From Regular-Beta CAPM to Downside-Beta CAPM

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**Abstract**  
CAPM has come a long way and has passed the time-test and eventually is fast coming out as a winner despite the onslaught of both, APT and multi-factor CAPM. The bottom line is that CAPM is needed, dead or alive. If so, it does not mean that CAPM stays as “CAPM”. Downside risk in recent times has caught the eyes of researchers. Downside-beta CAPM (DCAPM) based on downside risk is being thought a fast replacement to CAPM. It captures almost all the features of CAPM but let goes conditions of normality and investor’s preference of both upside and downside risk. With evidence pouring in from all corners of the world especially from emerging markets, that DCAPM and its different modified versions outperforms CAPM, it seems that DCAPM is long-awaited solution for asset pricing problem.

**Keywords:** CAPM, anomalies, DCAPM, Value at Risk (VaR).

**Section I: Introduction**  
The paper is one of its kinds that makes its journey back into history with the inception of CAPM and concludes with Downside-beta CAPM (DCAPM) based on downside risk, bringing the two worlds together. At least to our knowledge, CAPM and DCAPM have not been discussed simultaneously at great length, in one paper. The paper primarily focuses on empirical evidence for and against CAPM. Though these evidences are discussed in many papers but this paper categorizes the criticism which makes it easier for readers to retain it. As regarded by many, CAPM is still a solution in asset pricing whose acceptability and worldwide usage cannot be easily discarded. So relying on the same theoretical basis of CAPM, apart from the condition of normality and investor’s preference of both upside and downside risk, DCAPM comes to rescue with hard evidence. Evidence of DCAPM both from developed and emerging markets is discussed in this paper. The paper also discusses the modified versions of both CAPM and DCAPM, incorporating higher moments and time-varying betas.
The paper is divided into four sections. The first section gives an introduction while second section presents a brief introduction of CAPM covering primarily the empirical arena of CAPM. Initially, evidence in favor of CAPM is given and then the onslaught on CAPM is discussed. The criticism on CAPM is divided into three major categories. As a savior, downside risk is brought in and CAPM is transformed into DCAPM. Third section starts with the introduction to downside risk and ends up with evidence of DCAPM worldwide with emphasis on emerging markets. Finally, fourth section is conclusion and further recommendations.

Section II. I: Introduction to CAPM
Capital Asset pricing Model (CAPM)\(^1\) is one of the most, theoretically and empirically, discussed topics in the discipline of economics and finance. Although it cannot be called an empirical success, it’s intuitively brevity has provided it a special place in literature of economics and finance. Due to above discussed attributes; it is widely used\(^2\) asset pricing model. Its simplicity and cost-effectiveness makes it superior to both multi-factor and arbitrage models. Although there are no prices on graph-only risk and return, still it is called a ‘pricing model’ because it can be used to help us determine appropriate prices for securities in the market.

CAPM, based on Markowitz’s Mean-Variance (MV) Approach (1952) and Tobin (1958) Two-Fund Separation theorem under the conditions of market equilibrium, employs that more expected return accompanies with more expected risk having linear risk-return relationship on efficient portfolios as portrayed by Capital Market Line (CML). CML is sum of the return for delaying consumption and a premium for bearing the risk inherent in the portfolio in one-period investment decision that can be written as:

\[
E(R_p) = R_f + \sigma_p \left[ \frac{E(R_p) - R_f}{\sigma_m} \right]
\]

Where \(E(R_p)\) is expected return on portfolio; \(R_f\) is the risk free rate available in market.

CAPM can be graphically represented using Security Market Line (SML). It displays the expected rate of return of an individual security or portfolio in terms of risk-free rate and relative risk of a security or portfolio as a function of non-diversifiable risk, commonly known as beta. The beta can be determined by regressing, holding period returns of the security against the returns on the overall market and can be shown as following:

\[
E(R_i) = R_f + \beta_{im} [E(R_m) - R_f]
\]

\[
\beta_{im} = \frac{\sigma_i \sigma_m}{\sigma_m^2} = \frac{\text{cov}(r_i, r_m)}{\text{var}(r_m)}
\]

Where \(E(R_i)\) is expected return on security i, \(E(R_m)\) is the expected return on market portfolio, \(R_f\) is the risk free rate and \(\beta_{im}\) is the volatility of security i with respect to market portfolio m.

