

平成24年5月10日

各位

社団法人 日本証券投資顧問業協会

CREATE-Research 社による投資理論に関する報告書

このたび CREATE-Research 社の CEO である Amin Rajan 教授が作成した”The Death of Common Sense”と題する報告書（英語）を、ホームページに掲載しました。同社は、英国の独立系のグローバルなコンサルティング会社であり、金融、航空宇宙、IT、石油、製薬、テレコム等の幅広い産業をカバーしています。

同報告書は、世界各国の9名の CIO から構成されている The 300 Club という組織の見方や考え方を取りまとめたものであり、今回は、2008年の市場崩壊に際して、CAPM や効率市場仮説といった理論が機能しなかったことを結論付ける内容となっています。

資産運用業に携わる方々にとって役立つものとなれば幸甚です。

以上



The Death of Common Sense: How elegant theories contributed to the 2008 market collapse



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Views expressed here are those of the author, who is solely responsible for any errors and omissions.

1. Scene setting

The 300 Club believes that modern portfolio theory and practice are failing institutional investors at a time when their depressed funding levels and high covenant risks require smarter ways of investing.

Investor confidence is now at its lowest ebb in living memory. The scale of the losses inflicted by the Lehman collapse in 2008 and the sovereign debt crisis in 2011 are immediate causes, but confidence had been eroding over the last decade.

First and foremost, the buy-and-hold strategy was not working, as equities were outperformed by bonds over a long period; second, nor was the barbell approach, as actual returns diverged markedly from expected returns for most asset classes; third, nor was diversification, as excessive leverage ramped up the correlation between historically lowly correlated asset classes.

These fault lines gave investing poor press after the unprecedented scale and speed of sell-offs in 2008. The prevailing doom and gloom caused a herd-like rush into passive funds, as armchair pundits projected the here-and-now into the future. Rational debate was conspicuous by its absence. It is time for a sombre stock-take.

The 300 Club aims to up the ante by delivering dispassionate analyses of the problems that our industry faces, and the actions that it needs to take. Accordingly, this is the first paper in a new series. It sets the scene for the subsequent papers.

It aims to:

- Describe the modern portfolio theory which has profoundly influenced the thinking of successive generations of investors and policy makers since the 1960s
- Review the empirical evidence produced by independent experts to assess how modern portfolio theory has stood the test of time
- Assess the role that modern portfolio theory played in the great financial crash of 2008
- Highlight the subject areas that need to be addressed, if a vibrant investment industry is to emerge from the ashes of the recent meltdown.

Our narrative starts with Harry Markowitz, the pioneer of modern portfolio theory. His famous paper on portfolio selection was a game changer [Markowitz, 1952]. Till then, there was no cogent theory of investment: only rules of thumb and folklore. Investors of 1952 thought the same thoughts and talked the same language as investors a century previously.

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Speed-Read

Investor confidence is now at its lowest ebb in living memory. Modern portfolio theory bears some responsibility.

This paper describes how it all came about. It also sets the scene for other papers in this series from the 300 Club.

Markowitz was the first to make risk the centrepiece of portfolio management. The novelty of his approach was summed up by his famous insight:

“Investing is a bet on an unknown future... you have to think about risk as well as return”.

He thus inspired the intellectual origin of the two concepts that have since dominated the burgeoning literature on portfolio theory as we know it today: the capital asset pricing model (CAPM) and the efficient markets hypothesis (EMH).

In the CAPM, an investor selects a portfolio at a given time t which produces a return at time $t+1$. The model assumes that investors are risk averse. When selecting their portfolios, they care only about the mean and variance of their one-period investment return. The model is also called the mean-variance model since investors seek to minimise the variance of portfolio return, given expected return; and maximise the expected return, given variance.

Before long, two other related concepts were invented in the investment landscape: efficient markets and active management. It was argued that by factoring in all known information into prevailing stock prices, an efficient market bears out all the predictions of the CAPM. Thus, based on *a priori* reasoning, this argument also inferred that active management adds no value: in an efficient market nobody has an information advantage.

The edifice of modern financial theory is mainly constructed around CAPM and the EMH. We review the evidence on each in order to show how they contributed to the current financial crisis.

Our review is deliberately detailed: it aims to show how the evolution of the theory over time has side-tracked into trivia and inadvertently missed the big picture of how the financial markets really work.

The theory started with the sound idea that investing is a bet on an unknown future.

But its subsequent evolution sidetracked into trivia and missed the big picture understanding of how the financial markets work...

...while also giving birth to intellectual twins.

