperform univariate time series forecasts by a greater margin for larger firms than for smaller firms. Size is viewed as a proxy for available information in addition to that which is reflected in the past time series of earnings and for the number of market participants gathering and processing information.*
98	Shanken (1987)	How efficiency of given portfolio is tested through Bayesian approach?	US Data — [1926 – 1982]	MPT	Bayesian approach test for efficiency	*The analysis indicates that significance levels higher than the traditional 0.05 level are recommended for many test situations. in an example from the literature. The classical test fails to reject with p-value 0.082. Yet the odds are nearly two to one against efficiency under apparently reasonable assumptions.*
99	Shanken (1987)	How CAPM performs when different proxy for market portfolio is used?	US Data — [1953 – 1983]	CAPM	OLS+MLE	*Empirical evidence has been presented which suggests that either the Sharpe-Lintner CAPM is invalid or our proxies account for at most two-thirds (rejected at the 0.05 level), or perhaps only one-half (rejected at the 0.10 level), of the variation in the true market return. The results are essentially the same whether we use the CRSP equal-weighted stock index alone, or together with the Ibbotson-Sinquefield long-term U.S. government bond index, in a multivariate proxy.*
100	French, et.al., (1987)	Is the expected market risk premium positively related to risk as measured by the volatility at the stock market?	US Data — [1928 – 1984]	CAPM	OLS+WLS+ modified WLS	*The expected market risk premium (the expected return on a stock portfolio minus the Treasury bill yield) is positively related to the predictable volatility of stock returns. There is also evidence that unexpected stock market returns are negatively related to the unexpected change in the volatility of stock returns.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	Conclusion
101	Freeman (1987)	Do the abnormal security returns related to accounting earnings occur (begin and end) earlier for large firms than for small firms (timing hypothesis)?	US Data — [1966 – 1982]	CAPM	OLS	*The security prices of large firms anticipate accounting earnings earlier than the security prices of small firms, and the magnitude of abnormal returns associated with good or bad news from a common class of signals (in the current study, accounting earnings) is inversely related to firm size.*
102	Ferson, et.al., (1987)	How tests of asset pricing with time-varying expected risk premiums and market betas perform?	US Data — [1963 – 1982]	CAPM	Maximum likelihood methods	*A single risk premium model of expected returns is not rejected if the premium is allowed to vary over time and if the risk measures associated with that premium are not constrained to equal market betas.*
103	Bollerslev, et.al., (1988)	Do all investors choose mean-variance efficient portfolios with one period horizon although they need not have identical utility functions?	US Data — [1959 – 1984]	CAPM	(GARCH-M) maximum likelihood estimation	*The conditional covariance matrix of the asset returns is strongly autoregressive. The data clearly reject the assumption that this matrix is constant over time.*
104	Kroll and Levy (1988)	What are the effects of the correlations between the risky assets on investment portfolios? Is separation theorem valid?	Experimental (questionnaire) data	CAPM and MPT	Mean-variance mathematics + ANOVA	*As predicted by the CAPM, in most cases the subjects diversified their investment capital among the three risky assets. However, on the average the subjects invested considerably more than predicted in the riskiest asset. The introduction of a riskless asset did not enhance homogeneity in investment behavior, in contradiction to the Separation Theorem*
105	Burmeister and McElroy (1988)	How APT and CAPM perform?	US Data — [1972 – 1982]	CAPM and APT	Iterated nonlinear WLS, iterated nonlinear SUR and iterated nonlinear three stage least squares.	*The January effect is an important determinant of expected returns. The existence of a January effect that is not explained by this set of factors is evident, but, it would be trivial to add a portfolio that exhibits a strong January effect and hence represents a "January factor." Including or excluding a January effect has, however, no appreciable effect on the following results from nested testing: the CAPM restrictions on the APT are rejected; the APT restrictions on the LFM are not rejected.*
106	Connor and Korajczyk (1988)	How APT and CAPM perform?	US Data — [1964 – 1983]	APT and CAPM	Asymptotic principal component (factor analysis)+OLS	*The APT performs much better than either implementation of the CAPM in explaining the January-specific mispricing related to firm size. This result is due to seasonality in the estimated risk premiums of the multi-factor model that is not captured by the single-factor CAPM relations, even though the premium in the latter model also exhibits seasonality*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
107	Chan and Nai-Fu Chen (1988)	How CAPM performs?	US Data — [1949 – 1983]	CAPM	OLS(modified OLS)+ SURR	*Although our results show that the pricing equation cannot be rejected in favor of the alternative pricing equation with the firm-size variable, theoretical reasoning suggests that we should have a multifactor asset-pricing model if risks corresponding to a changing investment opportunity set.*
108	Jaffe, et.al., (1989)	What is the relation at earnings yields, market value (size) with stock returns?	US Data — [1951 – 1986]	CAPM	SURR+OLS	*Research finds significant E/P and size effects when estimated across all months during the 1951-1986 period. The findings also indicate a difference between January and the rest of the year.*
109	Korajczyk and Viallet (1989)	How asset pricing models perform in international settings?	US Data — [1969 – 1983]	CAPM and APT	OLS +factor analysis (asymptotic principal components technique)	*There is some evidence against all of the models, especially in terms of pricing common stock of small-market-value firms. Multifactor models tend to outperform single-index CAPM-type models in both domestic and international forms.*
110	Harlow and Rao (1989)	How MLPM performs?	US Data — [1931 – 1980]	MPLM CAPM	OLS+SURR procedure	*Using market data, the MLPM model was tested against an unspecified alternative. For the CRSP equally weighted index, the MLPM model could not be rejected for a large set of alternative target rates of returns.*
111	Bodurtha, and Mark (1991)	How CAPM (conditional) performs?	US Data — [1926 – 1985]	Conditional CAPM	GMM (Garch specification)	*It is found strong evidence of time variation in the conditional first and second moments of excess stock returns. The first- and third-order lags in the conditional variance of the market risk premium, as well as in the conditional covariance between the returns of five value-weighted portfolios and the market were found to be significant. These results suggest that monthly and quarterly variability components are priced in equity excess returns.*
112	Cochrane (1991)	How investment-based CAPM performs?	US Data — [1947 – 1987]	Investment-based CAPM	OLS	*Investment returns do not explain the component of stock returns forecastable by dividend-price ratios. Dividend-price ratios seem to forecast a long horizon component in stock returns not present in investment returns.*
113	Tan (1991)	How three moment CAPM performs?	US Data — [1970 – 1986]	Three moment CAPM	OLS	*The tests of the TMCAPM show that the average return over time on the selected mutual funds tends to deviate from the predictions of the model. They are generally flatter than predicted by TMCAPM, implying that tradeoffs of risks for return are less than predicted.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
114	Lilian Ng (1991)	How conditional CAPM performs?	US Data — [1926 – 1987]	Conditional CAPM	GMM (GARCH specification)	*Empirical results based on the pooled time series and cross-section of beta-ranked portfolio returns do not reject the conditional mean-variance efficiency of the market proxy portfolio. The findings also indicate that the ratio of expected excess market return to the conditional market variance, or the reward-to-risk ratio, is positively correlated with the level of the conditional market variance. When tests are based on ten size-sorted portfolios, however, the tests reject the model.*
115	Hamori (1991)	How C-CAPM performs?	Japanese Data— [1980 – 1988]	C-CAPM	GMM	*The estimation results of C-CAPM in Japan are totally different from those in the United States. These results are not robust and at least in Japan the model is consistent with the movements of asset returns.*
116	Sauer and Murphy (1992)	How CCAPM and CAPM perform?	German Data— [1968 – 1988]	CCAPM and CAPM	GLS	*This research finds evidence that the CAPM is a better indicator of capital asset pricing in Germany than the CCAPM.*
117	Fama and French (1992)	What is the relation of size and book-to-market equity with stock returns?	US Data — [1962 – 1989]	CAPM	OLS	*For the 1963-1990 period, size and book-to-market equity capture the cross-sectional variation in average stock returns associated with size, E/P, book-to-market equity, and leverage.*
118	Fama and French (1993)	What are the relevant factors that affect stock and bond returns?	US Data — [1963 – 1991]	CAPM and Three factor model	OLS	*The three stock-market factors are largely uncorrelated with one another and with the two term-structure factors. The regressions that use the proxy return for market portfolio, SMB, HML, TERM and DEF as factors to explain stock and bond returns thus provide a good summary of the separate roles of the five factors in the volatility of returns and in the cross-section of average returns.*
119	Handa, et.al., (1993)	How the return interval affects betas?	US Data — [1926 – 1982]	CAPM	OLS+GLS	*Beta changes with the return interval because an asset return's covariance with the market return and the market return's variance may not change proportionately as the return interval is varied. The evidence is consistent with the market model betas changing predictably with the return interval. Betas of high-risk securities increase with the decrease with the return interval, whereas betas of low-risk securities decrease with the return interval.*
120	Zhou (1993)	How asset pricing tests perform under alternative distributions?	US Data — [1926 – 1986]	CAPM	MLE	*If the returns are elliptically distributed, empirical studies that ignore the non-normality are likely to over-reject the theory being tested, but the proposed approach can be used to detect the magnitude of the over-rejection.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
121	Mei (1993)	How APT and CAPM perform?	US Data — [1989 – 1993]	CAPM, APT	GLS(3 SLS)+ (Semiautoregressive system)+factor analysis	*Historical returns can be used to approximate the unobservable factor loadings and factors can be estimated by running a series of semi autoregressions.*
122	Chen and Jordan (1993)	How APT performs?	US Data — [1971 – 1986]	APT	"factor analysis + GLS	*A number of tests are run in this study to compare the performance of two empirical versions of the APT, a factor loading model (FLM) and a macroeconomic variable model (MVM). The viability of the MVM to the FLM is suggested by all three sets of test results.*
123	Ferson and Harvey (1993)	How multifactor model performs?	18 national equity markets — [1970 – 1989]	Multifactor model	(SUR) GMM	*Although previous studies do not reject the unconditional mean-variance efficiency of a world equity market portfolio, we find that the world market betas provide a poor explanation of the average returns across countries.*
124	Pettengill, et.al., (1995)	How CAPM performs?	US Data — [1926 – 1990]	CAPM	OLS	*A systematic relation exists between beta and returns for the total sample period and is consistent across subperiods and across months in a year, and a positive tradeoff between beta and average portfolio returns is observed.*
125	Cochrane (1996)	How investment-based CAPM performs?	US Data – [not stated]	Investment based CAPM	GMM (iterated GMM)+GLS	*The simple investment return model performs surprisingly well. The investment return factors significantly price assets, the model is not rejected, and it is able to explain a wide spread in expected returns, including managed portfolio returns formed by multiplying returns with instruments.*
126	Campbell (1996)	How the multifactor model performs?	US Data — [1952 – 1990]	Multifactor models	GMM (VAR specification)	*The implications of the intertemporal model for the conditional moments of asset returns are strongly rejected, although there is only weak evidence against its implications for unconditional moments.*
127	Jagannathan and Wang (1996)	How conditional CAPM performs?	US Data — [1962 – 1990]	Conditional CAPM	OLS+GMM	*When betas and expected returns are allowed to vary over time by assuming that the CAPM holds period by period, the size effects and the statistical rejections of the model specifications become much weaker. When a proxy for the return on human capital is also included in measuring the return on aggregate wealth, the pricing errors of the model are not significant at conventional levels. More importantly, firm size does not have any additional explanatory power.*