Section II. II: All was Well for CAPM
Early tests, in seventies, for CAPM and areas of association reinforcing CAPM are in favor of CAPM theory. It seems that CAPM has solved centuries’ old problem as how to price an asset and seem to be building blocks for one of the most important discoveries in financial markets\(^3\). Research evidences

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\(^1\) CAPM is independently developed by Sharpe (1964), Lintner (1965), Mossin (1966) & Treynor (1962). Arguably, Treynor is the pioneer for CAPM but his first paper “Toward a Theory of Market Value of Risky Assets” (1962) was not published until 1999 (French, 2003).

\(^2\) 73.5% of U.S. CFOs (Graham & Harvey (2001)) and 45% in Europe use CAPM (Brounen, Abe de Jong and Koedijk (2004)).

\(^3\) In fact Sharpe ultimately won noble prize in 1990 for his work on CAPM.
from early seventies reinforce CAPM as almost all the evidences are in favor. Beaver, Ketter and Scholes (1970) investigate relationship between systematic risk and accounting-based risk measures and concludes a high degree of association between the two. Hamada (1972) detects positive relationship between leverage and systematic risk. Galai and Malulis (1976) studies joint inference of option theory and CAPM to security valuation concludes that leverage, debt value and variance of return of a firm have an impact on systematic risk.

However, the most significant studies are of Black, Jensen and Scholes (BJS), Fama and MacBeth (FMac) and Blume and Friend (BF) which are still applicable in contemporary financial econometrics. BJS (1972) test CAPM from period 1926-1966 using NYSE market data examining whether intercepts are zero on market beta for cross-sectional and time series regressions of excess return. They find positive association between average return and market beta. BF (1973) and FMac (1973) also report similar results while Kim (1978) relies on truncated normal distributions to develop an asset pricing model with costly bankruptcy and shows that impact of distress on bond prices occurs via changes in the covariance between bond and market returns making CAPM seem almost infallible.

Section II.III: CAPM-The Fallen Hero or Face Saving
However as research progressed, controversies rise as to prior evidence. There are three major viewpoints developed towards CAPM apart from the one that accepts CAPM wholly and solely. The first perspective completely rejects CAPM and makes it invalid both from theoretical as well from empirical point of view. It is led by none other than Roll (1977) and Ross (1977), both arguing that single-factor CAPM is rejected when the index returns are used as market return proxy. They argue that proxy variable for market return is also supposed to be efficient and even a small deviations from efficiency can produce relationship between risk and expected returns insignificant. Secondly, they argue as the true market portfolio is not observable so CAPM can not be tested. Ross (1976) applies Arbitrage Pricing Theory (APT) to capital asset pricing and contests that APT substitutes CAPM, and truly it is thought to be so until the first major blow came from Shanken (1982) who concludes that APT does not entail a risk-return relation which is linear and exact even though the number of asset are infinite. Also, Shanken (1987) and Kandel and Stambaugh (1987) both argue that, even though the stock market is not true market portfolio, it must nevertheless a highly correlated proxy for the true market. Later Reisman (1992) and Nawalkha (1997, 2004) report that APT is dying and taking its place is multi-factor CAPM as the factors included in APT are already identified in multi-factor CAPM.

The second perspective does not reject CAPM altogether but it argues that anomalies are present and beta is not the only predictor, as outlined by CAPM, rather size, value and momentum are additional factors to be added to the model. Price-Earnings ratio, Size-effect, Book-to-Market ratio and various Time-effects are arguably various important factors need to be included in CAPM (FF (1993, 1996)). Reasonable size of research concludes that smaller equity capitalization stocks on average have higher risk-adjusted returns than larger firms in NYSE (Banz (1981), Reinganum (1981), Dimson and Marsh (1984), Banz (1985), Ma and Shaw (1990)). Book-to-market (B/M) effect is an

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4 For a thorough survey, please see Abbas(2011).
5 FMac (1973) provides evidence that of a larger intercept term than the risk-free rate, linear relationship between the average return and the beta holds but when data covers a long time period.
6 Generally, market Indices have been taken as proxy for market returns which are not efficient portfolio.
important indicator for expected returns. Stattman (1980), Rosenberg, Reid and Lamstein (1985), Debondt and Thaler (1987) and Fama and French (1992, 1996, 2004), all report that there is significant but negative relation between B/M and expected returns. Moreover, Book-to-Market effect is vital in financial distress, so risk premium should be compensated including it. It is also important to note that contradictory results have also been reported\(^8\) [Xu, 2001].