2. How it all began

The CAPM originated from the work of the Nobel Laureate William Sharpe [1970]. He advanced the idea that each investment contains two distinct risks:

- **Systemic risks:** as the name implies, these are all-pervasive market risks that cannot be diversified away. They affect investor sentiment directly and market volatility indirectly. Interest rates, recessions, inflation and wars are examples of factors that affect the price of all securities, notwithstanding their business fundamentals. Diversification is no answer to systemic risks that affect all assets indiscriminately.
- **Idiosyncratic risks:** these risks, in contrast, are specific to individual stock and can be diversified away as an investor increases the number of stocks in his/her portfolio. As the name implies, it represents the component of a stock's return that is uncorrelated with general market movements. The only reason why an investor should earn more, on average, by investing in one stock rather than another is that one is riskier than the other.

The CAPM's starting point is the *risk-free rate* – typically a yield on a government bond: it is the minimum return that investors expect. However, it goes on to argue that investors in equities also demand an added premium to compensate them for taking the extra risk. This risk premium is derived by calculating the expected return from the market as a whole *less* the risk-free rate.

On this argument, much of the variation in expected return comes from market movements as a whole: idiosyncratic risks are negligible. Therefore, by implication, active management cannot add value, it is just noise.

The first was the Capital Asset Pricing Model. By making various assumptions, it concluded that much of the variation in investment returns comes from market movements.

Subsequent tests showed that CAPM omitted numerous other factors that influence returns...

In the academic world, CAPM rode high for the best part of two decades with early tests creating a consensus that the model is a good description of the expected returns. Coupled with the model's simplicity and intuitive appeal, these tests pushed the CAPM to the forefront of financial theory of markets [Fama and French, 2004].

However, these authors also show that since the late 1970s, there has been mounting evidence that the variation in expected return is unrelated to market beta alone. Their exhaustive summary of various studies shows that certain factors ignored by CAPM have a significant role in influencing future returns.

They include:

- Price-earnings ratios
- Company size as measured by market capitalisation
- Debt-equity ratios that measure leverage
- Book-to-market equity ratios.

Fama and French went on to consider whether these seemingly 'spurious' results might be the result of data dredging: publication-hungry researchers scouring the same US data on returns and unearthing contradictions that occur in specific samples by chance. However, they dismissed this possibility as these additional factors were also identified as significant in other independent studies, using Japanese and European data.

These other studies also show that CAPM ignores investors' behavioural biases, they often over-extrapolate past performance resulting in stock prices that are too high for growth firms and too low for distressed firms. When the over-reactions are eventually corrected, value stocks tended to end up with high returns and growth stocks with low returns.

This is a far cry from CAPM's key premise that investors care only about the mean and variance of distributions of one-period portfolio returns. In two previous papers, Fama and French [1993, 1996] refine the original specification of the CAPM and include two other factors: company size and book-to-market equity ratios.

Later refinements included two more factors. The first was the momentum effect: stocks that do well relative to the market over the previous three to twelve months tend to continue to do well for the next few months [Carhart, 1997]. The second concerned cash flows: stocks that do well relatively also have high expected cash flows.

These and other refinements are a matter of detail. The substantive argument is that CAPM's two-point inference on active management has been sorely challenged. Namely, that expected returns are solely influenced by market beta and it is impossible to beat the market by developing special insights into company-related factors. Evidence on both these points is weak, at best. Yet, the proponents of CAPM still continue to reject active management by its *a priori* assumptions.

For them, the centrality of trade-off between risk and expected return continues to infuse all investment decisions. Even alpha is defined as returns above or below what the CAPM predicts. The twin notions, that the market is hard to beat and investors are rational, are now conventional wisdom, even among those who declare they know how to outperform.

As Fama and French conclude [2004]:

"The CAPM, like Markowitz's portfolio model on which it is built, is nevertheless a theoretical tour de force. Despite its seductive simplicity, the CAPM's empirical problems invalidate its applications."

...such as business fundamentals like earnings, company size, debt and so on.

Yet, CAPM remained a theoretical tour de force because it was difficult to understand how markets worked without first taking CAPM into account.

Bernstein [2007] sums it up succinctly by stating that the situation is identical to what Louis Menand, the Pulitzer Prize-winner, had to say about Freud's famous tract, *Civilisation and Its Discontents*:

"The grounds have been entirely eroded for whatever authority it once enjoyed as an ultimate account of the way things are, but we can no longer understand the way things are without taking it into account."

Much the same observation can be made about CAPM's intellectual twin: the efficient markets hypothesis, a deceptively simple notion that has become a lightning rod for its disciples and opponents alike.

3. A dangerous comfort blanket

Despite numerous modifications, the basic thrust of the EMH has not changed much since the Nobel Laureate Paul Samuelson first proposed it:

- Individual investors form expectations rationally
- Expectations are based on all available information
- Markets aggregate information efficiently and
- Equilibrium prices incorporate all information.