Code	Reference	Research Question	Data-[Time period]	Model	Estimation Techniques	*Conclusion*
128	Clare, et.al., (1998)	How CAPM performs?	UK Data — [1980 – 1993]	CAPM	NLSUR (Non-linear Seemingly Unrelated Regression)	*A significant and powerful role for beta in explaining expected returns is found.*
129	Naranjo, et.al., (1998)	Do stocks with higher anticipated dividend yields earn higher risk-adjusted returns?	US Data — [1963 – 1994]	TFM	OLS, SUR	*Returns are positively related to that yield. This holds true even after making risk adjustments based on the Fama-French factors and macroeconomic risk factors from the asset pricing literature.*
130	Chan, et.al., (1998)	How common factor affect stock returns?	US and Japanese Data — [1968 – 1994]	Factor Models	OLS, Factor Analysis	*The performance of these Macroeconomic factors to be quite disappointing. With the exception of the factors related to the default premium and the term premium, the macroeconomic factors do a poor job in explaining return co-variation.*
131	Rouwenhorst (1999)	Are similar return factors present around the world?	20 Emerging Markets Data — [1975 – 1997]	TFM	OLS	*The return factors in emerging markets are qualitatively similar to those in developed markets: Small stocks outperform large stocks, value stocks outperform growth stocks and emerging markets stocks exhibit momentum.*
132	Lettau and Ludvigson (2001)	How CAPM and CCAPM perform?	US Data-- [1963 – 1998]	CAPM, CCAPM, TFM Conditional CAPM	OLS, GMM	*Scaled consumption CAPM does a good job of explaining the celebrated value premium: portfolios with high book-to-market equity ratios also have returns that are more highly correlated with the scaled consumption factors we consider, and vice versa.*
133	Dittmar (2002)	How four moment CAPM performs?	US Data — [1963 – 1995]	FMCAPM, TFM	Hansen Jagannathan estimator (modified GMM)	*The pricing kernels implied by both a linear single- and a linear multi-factor model appear unable to explain the cross-sectional variation in port folio returns.*
134	Wang (2003)	How CAPM, conditional CAPM and three factor model performs?	US Data — [1947 – 1995]	CAPM – conditional CAPM , TFM	OLS+WLS+GMM+ BHV (Bansal,hsiesh,Viswonathan)	*The momentum effect does not seem to be a serious anomaly to the nonparametric conditional version of the Fama and French model. According to the model, the winners tend to have conditional expected returns that are significantly higher than the losers.*
135	Vorkink (2003)	How different estimations techniques affect tests' results?	US Data — [1963 – 1995]	CAPM	OLS+GMM+HLV	*Contrary to the OLS and GMM estimators, the Hodgson, Linton, and Vorkink (2002) estimator fails to reject the linear CAPM on the group of size-sorted portfolios. We find that the OLS-GMM rejection of the CAPM is driven by sensitivity to outliers in the size-sorted data.*
136	Acharya and Pedersen (2005)	How Liquidity Based CAPM performs?	US Data — [1962 – 1999]	Liquidity Based CAPM	GMM	*The liquidity-adjusted CAPM explains the data better than the standard CAPM, while still exploiting the same degrees of freedom.*