Era of seventies and eighties saw series of discussion regarding presence of various market anomalies as some of them have been discussed before (Basu (1977, 1983); Banz (1981); and Fama and French (1980)). Rozell and Kinney (1976) reports January-effect implying abnormality whereas weekend-effect is exposed by French (1980). Later on Heaton, Rouwenhorst and Wessels (1999) examine the ability of beta to predict expected returns for 12 European countries. They conclude that though beta and expected return are related but January effect is prevalent in January months. Moreover, Nimal (2006) studies Tokyo Stock Exchange and concludes that CAPM is invalid as the beta-return relationship does not hold.


Research regarding second perspective has also been conducted in Asian Economies. It will be unfair not to discuss the results attained in this part of the world. In Asian markets, Wong and Tan (1991) observe linear relation in beta between systemic risk and average return to test the validity of CAPM in Singapore Stock Exchange. Cheung and Wong (1992) study, for Hong Kong Equity Market, relationships between returns and risk measures and contest that overall the application of CAPM in equity market seems weak. Additionally, Huang (1997) also reports an inverse relationship between returns and different measures of risk in Taiwan stock market. Ahmad and Zaman (2000) study the same relationship for Karachi Stock Exchange using sector-wise monthly data from July 1992 to March 1997 and conclude that risk is compensated by market. Iqbal and Brooks (2007) investigate, for Pakistan over the period 1999 to 2005, role of thin trading and censoring correction in beta-estimation in asset pricing testing; and find that while thin trading correction worked as expected but it does not impact the results of asset pricing tests. The results in developed market are more against CAPM but the overwhelming support in German Stock Exchange can not be denied\(^11\). While for emerging markets the evidence for CAPM is mixed and one can not give a final verdict.

The third perspective does not address the above issue but it tries to overcome the theoretical weaknesses of CAPM. This leads CAPM to a new world of modified-CAPM, where there are numerous modified versions with numerable applications. Among them is the problem of y-intercept or CAPM without risk-free borrowing or lending. Fischer Black (1972) develops Zero-Beta CAPM by allowing unlimited short sales of risky assets making the composition of market portfolios from efficient portfolios themselves, thus market portfolio becomes also efficient. Gibbons (1982) rejects CAPM as well as Zero-Beta CAPM. However contrary to Gibbons, Stambaugh (1982) arrives at an opposite conclusion and strongly supports Zero-Beta CAPM.


\(^10\) This result is challenged by Jegadeesh (1992) who gives argument that regressions that include both of these variables are suspect because of the almost perfect inverse correlation between size and beta.

\(^11\) Sauer and Murphy (1992) assert that CAPM is best fit for German Stock Exchange.
Another argument placed is that beta is not stable and is sensitive to economic factor thus leading time-varying beta. \(^{12}\) CAPM or Conditional CAPM (CCAPM) which not only captures time-varying beta on an information set but also explains anomalies. Bollerslev (1987) and French, Schwert, and Stambaugh (1987) allow both conditional expected returns and variances to be time varying. Harvey (1995) studies 20 emerging equity markets and concludes that half of the predictable variance in the emerging market returns can be traced to local information. Pettengill, Sundaram and Mathur (1995) and Fletcher (2000) examine the conditional beta-return relationship and assert that not considering macro-economic variables in CAPM lead to its failure. Jagannathan and Wang (1996), Lettau and Ludvigson (2001), Zhang (2003) and Petkova and Zhang (2003) argue that stock market anomalies are effectively dealt by CCAPM. On the contrary, Lewellen and Nagel (2003) find out that anomalies like B/M and momentum can not be explained by CCAPM and most importantly, conditional alphas are large and significant which is indirect violation of CCAPM.

CAPM assumes normal distribution but returns are found to have skewness and kurtosis. Common methodology is to include higher moments in CAPM. Higher moments’ inception is believed to be solution to empirical problems of CAPM with Kraus and Litzenberger (1976), Ingersoll (1975), Fang and Lai (1997), Hwang and Satchell (1999), Harvey and Siddique (2000), Christie-David and Chaudry (2001) and Jurcenzko and Maillet (2002) favoring the change with strong empirical evidence behind them. However the problem of non-normality can be addressed by using Generalized Method of Moments (GMM) as normal distribution assumption is a sufficient not a necessary condition to derive CAPM. The assumption regarding normality of returns is assumed for statistical purposes and to make it empirically testable (Campbell, Lo and MacKinlay (1997), chapter 5). Satchell (2001) derives a utility function that is consistent with LPM-CAPM without making any distributional assumptions showing that Tobin’s two-fund separation exists.