In a seminal article [Samuelson, 1965], he argued that prices fully reflect all available information. In an efficient market, price changes cannot be predicted with any realistic degree of accuracy, since they already incorporate the information and expectations of all market participants.

The underlying idea is that in a large, active marketplace for publicly traded securities, vigorous competition among thousands of investors will drive speculative profits to zero. To the extent that speculative trading is costly, speculation must be a loser's game.

On this argument, passives are bound to beat actives that seek to exploit mispriced assets relative to a risk-adjusted benchmark, since the invisible hand of the market works faster than any single investor.

Samuelson's concept of informational efficiency has a Zen-like counterintuitive flavour [Lo, 2004]. The more efficient the market, the more random are the price changes generated by it. In the extreme case of efficiency, price changes are totally random.

The implications are clear. If prices are unforeseeable, then:

- Their future direction is random
- They follow a bell curve distribution
- They nullify active management.

Until the EMH was subjected to a battery of empirical tests, the received wisdom was simple: when new information emerges, the news spreads very quickly and is instantly incorporated into the price of securities.

Hence, neither technical analysis (the study of past prices to predict future prices) nor fundamental analysis (study of company-specific data) can enable investors to identify 'undervalued' stocks and achieve returns greater than those that could be obtained by a randomly selected portfolio of individual stocks.

In the meantime, CAPM's intellectual twin, the efficient markets hypothesis, was gaining traction.

EMH argued that markets are efficient because they factor in all known information when pricing securities. They follow a random walk.

So, active management is just 'noise': it can never outperform the markets.

This idea has spawned today's passive industry. Earliest indices were not created to measure manager performance but to provide a representative outcome for the market as a whole. The index is a market proxy, not an investment idea.

Unsurprisingly, the hypothesis is linked with the concept of a ‘random walk’ in the finance literature to caricature a price series where all subsequent price changes display arbitrary departures from previous prices.

On this argument, the price of a financial asset always reflects all available information relevant to its value. Deviations from equilibrium value cannot last long. Investors with information on under-valued assets will drive up their prices and make money in the short term. Beating the market in the long run is a fool’s game. Markets are omnipotent. Active management doesn’t work.

This belief has spawned today’s \$4 trillion index fund industry. While the history of the Dow Jones Industrial Average dates back to 1896, it is worth emphasizing that this index was simply a market proxy, not an investment idea. The earliest indices were not created to evaluate manager performance, but to provide a representative outcome for the stock market as a whole.

However, as technology developed to recreate market portfolios and observers noted that fewer managers were beating their benchmarks, enterprising asset managers saw an opportunity to deliver market representative returns at rock-bottom costs. As indices proliferated, the EMH became a *de facto* investment strategy in its own right [Sahai and Poor, 2011].

So widespread was the acceptance of the EMH that another Nobel Laureate [William Sharpe, 1991], had no hesitation in brandishing its detractors as being wholly economical with the truth:

“Properly measured, the average actively managed dollar must underperform the average passively managed dollar, net of costs. Empirical analyses that appear to refute this principle are guilty of improper measurement.”

But with the 2008 market meltdown, the knives were out.

Writing for *The Washington Post* in June 2009, financial journalist and best-selling author Roger Lowenstein pulled no punches:

“The upside of the current Great Recession is that it could drive a stake through the heart of the academic nostrum known as the efficient market hypothesis.”

In a similar vein, writing in his quarterly letter in January 2009, Jeremy Grantham, a highly respected money manager at GMO, said:

“The incredibly inaccurate efficient market theory [caused] a lethally dangerous combination of asset bubbles, lax controls, pernicious incentives and wickedly complicated instruments that led to our current plight.”

However, long before then, academic researchers had been training their guns on the EMH. Notably, however, none of them anticipated the catastrophic outcomes narrated by Lowenstein and Grantham. Instead, they were much more concerned about the nitty-gritty of improving the explanatory powers of the theory at the margin.

Hardly anyone questioned its foundations. This was an era in which the ‘rational expectations’ school of thought, pioneered by economists at the University of Chicago, was in rapid ascendancy. It believed in the primacy of markets as an article of faith: markets knew how to value resources and allocate them most efficiently through an impartial and robust price mechanism. The invisible hand of the market, so the argument ran, knew better than the visible boot of the state.

Before the crisis, however, there were growing doubts about the validity of the EMH.

But its proponents maintained that any evidence that runs against it has to be guilty of improper measurement...

...because only markets know how to value resources and allocate them most efficiently.

Recent critics argue that this blind faith caused a lethally dangerous combination of asset bubbles, pernicious incentives and complicated instruments that led to our current plight.