Note: CAPM is referring to Sharpe Lintner CAPM; TFM is referring to Three Factor Model of Fama and French; FMCAPM is referring to Four Moment CAPM;

7. Concluding Remarks

The purpose of this paper is to give a comprehensive theoretical review devoted to asset pricing models by emphasizing static and dynamic versions in the line with their empirical investigations. This paper fills the gap in literature by giving a comprehensive review of the models and evaluating the historical stream of empirical investigations in the form of structural empirical review. The distinctiveness of the study is that this is the first attempt to review literature written on asset pricing models and the empirical investigation conducted in the form of structural empirical review. In doing so, the historical perspective of the concept and the place it will take in future are clarified and the way further researches conducted will be explored. As it is highlighted in section 6, we present 136 research question investigated in asset pricing literature. Concluding remarks can be divided into two main categories such as theoretical perspective and empirical investigation perspective. In terms of theoretical perspective, we show that asset pricing models try to adopt additional variables into pricing process. This procedure is starting with the relaxing one of the assumptions of the previous model or approaching the problem from different perspectives. From static, one period model we see that dynamic, intertemporal models get the higher attention than static, one period models. In terms of empirical investigation perspective, it is documented that econometric advancement takes its biggest place ever in financial literature when compared with the other field. Almost every single econometric estimation technique is used to determine the most unbiased estimators of given model. This underlines the fact that the direction of advancing a methodology is changing from financial literature to economics due to the fact that there is huge account of raw data available to analyze. Future research direction should be judging the empirical power of the asset pricing models and their role in practice for incorporating a new dimension to the model.

References

Acharya, V.V., Pedersen, L.H. (2005), Asset Pricing with Liquidity Risk. Journal of Financial Economics, 77 (2), 375–410.

Adler, M., Dumas, B. (1983), International Portfolio Choices and Corporation Finance: A Synthesis. The Journal of Finance, 38(3), 925-984.

Alexander, G.J., Benson, P.G., Eger, C.E. (1982), Timing Decisions and the Behavior of Mutual Fund Systematic Risk. The Journal of Financial and Quantitative Analysis, 17(4), 579-602.

Amsler, C. E., Schmidt, P. (1985), A Monte Carlo Investigation of the Accuracy of Multivariate CAPM Tests. Journal of Financial Economics, 14(3), 359-375.

Ang, J. S., Peterson, D.R. (1985), Return, Risk, and Yield Evidence from Ex Ante Data. The Journal of Finance, 40(2), 537-548.

Arbel, A., Kolodny, R., Lakonishok, J. (1977), The Relationship Between Risk of Default and Return. The Journal of Financial and Quantitative Analysis, 12(4), 615-625

Bachrach B., Galai D. (1979), The Risk-Return Relationship and Stock Prices. Journal of Financial and Quantitative Analysis, 14 (2), 421-441.

Baesel, J.B., Stein, G.R. (1979), The Value of Information: Inferences from the Profitability of Insider Trading. The Journal of Financial and Quantitative Analysis, 14(3), 553 -571.

Balvers, R.J. (2001), Foundations of Asset Pricing. Lecture Notes, West Virginia University.

Banz, R.W. (1981), The Relationship between Return and Market Value of Common Stocks. Journal of Financial Economics, 9 (1), 3-18.

Barberis, N., Thaler, R., (2003), A Survey of Behavioral Finance. Handbook of the Economics of Finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, Elsevier Science B.V.

Barber, B. M., Odean, T. (1999), The Courage of Misguided Convictions. Financial Analysts Journal, 55(6), 41-55.