But a meticulous analysis yields that the there is something missing that has its root in the theoretical framework of CAPM and is encountered many a times in the empirical arena in the name of “normality”. And perhaps the answer lies in how investor defines, recognizes and assigns a value to risk. CAPM is based on Markowitz’s (1952) Mean-Variance (MV) framework implying that investor care about return and variance. But the irony is that the person who purposes MV-framework initially, he himself is convinced that semivariance instead of variance is better measure of risk, but discards it due to lack of resources at that time.\(^{13}\) Markowitz (1959) stays with the variance measure in spite of recognizing the importance of semivariance. So history is to be rediscovered and perhaps the problems of CAPM lie in retracing the footsteps back in time to the very beginning of the model.

### Section III.I: Safety First-Start of a New Era

It is said that it is never too late for heroes and so it can be said for downside risk. Initially discarded (Markowitz (1952, 1959), sustaining for three decades, overlooked, but slowly makes its way to the coliseum arena. It starts with Roy (1952) who argues that investor care for disaster and first and the foremost goal is the safety from that disaster, or in other words the safety-first rule (SF-rule). If this is true then Markowitz MV-framework to portfolio management does not apply and as CAPM is heavily dependent on MV-framework so CAPM does not hold or becomes invalid. Combining Markowitz’s portfolio theory (1952) with Roy’s SF-rule (1952) without contravening the assumption of Tobin (1958) 2-Fund Separation Theorem yields comparatively amazing results, but history has to wait to be rewritten.

\(^{12}\) Since the introduction of ARCH/GARCH-type processes by Engle (1982) time-varying beta has been given considerable attention in the literature (Bollerslev, Engle and Wooldridge (1988)).

\(^{13}\) Variance is computationally simpler as semivariance optimization model requires twice the number of data inputs than the variance model and with the lack of cost-effective computer power until advent of the microcomputer in 1980s and with the fact that variance model is already mathematically very complex.
During sixties and seventies, downside risk remains alive despite of CAPM overtaking the world of asset pricing. Quirk and Saposnik (1962), Mao (1970), Klemkosky (1973) and Ang and Chua (1979) demonstrate superiority of the semivariance over variance. Though Hogan and Warren (1974) replace variance with semivariance for portfolio risk in CAPM to give the first official version of downside beta CAPM or DCAPM based on downside risk but it fails to get due attention until the breakthrough by Bawa in 1975.

Stochastic dominance (SD), a powerful risk analysis tool, is used to measure semivariance which does not rely on certain type of distribution (e.g. normal distribution) rather uses cumulative distribution\textsuperscript{14}, can not be quantified. However in 1975 Bawa developed Lower Partial Moment (LPM), a proxy for SD. Fishburn (1977) extends the general LPM model into unlimited view of LPM which embraces all classes of investors; risk averse, risk seeking and risk neutral. Balzer (2001) derives mathematically the relationship between utility and downside risk measures, and contest that the expected approximation can accommodate different types of behavior for different investors. This makes semivariance framework based on SF-rule superior than Markowitz’s M-V framework\textsuperscript{15}.

Keeping in view the Safety-First rule in consideration, CAPM has been extended into Downside CAPM (Hogan and Warren (1974), Bawa and Lindenberg (1977), Harlow and Rao (1989) and Estrada (2002)). Bawa and Lindenberg (1977) suggested inclusion of downside beta (risk) instead of regular beta in the following way:

$$\beta_{BL}^{im} = \frac{E[(R_i - R_f) \min(R_m - R_f, 0)]}{E[(\min(R_m - R_f, 0))^2]}$$

The numerator in Equation is referred to as the co-semivariance of returns and is the covariance of returns below $R_f$ on the market portfolio with returns in excess of $R_f$ on security $i$.

It is also argued that risk is often seen as downside deviations below a target level by market participants and risk-free rate is replaced for average equity market returns (Harlow and Rao (1989)). The down side beta for Harlow and Rao (1989) can be shown as:

$$\beta_{HR}^{im} = \frac{E[(R_i - \mu_i) \min(R_m - \mu_m, 0)]}{E[(\min(R_m - \mu_m, 0))^2]}$$

Where $\mu_i$ and $\mu_m$ are security $i$ and market average returns respectively.