So, the new research focused on the narrow issue of whether past price changes could predict future price changes. They did find weak evidence that the past foretold the future. But these studies did not address a number of critical questions:

- How is the information generated before it impacts market prices?
- What mechanism causes the information to be reflected in prices?
- What is the incentive for anyone to generate the information?
- Why would anybody do any research on a company, if trading on information is unprofitable?
- If nobody collects any information, how can prices still reflect all the information?
- Most importantly, are markets 'efficient' in the sense that they can price assets correctly?

These questions led to a number of refinements of the original idea propounded by Samuelson.

Grossman and Stiglitz [1976] focused on information acquisition. They showed that those who invest in research are rewarded through speculative profits so that they at least recoup the cost of that activity. By being the first mover of the 'invisible hand', they drive prices towards their fair economic value. Thus, by extension, the authors envisaged the role of active management backed by superior resources and skills.

In a parallel tract, there also emerged the arbitrage pricing theory [Ross, 1976], which showed that the activity of arbitrageurs would naturally drive the expected returns to a level that correctly reflects the risk-return trade-off of any asset.

The idea was further refined in a paper that was based on the old adage from John Maynard Keynes that 'markets stay irrational longer than you can stay solvent' [Schleifer and Vishny, 1997]. They showed that high financing risk forces arbitrageurs to be cautious about exploiting mispricing. The outcome can be calamitous, if this risk is ignored, as happened in the case of Long-Term Capital Management.

Its highly leveraged bet on the convergence of US vs European and Japanese bond yield following the Asian currency crisis was sound and the convergence did actually happen. However, in the meantime, the leverage bankrupted LTCM and created a systemic crisis in 1998.

Over time, empirical studies came to acknowledge that active management can, and does, regularly exploit the deviations from equilibrium prices via specialised knowledge, lower trading costs, low management fees and a financing structure that rides out price anomalies persisting over a long period.

Indeed, if everybody shared the same opinion, nobody would trade [Black, 1986]. Differences in opinion create inefficiency and this in turn is the basis for trading. Earnings from active management are a reward for informed investors for identifying and exploiting mispricing created by other investors. But that is not all.

Researchers argued that the segmentation of markets and investors can have an impact on the market values of securities, on top of their business fundamentals [Barberis, Schleifer and Wurgler, 2003]. Investors are shown to pigeon-hole securities – by, for example, geography, index or size – due to information limitations, trading restrictions and trading costs.

However, the reader who wades through this and other studies should expect a long hard slog, with little likelihood of emerging on the far side appreciably enlightened.

Before the current crisis, the proponents of the EMH had in fact begun to accept a limited scope for active management

...but the resulting debate generated more heat than light.

All they will discover is that it is nigh on impossible to test the two key propositions of the EMH: (a) markets are efficient since they incorporate all available information and (b) markets provide a fair valuation of securities. Neither of these propositions can be independently tested via the conventional econometric methods. Hence the EMH can never be rejected [Campbell, Lo, and MacKinlay, 1997].

While a number of factors – ‘anomalies’ – have been identified as delivering higher returns over time that cannot be explained by the EMH, there is no consensus on whether these factors reflect the existence of an inefficient market or the dynamic nature of risks that no model can explain.

The sceptics, as a result, go for the jugular: anomalies mean that the whole paradigm of rational expectations that reigned supreme for nearly fifty years is no more than an ideological aspiration about how markets *ought* to work under the tenets of neo-classical economics. The crash-landing of its two cherished idols – CAPM and EMH – in 2008 shows all too well that they were as remote from the complexities of markets as the man on the moon.

Writing in *The New York Times Magazine* in September 2009, another Nobel Laureate, Paul Krugman, argued that Chicago School free market theorists “mistook beauty... for truth”. The synthetic outrage provoked by the article generated more heat than light [Frydman and Goldberg, 2011].

The advocates of the EMH countered that it is still alive and well except for periodic distortions. The stock market is a voting mechanism in the short term, but a weighing mechanism in the long term. True value will win out in the end.

They also contend that the EMH never stated that the markets are ‘efficient’ in the sense they can price assets correctly: all it said was that prices reflect all known information. It does not say that this information is valued correctly in any sense: prices merely reflect the current consensus of the market without preventing market changes on a whim. In short, markets can be inefficient and inaccurate.

This volte-face is all the more remarkable for its tacit subtlety. For belief continues to reign supreme over reason: reality is not allowed to obscure the theory! No wonder the average investor is bewildered. No wonder Lowenstein and Grantham pull no punches.

For now, it is worth restating the measured conclusion of the most detailed review presented in a recent landmark report commissioned by the Norwegian Government Pension Fund [Ang, Goetzmann, and Scherfer 2009];

“The balance between indexation and active management is a choice variable for which the optimum depends on general beliefs about the existence and potential of manager skill, the pricing opportunities afforded within a given market, the time preferences and risk aversion of the investor, and the expertise and incentive contract of the specific manager.”