Barber, B. M., Odean, T. (2001), Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment. The Quarterly Journal of Economics, 116(1), 261-292.

Bar-Hillel, M., Neter, E. (1996), Why Are People Reluctant to Exchange Lottery Tickets? Journal of Personality and Social Psychology, 70(1), 17-27

Barry, P.J. (1980), Capital Asset Pricing and Farm Real Estate. American Journal of Agricultural Economics, 62(3), 549-553.

Basu, S. (1983), The Relationship Between Earnings' Yield, Market Value and Return for NYSE Common Stocks: Further Evidence. Journal of Financial Economics, 12(1), 129-156.

Baxter, M., Jermann, U. (1997), The International Diversification Puzzle is Worse than You Think. American Economic Review, 87(1), 170-180.

Bawa, V., Lindenberg, E. (1977), Capital Market Equilibrium in a mean, Lower Partial Moment Framework. Journal of Financial Economics, 5(2), 189-200.

Benartzi, S. (2001), Excessive Extrapolation and Allocation of 401(k) Accounts to Company Stocks. Journal of Finance, 56(5), 1747-1764.

Benartzi, S., Thaler, R.H. (2001), Naive Diversification Strategies in Defined Contribution Savings Plan. American Economic Review, 91(1), 79-98.

Best, M. J., Grauer, R.R. (1985), Capital Asset Pricing Compatible with Observed Market Value Weights. The Journal of Finance, 40(1), 85-103.

Bey R. P., (1983), Market Model Stationarity of Individual Public Utilities. The Journal of Financial and Quantitative Analysis, 18(1), 67 -85.

Black, F. (1972), Capital Market Equilibrium with Restricted Borrowing. Journal of Business, 45(3), 444-54.

Black, F., Scholes M. (1973), The Pricing of Options and Corporate Liabilities. Journal of Political Economy, 81 (May–June), 637–654.

Bikhcandani, S., Sharma, S. (2000), Herd Behavior in Financial Markets. IMF Staff Papers, WP/00/48, International Monetary Fund

Bodie, Z., Kane, A., Markus, A.J. (2008), Investment, 7th edn., McGraw-Hill/Irwin, 1221 Aveneu of the Americas, New York, US.

Bodurtha, J. N.Jr., Mark, N.C., (1991), Testing the CAPM with Time-Varying Risks and Returns. The Journal of Finance, 46(4), 1485-1505.

Bower, D. H., Bower, R.S., Logue, D. E. (1984), Arbitrage Pricing Theory and Utility Stock Returns. The Journal of Finance, 39(4), 1041-1054.

Bollerslev, T., Engle, R.F., Wooldridge, J.M. (1988), A Capital Asset Pricing Model with Time-Varying Covariances. The Journal of Political Economy, 96(1), 116-131.

Breeden, D. T. (1979), An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities. Journal of Financial Economics, 7 (3), 265-96.

Brenner, M., Smidt S. (1977), A Simple Model of Non-Stationarity of Systematic Risk. Journal of Finance, 32(4), 1081-1092.

Brewer, H. L. (1981), Investor Benefits from Corporate International Diversification. Journal of Financial and Quantitative Analysis, 16 (1), 113-126.

Brock, W. A. (1979), Asset Prices in a Production Economy. Social Science Working Paper 275, California Institute of Technology.

Brown, S. L. (1979), Autocorrelation, Market Imperfections, and the CAPM. Journal of Financial and Quantitative Analysis, 14 (5), 1027-1034.

Brown, P., Kleidon, A.W., Marsh, T.A. (1983), New Evidence on the Nature of Size-Related Anomalies in Stock Prices. Journal of Financial Economics, 12(1), 33-56.

Brown, D. P., Gibbons, M. R. (1985), A Simple Econometric Approach for Utility-Based Asset Pricing Models. The Journal of Finance, 40(2), 359-381.

Brown, S. J., Weinstein, M. I. (1983), A New Approach to Testing Asset Pricing Models The Bilinear Paradigm. The Journal of Finance, 38(3), 711-743.

Burmeister, E., McElroy, M.B. (1988), Joint Estimation of Factor Sensitivities and Risk Premia for the Arbitrage Pricing Theory. The Journal of Finance, 43(3), 721-733.

Camerer,C., Babcock, L., Loewenstein, G., Thaler, R. (1997), Labor Supply of New York City Cabdrivers: One Day at a Time. The Quarterly Journal of Economics, 112(2), 407-441.

Campbell, J.Y. (1996), Understanding Risk and Return. The Journal of Political Economy, 104(2), 298-345

Carter, C.A., Rausser, G.C., Schmitz, A. (1983), Efficient Asset Portfolios and the Theory of Normal Backwardation. The Journal of Political Economy, 91(2), 319-331.

Casabona, P. A., Vora, A. (1982), The Bias of Conventional Risk Premiums in Empirical Tests of the Capital Asset Pricing Model. Financial Management, 11 (2), 90-96.

Chan, K. C., Chen, N.F., Hsieh, D.A. (1985), An Exploratory Investigation of the Firm Size Effect. Journal of Financial Economics, 14(3), 451-471.

Chan, L.K.C., Karceski, J., Lakonishok, J. (1998), The Risk and Return from Factors. The Journal of Financial and Quantitative Analysis, 33(2), 159-188.

Chan, K. C., Chen, N.F. (1988), An Unconditional Asset-Pricing Test and the Role of Firm Size as an Instrumental Variable for Risk. The Journal of Finance, 43(2), 309-325.

Chen, S.N. (1981), Beta Nonstationarity, Portfolio Residual Risk and Diversification. Journal of Financial and Quantitative Analysis, 16 (1), 95-111

Cheng, P. L., Grauer, R.R. (1980), An Alternative Test of the Capital Asset Pricing Model. American Economic Review, 70 (4), 660-671.

Chen, N.F. (1983), Some Empirical Tests of the Theory of Arbitrage Pricing. The Journal of Finance, 38 (5), 1393-1414.

Chen, S.J., Jordan, B.D. (1993), Some empirical tests in the Arbitrage Pricing Theory: Macrovariables vs. derived factors. Journal of Banking and Finance, 17(1), 65-89.