Estrada (2002) modified the down side beta in a downside framework as follows:

$$\beta_{E}^{im} = \frac{E[\min(R_i - \mu_i, 0) \min(R_m - \mu_m, 0)]}{E[(\min(R_m - \mu_m, 0))^2]}$$

Disagreement between CAPM and DCAPM does not mean to nullify CAPM but to show that DCAPM is both theoretically as well empirically superior; as the strongest rationale behind it, that investors are safety conscious. Invalidating CAPM means shooting you as for different distributions, CAPM is a special case of DCAPM\textsuperscript{16} (Nawrocki (1999)). Secondly, it can not be argued that Zero-beta CAPM, CCAPM or Higher-order CAPM is a better risk measure than DCAPM as adding zero-beta portfolio, conditionality or skewness/kurtosis can also be done to DCAPM with the same convenience. And lastly, skewness is not to be confused with downside risk. Though DCAPM works well when distribution is non-normal or skewness is present but it is primarily confined to the second moment only\textsuperscript{17}. These three points will be discussed in detail in the next section.

\textsuperscript{14}There are three main types of SD namely; First-order SD, Second-order SD and Third-order SD (Elton, Gruber, Brown and Goetzmann (2003)).
\textsuperscript{15}MV based CAPM primarily assumes risk averse investor.
\textsuperscript{16}When distribution is normal, CAPM and DCAPM yield the same result when variance and semivariance is taken into account (Nawrocki (1999) and Estrada (2002)).
\textsuperscript{17}Second-order downside utility has quadratic penalty on downside returns while third-order downside utility is a cubic penalty. For details see Sortino and Satchell (2001), chapter 8.
Section III.II: Empirical Results of DCAPM-Down-to-Earth Pays

CAPM’s empirical evidence is based on normality, however evidence is overwhelmingly against it. Fama (1965), Kon (1984), Affleck-Graves and McDonald (1989), Richardson and Smith (1993), Susmel (2001), Hwang and Pedersen (2002), Dufour, Khalaf and Beaulieu (2003), all provide evidence against the assumption of normality. Jagannathan and McGrattan (1995) challenge the quadratic utility used in CAPM. Aparicio and Estrada (1997) study stock returns in the Scandinavian markets and conclude that the distributions of daily stock returns show fat tails and high peaks. Bekaert and Harvey (1995, 1997), Eftekhari and Satchell (1996) and Bekaert, Erb, Harvey, and Viskanta (1998), show that emerging market equities display non-normality in emerging markets. With all the empirical evidence against normality, to test CAPM, a model, is to arrive at advance statistical tools accommodating skewness or kurtosis or come up with a model which is flexible enough to accommodate them.

Additionally, investors dislike downside risk and do not give equal weights to both upside and downside risk as assumed in CAPM. Markowitz (1959) agrees that investors care more for downside risk rather than the market risk. Kahneman and Tversky (1979) and Gul (1991) conclude that investors emphasize or in other words give more weights to losses as compared to gains implying the importance of downside risk. Estrada (2000, 2002 and 2007) studies investors in emerging markets and accentuate that investors care more downside risk. Estrada (2002) shows that mean returns in developed as well as emerging markets are more sensitive to changes in downside beta than to equal changes in beta. And still more Post and Levy (2005) emphasize that if investors show different behavior for bear and bull markets, then they are willing to pay premium for stocks giving downside protection in bear markets and upside potential in bull markets. With irresistible evidence from both developed and emerging markets for non-normality and investor’s preference for downside risk, DCAPM seems to be the ultimate alternate to CAPM, both for theoretical and empirical grounds.

Levy and Markowitz (1979) defend portfolios based on MV-framework which yields level of utility approximately equal to expected utility of an investor. Estrada (2002) asserts that mean-semivariance (MSV) framework can also be defended with the same criterion used by Levy and Markowitz. Secondly he concludes that empirically semi variance is more credible than standard deviation. Grootveld and Hallerbach (1999) study US asset allocation portfolios, based on variance and semivariance, and conclude that downside risk approaches tend to favor. Estrada (2000) argues that for partially-integrated emerging markets, cost of equity calculated using downside risk is more appropriate. Harvey (2000) suggests the supremacy of downside risk for emerging markets for a sample based on equilibrium as well as non-equilibrium-based risk measures. Ang, Chen and Xing (2002) study downside risk on NYSE and conclude that past downside beta is good predictor of future covariation with downside market movements. Estrada (2002) study both developed market as well as emerging markets for various risk measures. He affirms that DCAPM explains over 45% of variability in cross-section of returns of a joint sample of developed markets as well as emerging markets and 55% of variability in cross section of returns in emerging markets. Post and Vliet (2004) on comparing CAPM and DCAPM, conclude that DCAPM outperforms CAPM. Estrada and Serra (2005) find out that among the various risk measures, global downside beta has the largest impact on portfolio. The evidence stated above is just tip of the iceberg, but the question arises as whether DCAPM is flexible enough to accommodate unstable downside beta and higher moments in the downside risk model as evidence of both is sufficient and irresistible, not to be overlooked.