Translation: the EMH leapt from unwarranted assumptions to pre-conceived conclusions.

Yet, a tacit volte face was evident when it was conceded that the EMH did not mean that markets were ‘efficient’ in the sense they could price assets correctly. All it meant was that prices reflect all known information.

The most dispassionate study done so far inferred that the EMH leapt from unwarranted assumptions to pre-conceived conclusions.

4. A bullet dodged

The original attempts to check the randomness of stock prices looked at whether the way a price behaved in the past is any guide to how it will behave in the future. They showed that stock prices did not behave as random walks. Future price changes were influenced by the past movements: market has a memory, after all.

It also confirmed that stock prices do not behave as random walks, as postulated by EMH.

To economists and psychologists engaged in the field of behavioural finance, such short run momentums are consistent with the “bandwagon effect”. The famous example of that was the psychological contagion leading to irrational exuberance with the tech bubble in the 1990s [Shiller, 2001].

The behaviouralists acknowledge the inherent fallibility of mortal investors. To them, humans are highly imperfect organisms, given to bouts of greed and fear. They are impatient; they make analytical errors, suffer from bad data interpretation and overrate their abilities. Moreover, they are hard-wired for self deception, plain ad hocery, and faulty logic, contrary to the premises of the EMH. They are not rational, calculating machines, without systematic biases, whose behaviours can be predicted by mathematical models.

The most memorable indictment from this behavioural perspective came from Shiller [1981]:

“Just because markets are unpredictable doesn’t mean they are efficient. The leap in this logic was one of the most remarkable errors in the history of economic thought.”

Before then, however, the new behavioural edifice had started to expose fault lines in the EMH, since the landmark publication of *Prospect Theory* [Kahneman and Tversky, 1979].

It accepts that there is often a reasonable balance between different types of investors in the market and deviations in valuation are often corrected. But look under the bonnet and you’ll find a whole bunch of behavioural cognitive biases ticking away – sometimes cancelling each other out, most times not. These biases reflect imperfections in their perceptions of reality.

In finance, four biases are most common:

- **Mental accounting:** dividends are perceived as additions to income; capital gains are not
- **Biased expectations:** people tend to be overconfident in their predictions of the future
- **Reference dependence:** investment decisions are affected by an investor’s reference point which tends to be arbitrary
- **Representativeness heuristic:** investors mistake good companies for good stocks, not realising that their stock is usually already fairly valued, leaving little upside potential.

If the new behavioural finance is closer to reality than the old EMH paradigm of rational, calculating utility-balancing economic man, why has it failed to make major inroads into conventional thinking? There are two reasons.

The first reason is the power of the old guard, protecting the citadel for free market economics. It was the scientist Max Plank who showed that science advances “one funeral at a time”. It requires the old, controlling generation to die before new ideas that threaten their conception can take hold.

The second reason is that the EMH appears to work a lot of the time and then suddenly blows up. It is analogous to the relationship between Newton’s laws of gravity and Einstein’s theory of relativity. The former approximates the latter so long as the odd stuff about the speed of light and anti-gravity are taken out.

The problem seems to arise from the frequency of events in markets. High frequency events tend to follow the predictions of the EMH. If asset prices tend to deviate overly from an accepted norm, then the normal mechanism of the market brings them back in line.

On the other hand, there are also low frequency events that do not follow the EMH. When they occur, efficient market strategies can be disastrous, as deviations from sensible valuations turn explosive rather than self-correcting. Rational economic theories can’t explain such events that stem largely from subconscious investor psychology.

Indeed, new advances in behavioural finance showed that markets suffer from ‘bandwagon’ effects that can be contagious.

But such advances were brushed aside at the time - so powerful was the voice of the old guard.

Besides, the EMH appeared to work a lot of the time, then, it blew up – much like Newton’s laws of gravity - when faced with the notions of anti gravity and speed of light.

Finally, for all its fresh insights, the new behavioural finance can tell us why things go horribly wrong but not when. Not surprisingly, Samuelson admired Kahneman but considered much of the work in the behavioural finance “*a lot of noise*” [Bernstein, 2007].

He doubted if one could make money out of it. To him, most investors do not even understand how to capitalise on behavioural anomalies even if they are sceptics about efficiency and fans of behavioural finance. However, he did not address the bigger issue: namely, to what extent can such behavioural biases cause market contagion with disastrous consequences for the world economy?

Research attention remained firmly focused on the nuts-and-bolts of the EMH. On the one hand, some proponents of behavioural finance recognise its limitations, as spelt out by Samuelson. On the other hand, the proponents of EMH started to factor in the behavioural effects.