Cho, D. C. (1984), On Testing the Arbitrage Pricing Theory Inter-Battery Factor Analysis. The Journal of Finance, 39(5), 1485-1502.

Cho, D.C., Taylor., W.M. (1987), The Seasonal Stability of the Factor Structure of Stock Returns. The Journal of Finance, 42(5), 1195-1211.

Cho, D.C., Elton, E.J., Gruber, M.J. (1984), On the Robustness of the Roll and Ross Arbitrage Pricing Theory. The Journal of Financial and Quantitative Analysis, 19(1), 1- 10.

Clare, A.D., Smith P.N., Thomas S.H. (1997), UK stock returns and robust tests of mean variance efficiency. Journal of Banking & Finance, 21(5), 641-660.

Cochrane, J. H. (1991), Production-Based Asset Pricing and the Link Between Stock Returns and Economic Fluctuations. The Journal of Finance, 46(1), 209-37.

Cochrane, J. H. (1996), A Cross-Sectional Test of an Investment-Based Asset Pricing Model. Journal of Political Economy, 104(3), 572-621.

Cochrane, J. H. (2005), Asset Pricing, (revised edition) Published by Princeton University Press, 41 William Street, Princeton, New Jersey 08540, US.

Collins, D. W., Rozef, M. S., Dhaliwal, D.S. (1981), The Economic Determinants of The Market Reaction to Proposed Mandatory Accounting Changes in The Oil and Gas Industry: A Cross-Sectional Analysis. Journal of Accounting and Economics, 3(1), 37-71

Collins, D.W., Kothari, S.P., Rayburn, J.D. (1987), Firm Size and the Information Content of Prices with Respect to Earnings. Journal of Accounting and Economics, 9(2), 111-138.

Connor, G., Korajczyk, R.A. (1988), Risk and Return in an Equilibrium APT: Application to New Test Methodology. Journal of Financial Economics, 21(2), 255-289.

Constantinides, G.M., Harris, M., Stulz, R.M.(editors) (2003), Handbook of The Economics of Finance Volume 1b. Elsevier B.V. Sara Burgerhartstraat 25, P.O. Box 211, 1000 AE Amsterdam, The Netherlands

Corhay, A., Hawawini, G., Michel, P. (1987), Seasonality in the Risk-Return Relationship Some International Evidence. The Journal of Finance, 42(1), 49-68.

Daniel, K. D., Hirshleifer, D., Subrahmanyam, A. (1998), Investor Psychology and Security Market Under- and Overreactions. Journal of Finance, 53(6), 1839-1885.

Daniel, K., Titman, S. (1999), Market Efficiency in an Irrational World. Financial Anlaysts Journal, 55(6), 28-40.

De Bondt, W. F. M., Thaler, R. (1985), Does the Stock Market Overreact? The Journal of Finance, 40(3), 793-805.

De Bondt, W. F. M., Thaler, R. (1987), Further Evidence on Investor Overreaction and Stock Market Seasonality. 42(3), 557-581

Dimson, E., Marsh P. R. (1983), The Stability of UK Risk Measures and the Problem of Thin Trading. The Journal of Finance, 38(3), 753-783.

Dimson, E., Marsh, P. (1986), Event Study Methodologies and the Size Effect: The Case of UK Press Recommendations. Journal of Financial Economics, 17(1), 113-142.

Dittmar. R. R. (1999), Nonlinear Pricing Kernels, Kurtosis Preference, and Evidence from the Cross-Section of Equity Returns. Working Paper, University of North Carolina at Chapel Hill.

Dittmar, R.F. (2002), Nonlinear Pricing Kernels, Kurtosis Preference, and Evidence from the Cross Section of Equity Returns. The Journal of Finance, 57(1), 369-403

Dhrymes, P. J., Friend, I., Gultekin, M.N., Gultekin, N. B. (1985), New Tests of the APT and Their Implications. The Journal of Finance, 40(3), 659-674

Dhrymes, P.J., Friend, I., Gultekin, N.B. (1984), A Critical Reexamination of the Empirical Evidence on the Arbitrage Pricing Theory. The Journal of Finance, 39(2), 323-346.

Downes, D.H., Heinkel, R. (1982), Signaling and the Valuation of Unseasoned New Issues. Journal of Finance, 37(1), 1-10

Ellsberg, D. (1961), Risk, Ambiguity, and Savage Axioms. Quarterly Journal of Economics, 75(4), 643-669.

Elton, E.J., Gruber, M.J. (1983), A Simple Examination of the Empirical Relationship between Dividend Yields and Deviations from the CAPM. Journal of Banking and Finance, 7(1), 135-146.

Fama, F., French, K.R. (1988), Permanent and Temporary Components of Stock Prices. The Journal of Political Economy, 96(2), 246-273.

Fama, F., French, K.R. (1996), Multifactor Explanations of Asset Pricing Anomalies. Journal of Finance, 51(1), 55-84.

Fama, E.F., French, K.R. (1992), The Cross-Section of Expected Returns. Journal of Finance, 47(2), 427-465.

Fama, E. F., French, K. R. (1993), Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics, 33(1), 3-56.

Fang, H., Lai, T. (1997), Co-Kurtosis and Capital Asset Pricing. The Financial Review, 32(2), 293-307.

Ferson, W.E., Kandel, S., Stambaugh, R.F. (1987), Tests of Asset Pricing with Time-Varying Expected Risk Premiums and Market Betas. The Journal of Finance, 42(2), 201-220

Ferson, W.E., Harvey, C.R. (1993), The Risk and Predictability of International Equity Returns. The Review of Financial Studies, 6(3), 527-566.

Figlewski, S. (1981), The Informational Effects of Restrictions on Short Sales Some Empirical Evidence. Journal of Financial and Quantitative Analysis, 16(4), 463-476

Finnerty, J.E. (1976), Insiders and Market Efficiency. Journal of Finance, 31(4), 1141-1148.

French, K.R., Schwert, G.W., Stambaugh, R.F.(1987), Expected Stock Returns and Volatility. Journal of Financial Economics, 19(1), 3-29.