As the problem of instable beta, Ang, Chen, and Xing (2002) split up bets into downside and upside betas which are conditional on falling and rising markets. They observe that conditional betas split up this way exhibit little asymmetry relative to conditional correlations. So they turn their attention to downside correlation for a measure of asymmetric risk. In another study having a sample from 1926 to 2002 for US stocks, Post and Vliet (2004) test CAPM and CCAPM against mean semivariance(MS)-CAPM and conditional MS-CAPM and sum up that the latter perform better both

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18 Investors are risk averse for losses and they are risk seeking for gains.
theoretically and empirically and is a possible alternative for regular beta. Galagedera and Jaapar (2009) uses time-varying systematic downside risk for daily returns of Malaysian stock exchange and find out that conditional covariance between excess portfolio return and market portfolio downside excess return is persistent and covariance between industry portfolio excess return and market portfolio downside excess returns vary over time. Bali, Demirtas and Levy (2009) examine intertemporal relation between downside risks and expected stock returns. They contest that if downside risk determines expected returns, then its proxies will perform well also. So they use Value-at-Risk (VaR) as a proxy for downside risk and the results indicate that VaR outperforms both variance as well conditional variance proxies.

Stock prices exhibit non-normality\(^{19}\) so the importance of skewness, at least, can not be overlooked. Adcock and Shutes (1998), Leland (1999), Harvey and Siddique (2000), Chen, Hong and Stein (2001) and Adcock and Shutes (2002) all observe, conclude and stress that for asset pricing, skewness is an important measure that can not be overlooked. Christie-David and Chaudhry (2001) demonstrate that third and fourth moments explain better the returns in futures markets. Adcock (2002), not only introduces skewness to describe properties of a non-linear market model but he also adds leptokurtic distributions. But all skewness is not bad. Rubinstein (1973), Kraus and Litzenberger (1976), Friend and Westerfield (1980) and Harvey and Siddique (2000) demonstrate that investors dislike negative co-skewness meaning that stocks with low co-skewness amplify high average stock returns. Downside risk is not to be mixed up with co-skewness risk. The downside market movements are captured by downside beta in non-linear manner, while co-skewness does not emphasize asymmetries for down and up markets even though co-skewness may vary over time. However co-skewness captures some aspects of downside covariation, so co-skewness is to be controlled in assessing premium for downside beta. Kaplanski (2004) develops downside risk asset-pricing model, based on Conditional-VaR\(^{20}\). The study point out that CVaR-beta based on downside risk, has explanatory power greater than traditional beta especially for bearish market. Galagedera and Brooks (2005) include downside co-skewness to downside beta to asses and compare the performance of downside risk with and without co-skewness. They conclude that co-skewness is crucial for developing downside framework opening the door for higher moments not only in CAPM but also in DCAPM.

**Section IV: Conclusion-The Aftermath**

CAPM has come a long way. Although it has captured the minds in the field of financial econometrics, with applause in the beginning, but later on the researchers started looking at it skeptically because of anomalies, inefficient market portfolio and the condition of normality; and started finding an alternative for it.

Downside risk in recent times has caught the eye of researcher. CAPM based on downside risk, DCAPM is being thought to be a fast replacement of CAPM. It captures almost all the features of CAPM but let goes the condition of normality and investor’s preference for both upside and downside risk. With evidence pouring in from all corners of the world, especially from emerging markets that DCAPM and its modified versions outperforms CAPM and its sister modifications, DCAPM can provide the solution to asset pricing problem.

But DCAPM is still a model and does have room for improvement. Though improved through Conditional-DCAPM but it is not the end of the road. Intertemporal DCAPM and Consumption-based DCAPM and not to forget International DCAPM arising fast due to globalization, is just an eye opener and behind it lay the calm sea waiting to be disturbed. Investors desperately need a model with which they can forecast returns, diversify their risk and increase their earnings. They need a solution, a


\(^{20}\) CVaR risk measure help to incorporated extreme results, skewness and the fat-tails phenomena as well.
permanent solution, and perhaps they can find one in DCAPM, if not wholly, but to start with, at least for the time being.

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