This synthesis is clear from the emergence of *The Adaptive Markets Hypothesis* [Lo, 2004]. It argues that investors are hardly capable of the kind of utility optimisation assumed in the EMH. Since optimisation is costly and since humans are limited in their computational abilities, they engage in ‘satisficing’: making choices that are satisfactory, not optimal. Such decisions are reached not analytically, but through trial and error that enables one to develop simple rules of thumb that evolve into heuristics over time.

Thus, when the environment changes, the heuristics of the old environment are not necessarily suited to the needs of the new. The mismatch gives rise to behavioural biases: actions seem ill-advised in the context in which they are taken.

However, according to Lo, the new paradigm of AMH is still in its infancy and requires a great deal more empirical testing before it dislodges the EMH. He admits that:

“The internal consistency and logical elegance of the EMH framework are almost hypnotic, and it is all too easy to forget that the EMH is merely a figment of our imagination, meant to serve as an approximation – and not always a terribly accurate one – to a far more complex reality. Unlike the law of gravity and the theory of special relativity, there are no immutable laws of nature from which the EMH has been derived.”

The implications are clear. Neither the CAPM nor the EMH have the necessary empirical credence; quite the reverse. Yet, they remained firmly anchored in the investor psyche and policy thinking in the West – at least until the 2008 market meltdown. It reminded us all too painfully that [Derman, 2011]:

“CAPM is a useful way of thinking about a model world that is, quite often, far from the world we live in.”

So pervasive was the hypnotic appeal of the EMH that research pre-2008 did not even consider the bigger issue: namely, how the bandwagon mentality in a world awash with liquidity could cause disastrous consequences for the global economy.

Despite strong evidence to the contrary, both CAPM and EMH remained firmly anchored in the investor psyche and policy thinking...

5. The moment of reckoning

In hindsight, it beggars belief that the sub-prime mortgage boom in the US lasted for as long as it did.

The Federal Reserve could not foresee a concealed time bomb. Nor did it have the inkling that any sub-prime crisis in the US would soon tip into a global disaster by the new mark-to-market rules introduced after 2004. So keen it was to sustain the economic recovery in the 1990s that at every whiff of a market downturn, fresh liquidity was pumped into the system. With the banking system awash with cash, product innovation proliferated.

Sub-prime loans became a ready outlet, once they were sliced, diced and repackaged to create the magic dust. Authorities believed that the efficiency of the markets would ensure their fair valuation and attract willing buyers around the world for these freshly minted securitised products – many with (bogus) triple-A rating. Also by spreading their risks across the global investment community, their use of derivatives would pre-empt any systemic risks. Alan Greenspan, no less, was emphatic on the merits of this financial engineering [1997]:

“The use of a growing array of derivatives and the related application of more sophisticated methods of measuring and managing risk are key factors underpinning the enhanced resilience of our largest financial institutions. ... As a result, not only have individual financial institutions become less vulnerable to shocks from underlying risk factors, but also the financial system as a whole has become more stable.”

The rest is history. No wonder, today’s investors fall into two camps: the shocked and the dismayed. Indiscriminately, like a tsunami, the 2008 sub-prime crisis wiped out some \$15 trillion in asset values, hitting every asset class, every market, every geography and every client segment: 15 years of capital gains were wiped out in 15 months.

Yet, in May 2007, barely three months before the crisis unfolded, Ben Bernanke couldn’t see a phenomenon of this magnitude coming, when he stated in a public speech in May 2007:

“We do not expect significant spill-over from the sub-prime market to the rest of the economy or to the financial system.”

Nor did Gordon Brown, for that matter. In his June 2007 Mansion House speech he said:

“Everyone needs to follow the City’s great example and emulate this high value-added talent-driven industry. Thanks to its remarkable achievement, we have the huge privilege to live in an era that history will record as the beginning of a Golden Age.”

Of the 20 biggest daily upswings in the S&P 500 since 1980, 10 have occurred in the last five years. Likewise, of the 20 biggest downswings, 13 have taken place in the last 5 years. Rarely have the stock markets been so wild and moved so little, until early 2012. With too many wild variables, investing has become a loser’s game.

This is a far cry from the heady days of the 1990s when the unrelenting chase for relative returns delivered double digit performance year after year until the ensuing crash in March 2000. It was a defining moment. Investors discovered that index hugging could not buy groceries in a bear market; nor could it prevent an unprecedented funding shortfall in defined benefit pension plans worldwide. Thus, uncorrelated absolute returns became the new mantra.

Some 30 new product sets, asset allocation tools and hedging techniques were duly adopted [Rajan, 2011]. They aimed to control risk and boost returns irrespective of market conditions – only to be overwhelmed by the crash of 2008.