French, K., Poterba, J. (1991), Investor Diversification and International Equity Markets. American Economic Review, 81(2), 222-226.

Freeman, R.N. (1987), The Association between Accounting Earnings and Securıty Returns for Large and Small Fırms. Journal of Accounting and Economics, 9(2), 195-228.

Friend, I. Westerfield, R. Granito, M. (1978), New Evidence on the Capital Asset Pricing Model. Journal of Finance, 33 (3), 903-917.

Fogler, H. R., Kose J., Tipton, J. (1981), Three Factors, Interest Rate Differentials and Stock Groups. Journal of Finance, 36 (2), 323-335.

Fowler, D.J., Rorke C.H., Jog, V.M. (1979), Heteroscedasticity, R square and Thin Trading on the Toronto Stock Exchange. Journal of Finance, 34 (5), 1201-1210.

Gibbons, M. R. (1982), Multivariate Tests of Financial Models: A New Approach. Journal of Financial Economics, 10(1), 3-27.

Gibbons, M.R., Ferson, W. (1985), Testing Asset Pricing models with changing expectations and an unobservable market portfolio. Journal of Financial Economics, 14(2), 217-236.

Gray, D.F., Merton, R.C., Bodie, Z. (2007), Contingent Claims Approach to Measuring and Managing Sovereign Credit Risk. Journal of Investment Management, 5(4), 5–28.

Barone-Adesi, G. (1985), Arbitrage Equilibrium with Skewed Asset Returns. The Journal of Financial and Quantitative Analysis, 20(3), 299 -313.

Gultekin, N.B., Rogalski, R.J. (1985), Government Bond Returns, Measurement of Interest Rate Risk, and the Arbitrage Pricing Theory. The Journal of Finance, 40(1), 43-61.

Goldberg, M.A., Vora A. (1978), Bivariate Spectral Analysis of the Capital Asset Pricing Model. Journal of Financial and Quantitative Analysis, 13 (3), 435-459.

Goldberg, M.A., Vora, A. (1977), Spectral Analysis of Public Utility Returns. Journal of Econometrics 6(1) 79-101.

Griffin, P.A. (1976), Competitive Information in the Stock Market: An Empirical Study of Earnings, Dividends and Analysts' Forecasts. Journal of Finance, 31 (2), 631-650.

Grauer, R.R. (1978), Generalized Two Parameter Asset Pricing Models: Some Empirical Evidence. Journal of Financial Economics, 6(1), 11-32

Grauer, R. R. (1981), Investment Policy Implications of the Capital Asset Pricing Model. Journal of Finance, 36 (1), 127-141.

Hamori, S. (1991), Tests of C-CAMP for Japan. Economics Letters, 38(1), 67-72.

Hansen, L.P., Singleton, K.J. (1983), Stochastic Consumption, Risk Aversion, and the Temporal Behavior of Asset Returns. The Journal of Political Economy, 91(2), 249-265.

Handa, P., Kothari, S. P., Wasley, C. (1993), Sensitivity of Multivariate Tests of the Capital Asset-Pricing Model to the Return Measurement Interval. The Journal of Finance, 48(4), 1543-1551.

Harlow, W.V., Rao, R. K. S. (1989), Asset Pricing in a Generalized Mean-Lower Partial Moment Framework: Theory and Evidence. Journal of Financial and Quantitative Analysis, 24(3), 285-311.

Hazuka, T. B. (1984), Consumption Betas and Backwardation in Commodity Markets. The Journal of Finance, 39(3), 647-655.

Hogan, W., Warren, J. (1974), Toward the Development of an Equilibrium Capital Market Model Based on Semivariance. Journal of Financial and Quantitative Analysis, 9(1), 1-11.

Hong, H., Kubik, J.D., Stein, J. C. (2004), Social Interaction and Stock-Market Participation. Working Papers, Standford Bussiness School.

Jagannathan, R., Wang, Z. (1996), The Conditional CAPM and the Cross-Section of Expected Returns. Journal of Finance, 51(1), 3-53.

Jagannathan, R. (1985), An Investigation of Commodity Futures Prices Using the Consumption-Based Intertemporal Capital Asset Pricing Model. The Journal of Finance, 40(1), 175-191.

Jaffe, J., Keim, D.B., Westerfield, R. (1989), Earnings Yields, Market Values, and Stock Returns. The Journal of Finance, 44(1), 135-148.

Johnson, E.J., Tversky, A. (1983), Affect, Generalization, and the Perception of Risk. Journal of Personality and Social Psychology, 45(1), 20-31.

Jorion, P., Schwartz, E. (1986), Integration vs. Segmentation in the Canadian Stock Market. The Journal of Finance, 41(3), 603-614.

Kahneman, D., Tversky, A. (1979), Prospect Theory: An Analysis of Decision Under Risk. Econometrica, 47(2), 263-291.

Keim, D. B. (1983), Size-Related Anomalies and Stock Return Seasonality: Further Empirical Evidence. Journal of Financial Economics, 12(1), 13-32.

Keller, C., Kunzel, P., Souto, M. (2007), Measuring Sovereign Risk in Turkey: An Application of the Contingent Claims Approach. IMF Working Paper, WP/07/233, International Monetary Fund.

Klemkosky, R.C., Jun, K. W. (1982), The Monetary Impact on Return Variability and Market Risk Premia. The Journal of Financial and Quantitative Analysis, 17(5), 663 -681.

Korkie, B. (1986), Market Line Deviations and Market Anomalies with Reference to Small and Large Firms. The Journal of Financial and Quantitative Analysis, 21(2), 161-180.

Kraus, A., Litzenberger, R.H. (1976), Skewness preference and the valuation of risk assets. Journal of Finance, 31(4), 1085-1100.

Kroll, Y., Levy, H., Rapoport, A. (1988), Experimental Tests of the Separation Theorem and the Capital Asset Pricing Model. The American Economic Review, 78(3), 500-519.

Korajczyk, R.A., Viallet, C.J. (1989), An Empirical Investigation of International Asset Pricing. The Review of Financial Studies, 2(4), 553-585.

Kryzanowski, L., Chau, T. M. (1983), General Factor Models and the Structure of Security Returns. The Journal of Financial and Quantitative Analysis, 18(1), 31-52.

Lettau, M., Ludvigson, S. (2001), Resurrecting the (C)CAPM: A Cross-Sectional Test When Risk Premia Are Time-Varying. The Journal of Political Economy, 109(6), 1238-1287.

Lee, C.F. (1977), Functional Form, Skewness Effect, and the Risk-Return Relationship. Journal of Financial and Quantitative Analysis, 12 (1), 55-72.

Levy, H. (1980), The Capital Asset Pricing Model, Inflation, and the Investment Horizon The Israeli Experience. Journal of Financial and Quantitative Analysis , 15 (3), 561-593.

Lessard, D.R. (1974), World, National, and Industry Factors in Equity Returns. Journal of Finance, 29 (2), 379-391.

Levhari, D., Levy, H. (1977), The Capital Asset Pricing Model and the Investment Horizon. Review of Economics and Statistics, 59 (1), 92-104.

Lintner, J. (1965), The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics, 47(1), 13-37.

Litzenberger, R.H., Ronn, E.I.(1986), A Utility-Based Model of Common Stock Price Movements. The Journal of Finance, 41(1), 67-92.

Lloyd, W.P., Shick, R. A. (1977), A Test of Stone's Two-Index Model of Returns. Journal of Financial and Quantitative Analysis, 12(3), 363-376.

Lucas, R. (1978), Asset Prices in an Exchange Economy. Econometrica, 46(6), 1429-1445.

Lord, C. G., Ross, L., Lepper, M.R. (1979), Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence. Journal of Personality and Social Psychology, 37(11), 2098-2109.

MacGregor, D.G. (2002), Imagery and Financial Judgement. Journal of Psychology and Financial Markets, 3(1), 15-22.

MacKinlay, A.C. (1987), On Multivariate Tests of the CAPM. Journal of Financial Economics, 18(2), 341-371.

Markowitz, H. M. (1952), Portfolio Selection. Journal of Finance, 7(1), 77-91.

Markowitz, H. M. (1959), Portfolio Selection: Efficient Diversification of Investment. John Wiley & Sons, Inc., 605 Third Avenue, New York, US.

Mankiw, N.G., Shapiro, M.D. (1986), Risk and Return: Consumption Beta Versus Market Beta. The Review of Economics and Statistics, 68(3), 452-459.

Mayers, D. (1972), Nonmarketable Assets and Capital Market Equilibrium Under Uncertainty. Studies in the Theory of Capital Markets (edited by Michael C. Jensen), 223-48. Praeger Publishers, N.Y. (cited in Jagannathan, R. and Z. Wang. (1996))

McDonald, B. (1983), Functional Forms and the Capital Asset Pricing Model. The Journal of Financial and Quantitative Analysis, 18(3), 319 -329.

McDonald, B. (1987), Event Studies and Systems Methods Some Additional Evidence. The Journal of Financial and Quantitative Analysis, 22(4), 495 -504.

McInish, T.H., Wood, R.A. (1986), Adjusting for Beta Bias: An Assessment of Alternate Techniques: A Note. The Journal of Finance, 41(1), 277-286.

Mei, J. (1993), A Semiautoregression Approach to the Arbitrage Pricing Theory. The Journal of Finance, 48(2), 599-620.

Mehra, R., Prescott, E.C. (1985), The Equity Premium: A Puzzle. Journal of Monetary Economics, 15(2), 145-161.

Merton, R.C. (1972), An Analytic Derivation of the Efficient Portfolio Frontier. The Journal of Financial and Quantitative Analysis, 7(4), 1851 -1872.

Merton, R. C. (1973), An Intertemporal Capital Assets Pricing Model. Econometrica, 41(5), 867-87.

Merton, R.C. (1980), On Estimating the Expected Return on the Market: An Exploratory Investigation. Journal of Financial Economics, 8(4), 323-361.

Miller, T.W., Gressis, N. (1980), Nonstationarity and Evaluation of Mutual Fund Performance. Journal of Financial and Quantitative Analysis, 15(3), 639-654.

Mossin, J. (1966), Equilibrium in a Capital Asset Market. Econometrica, 34(4), 768-83.

Ng, L. (1991), Tests of the CAPM with Time-Varying Covariances: A Multivariate GARCH Approach. The Journal of Finance, 46(4), 1507-1521.

Naranjo, A., Nimalendran, M., Ryngaert, M. (1998), Stock Returns, Dividend Yields, and Taxes. The Journal of Finance, 53(6), 2029-2057.

Oldfield, G. S.Jr., Rogalski R. J. (1981), Treasury Bill Factors and Common Stock Returns. Journal of Finance, 36 (2), 337-350.

Pettengill, G.N., Sundaram, S., Mathur, I. (1995), The Conditional Relation between Beta and Returns. The Journal of Financial and Quantitative Analysis, 30(1), 101-116.

Pettit, R. R., Westerfield, R. (1974), Using the Capital Asset Pricing Model and the Market Model to Predict Security Returns. The Journal of Financial and Quantitative Analysis, 9(4), 579- 605.