That episode showed that the world of investing can be a hall of mirrors: what you see is not as it is. Securitised mortgages in the US are just one example. The other is a raft of structured products that were subsequently hammered by the collateral damage from the collapse of Lehman Brothers and AIG. But that is not all.

In the heady days of the 2000s, there was a growing belief that the economies of the East and the West had significantly decoupled to the point where a market crisis could be contained. Yet, China and Russia notched up the biggest market falls in the immediate aftermath of the Lehman collapse. Globalisation had created greater economic connectivity and contagion susceptibility – concepts that were wholly alien to the EMH.

Policy makers did not see the 2008 meltdown coming when...

...15 years of asset gains were wiped out in 15 months.

To their cost, investors have since learnt that the world of investing can be a hall of mirrors, where what you see is not as it is.

They lost money in every asset class they were advised to follow by equating risk with volatility.

They are hard to model in a world where technology has amplified investor mood swings and compressed decision spans from calendar time to real-time. Nearly 65% of daily movements in key market indices are now driven by 'noise' rather than 'signal'. Politics, not economics, drives the markets. Also, high frequency trading reinforces the periodic bouts of risk-on/risk-off that are unconnected to corporate fundamentals, a far cry from the self-correcting mechanisms of the efficient markets.

In hindsight, investors have learnt that they were not managing risk, they were managing uncertainty. One relies on known probabilities of expected returns, the second on pure guesswork. As one large pension plan participating in the 2011 CREATE-Research survey observed,

"We've lost money in every asset class we were advised to follow in the last decade".

Few policy makers and their economists saw the bear markets coming; few detected the time bomb concealed in cheap money; few understood the unintended consequences of the mark-to-market rules; few expected the asset class correlation to go through the roof: few challenged the validity of the bar belling model. Long conditioned to viewing the investment landscape through the prism of EMH, they failed to see that investing had become ever more nuanced in the face of systemic forces akin to the Black Swan [Taleb, 2007].

In retrospect, the 2000-02 equity crash was a defining moment in global fund management. It set off a chain reaction whose cumulative impacts were hard to foresee. As millions lost billions, the old ways of investing fell into dispute. Nor could the hype of equity risk premium or benchmark hugging stop a severe shortfall in defined benefit pension plans worldwide.

So, they switched from relative to absolute returns, in what promised to be an era of low nominal returns. This decisive shift coincided with the most benign conditions in credit markets in living memory. These conditions served to perpetuate the myth that absolute returns were not only desirable but also deliverable, thanks to the arrival of the 'new masters of universe' who had suddenly rediscovered the skills that lay fallow in the bygone era of relative returns, when chasing alpha was like looking for a needle in a haystack.

In the brave new world of absolute returns, this new breed of managers overly relied on the use of leverage, shorting and derivatives in their freshly minted 'go anywhere' type strategies. Risk was stacked up like a wedding cake. Like alchemy and quack medicine, the prevailing risk models thrived on the investors' wish to believe in impossible things. The advice from a leading thinker of the day was largely ignored [Scholes, 2005]:

"We make models to abstract reality. But there is a meta-model beyond the model that assures us that the model will eventually fail. Models fail because they fail to incorporate the inter-relationships that exist in the real world."

It is all too clear that, far from acting on rational signals as EMH postulated, markets can also be driven by 'noise' that is far removed from business fundamentals.

With hindsight, many of the historical investment conventions didn't work in the last decade when risk failed to generate returns.

Investors discovered that they were not managing risk, they were managing uncertainty.

6. What's all this got to do with efficient markets?

First, it helped to cultivate the belief that markets are always right and mean reversion towards fundamental values is the norm. A new lingo was created which, in hindsight, used clever words to conceal longstanding problems. Policy makers, especially in the UK and the US, were seduced into believing either that bubbles never happened, or if they did there was no hope that central banks could spot them and intervene. Evidently, they believed that markets have their own self-correcting fair-value dynamic. The only thing that central banks can do is to mop up the periodic mess afterwards. That thinking lay behind

the two savage bear markets of the last decade. It also lay behind the whole mark-to-market accounting edifice introduced in 2004 that rests on the view that only markets can provide 'fair' valuations at all times. Arguably, that edifice turned the US sub-prime crisis into a global disaster, when the value of all securitised assets dropped like a stone, irrespective of their intrinsic worth.

Second, it also turned investing from art to science; from craft to industrialisation; from judgment calls to mechanical formulas. Much of the innovations – e.g. derivatives, shorting, leverage, portable alpha, high frequency trading – were justified on the grounds that the only way to beat the markets was to create ever more clever mouse traps. More often than not, they have aimed to extract value where there is none. Systemic risks, product complexity and higher charges have been the main outcomes.

Third, the EMH fostered complacency amongst policy makers and investors alike. Most of them did not realise that, under the froth of the booming markets in the period 2002-08, serious fault lines were developing in the investment landscape in response to mega forces like the globalisation of markets, the impact of revolutionary technologies, and the unintended consequences of regulatory changes – to name but a few. Via mounting anomalies, caused by periodic bouts of dislocations, these forces were progressively eroding the twin pillars of asset allocation: equity risk premium and asset class diversification.

The anomalies in question arose due to: the ad hoc manner in which markets react to information; the unstructured means by which markets price a given asset; and the behavioural biases of investors who continue to use the old heuristics for new situations.

The anomalies have multiplied as markets have gone from: local to global; calendar time to real time; clear 'signal' to loud 'noise'; buy-and-hold investing to opportunistic investing; and asset management to liability optimisation.

Last, but not least, the 'industrialisation' of investing has, in turn, depersonalised relations between investors and their asset managers. Unlike their physical counterparts, like cars and computers, investment products do not have a definable shelf life, they do not deliver predictable outcomes, they cannot be pre-tested in a lab, and they do not carry a fit-for-purpose certificate. For good returns, what matters most are timing and market environment. These require a far higher degree of engagement between investors and their managers than has been the case over the past 20 years where dis-intermediation has become ever more pronounced [Rajan 2012].

For asset managers, it is essential to:

- Understand their clients' dreams and nightmares
- Solicit new ideas by tapping into clients' investment expertise
- Manage expectations in what can and can't be delivered
- Minimise 'wrong time' risks in buying and selling
- Communicate bespoke research that addresses unique issues to clients
- Highlight proactive buying opportunities in periods of big price dislocations.

For investors, it is essential to:

- Seek better alignment of interests via common beliefs and time horizons
- Obtain a second opinion on their asset allocation and correlation risks
- Gain deeper insights into what works at different stages of market cycle
- Develop the mental agility to capitalise on periodic market dislocations
- Minimise behavioural biases and herd instinct provoked by periodic volatility
- Understand the 'health warnings' that are usually lost in the fine print of legal agreements.

Most of them did not realise that, under the froth of the booming markets in the period 2002-08, serious fault lines were developing in the investment landscape in response to ...

...mega forces like the globalisation of markets, the impact of revolutionary technologies, and the unintended consequences of de-regulation in the previous two decades.

To make matters worse, indirectly, the EMH was partly responsible for turning investing from art to science, from craft to industrialisation, from judgment calls to mechanical formulas.

It is all too clear that, far from acting on rational signals as EMH postulated, markets can also be driven by 'noise' that is far removed from business fundamentals.

In hindsight, many of the historical investment conventions didn't work in the last decade when risk failed to generate returns.

7. What next?

Our main conclusion is that neither the CAPM nor the EMH have much empirical support. They work until they don't work. Both have undergone significant refinements to the point where their much-publicised inferences – that markets are efficient and active management does not work – are no longer tenable.

Yet, they have reigned supreme for the best part of half a century, having a profound influence on the psyche of financial investors, policy makers and the investment industry.

It is probably too far-fetched to single them out as the key culprits in the current crisis. They are merely ingredients in a rich stew of financial irresponsibility, political ineptitude, lax regulation and perverse incentives. Besides, the world of investing is too complex for a few naïve ideas to bring it to its knees.

It is equally hard to underestimate their influence on the forces that have brought us to where we are today. They promoted a world view detached from the on-the-ground reality. For a long time, they rode on the back of the strong pro-market anti-regulation sentiment unleashed by the Thatcher-Reagan era in which faith mattered more than facts.

Either way, this paper has had the limited goal to describe how modern financial theory has evolved and how it has been linked to the current crisis. As such, its tone and content have been deliberately retrospective.

Subsequent papers in the 300 Club series will focus on some of the challenges highlighted in the last two sections and the responses they require from governments, investors and asset managers. Areas that will receive special attention are dynamic asset allocation, manager selection, principal-agency relationship and client engagement.

In sum, the events of the last four years have discredited the modern financial theory.

Further papers in this series will highlight areas where fresh thinking is needed, if today's investors are to have a fair deal.

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The 300 Club

The 300 Club is a group of leading investment professionals from across the globe who have joined together to respond to an urgent need to raise uncomfortable and fundamental questions about the very foundations of the investment industry and investing. The mission of the 300 Club is to raise awareness about the potential impact of current market thinking and behaviours, and to call for immediate action.

Current economic and investment trends will change the investing landscape over the next two decades and we are at a crisis point which presents huge risks to investors, according to the 300 Club. Moreover, the 300 Club believes that current financial and investment theory and practice run the risk of failing investors at their time of greatest need.

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