Pogue, G.A., Solnik, B.H. (1974), The Market Model Applied to European Common Stocks Some Empirical Results. Journal of Financial and Quantitative Analysis, 9 (6), 917-944.
Price, K., Price B., Nantell T.J. (1982), Variance and Lower Partial Moment Measures of Systematic Risk Some Analytical and Empirical Results. The Journal of Finance, 37(3), 843-855.
Reinganum, M.R. (1981), A New Empirical Perspective on the CAPM. Journal of Financial and Quantitative Analysis, 16(4), 439-462.
Reinganum, M.R. (1981), Misspecification of Capital Asset Pricing. Journal of Financial Economics, 9(1), 19-46.
Reinganum, M.R. (1981), The Arbitrage Pricing Theory Some Empirical Results. Journal of Finance, 36 (2), 313-321.
Reinganum, M.R. (1982), A Direct Test of Roll's Conjecture on the Firm Size Effect. The Journal of Finance, 37(1), 27-35.
Roll, R. (1977), A Critique of the Asset Pricing Theory's Tests. Journal of Financial Economics, 4(2), 129-76.
Roll, R., Ross S.A. (1980), An Empirical Investigation of the Arbitrage Pricing Theory. Journal of Finance, 35 (5), 1073-1103.
Roll, R. (1981), A Possible Explanation of the Small Firm Effect. Journal of Finance, 36 (4), 879-888.
Ross, S. (1976), Arbitrage Theory of Capital Asset Pricing. Journal of Economic Theory, 13(3), 341-360.
Rouwenhorst, K.G. (1999), Local Return Factors and Turnover in Emerging Stock Markets. The Journal of Finance, 54(4), 1439-1464.
Rubinstein, M. E. (1973), The Fundamental Theorem of Parameter-Preference Security Valuation. Journal of Financial and Quantitative Analysis, 8(1), 61-69.
Saunders, E. M. (1993), Stock Prices and Wall Street Weather. American Economic Review, 83(5), 1337-1345.
Schultz, P. (1983), Transaction Costs and the Small Firm Effect: A Comment. Journal of Financial Economics, 12(1), 81-88.
Schallheim, J., Demagistris, R. (1980), New Estimates of the Market Parameters. Financial Management, 9(3), 60-68.
Scott, E., Brown, S. (1980), Biased Estimators and Unstable Betas. Journal of Finance, 35 (1), 49-55.
Shanken, J. (1985), Multivariate Tests of the Zero-Beta CAPM. Journal of Financial Economics, 14(3), 327-348.
Shanken, J. (1987), Multivariate Proxies And Asset Pricing Relations. Journal of Financial Economics, 18(1), 91-110.
Shanken, J. (1987), Nonsynchronous Data and the Covariance-Factor Structure of Returns. The Journal of Finance, 42(2), 221-231
Sharpe, W. F. (1964), Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. Journal of Finance, 19(4), 425-442.
Shefrin, H., Statman, M. (1985), The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence. Journal of Finance, 40(3), 777-790.
Shefrin, H. (2005), A Behavioral Approach to Asset Pricing. Elsevier Academic Press 30, Corporate Drive, Suite 400, Burlington, MA 01803, USA.
Shiller, R. J. (1998), Human Behavior and the Efficiency of the Financial System. John B. Taylor and Michael Woodford, Editors, Handbook ofMacroeconomics. www.nber.org, no: 6375.
Shiller, R. J. (2003), From Efficient Market Theory to Behavioral Finance. The Journal of Economic Perspectives, 17(1), 83-104.
Solnik, B. H. (1974a), An Equilibrium Model of the International Capital Market. Journal of Economic Theory, 8(4), 500-24.
Solnik, B.H. (1974b), The International Pricing of Risk: An Empirical Investigation of the World Capital Market. Journal of Finance, 29 (2), 365-378.
Solnik, B.H. (1977), Testing International Asset Pricing Some Pessimistic Views. Journal of Finance, 32 (2), 503-512.
Stambaugh, R.F. (1982), On The Exclusion of Assets from Tests of the Two-Parameter Model. Journal of Financial Economics, 10(3), 237-268.

Stambaugh, R.F. (1983), Testing The CAPM with Broader Market Indexes. Journal of Banking and Finance, 7(1), 5-16.

Standish, P. E. M., Ung, S. (1982), Corporate Signaling, Asset Revaluations and the Stock Prices of British Companies. The Accounting Review, 57(4), 701-715

Sauer, A., Murphy, A. (1992), An Empirical Comparison of Alternative Models of Capital Asset Pricing in Germany. Journal of Banking and Finance, 16(1), 183-196.

Statman, M. (2002), Lottery Players/Stock Traders. Financial Analysts Journal, 58(1), 14-21.

Sweeney, R.J., Warga, A.D. (1986), The Pricing of Interest-Rate Risk Evidence from the Stock Market. The Journal of Finance, 41(2), 393-410.

Swidler, S. (1985), An Empirical Analysis of Analysts' Forecasts. Economics Letters, 17(4), 404-405

Tan, K.J. (1991), Risk Return and the Three-Moment Capital Asset Pricing Model: Another look. Journal of Banking and Finance, 15(2), 449-460.

Taylor, S., Brown, J. D. (1988), Illusion and Well-Being: A Social Psychological Perspective on Mental Health. Psychological Bulletin, 103(2), 193-210

Thaler, R.H. (2000), From Homo Economicus to Homo Sapiens. Journal of Economic Perspectives, 14(1), 133-141.

Tinic, S.M., West, R.R., (1986), Risk, Return, and Equilibrium A Revisit. The Journal of Political Economy, 94(1), 126-147.

Tversky, A., Kahneman, D. (1971), Belief in the Law of Small Numbers. Psychological Bulletin, 76(2), 105-110.

Tversky, A., Kahneman, D. (1973), Availability: A Heuristics for Judging Frequency and Probability. Cognitive Psychology, 5(2), 207-232.

Tversky, A., Kahneman, D. (1974), Judgement under Uncertainity: Heuristics and Biases. Science, 185(4157), 1124-1131.

Vorkink, K. (2003), Return Distributions and Improved Tests of Asset Pricing Models. The Review of Financial Studies, 16(3), 845-874.

Whaley, R.E., Cheung, J.K. (1982), Anticipation of Quarterly Earnings Announcements. Journal of Accounting and Economics, 4(2), 57-83.

Weinstein, N. D. (1980), Unrealistic Optimism about Future Life Events. Journal of Personality and Social Psychology, 39(5), 806-820.

Weinstein, M. (1981), The Systematic Risk of Corporate Bonds. Journal of Financial and Quantitative Analysis, 16(3), 257-278.

Wang, K.Q. (2003), Asset Pricing with Conditioning Information: A New Test. The Journal of Finance, 58(1), 161-196.

Yagil, J. (1985), Index Bonds: An Empirical Examination Using the CAPM. Economics Letters, 19(4), 377-380.

Zhou, G. (1993), Asset-Pricing Tests Under Alternative Distributions. The Journal of Finance, 48(5), 1927-1942.