Modern Finance, Methodology and the Global Crisis

Esteban Pérez Caldentey
Matías Vernengo

University of Utah
Department of Economics
260 S. Central Campus Dr., Rm. 343
Tel: (801) 581-7481
Fax: (801) 585-5649
http://www.econ.utah.edu

Modern Finance, Methodology and the Global Crisis

Esteban Pérez Caldentey
Economic Affairs Officer at ECLAC (Santiago, Chile)

Matías Vernengo
University of Utah, Department of Economics

Abstract

Modern finance has a conceptually unified theoretical core that includes the efficient market hypothesis (EMH), the relationship between risk and return based on the Capital Asset Pricing Model (CAPM), the Modigliani-Miller theorems (M&M) and the Black-Scholes-Merton approach to option pricing. The core has been instrumental to the growth of the financial services industry, financial innovation, globalization, and deregulation. The significant impact of the core is explained by their success in elevating finance to the category of a science by extracting the acquisitiveness associated with economic freedom from the workings of a free market society. This success was somewhat of a paradox. The core theories/theorems were based on wildly unrealistic assumptions and did not stand out for their empirical strength. Overcoming this paradox required a methodological twist whereby theories were devised to create rather than to interpret or predict reality. This view led to a series of financial practices that increased the fragility and vulnerability of financial institutions setting the context for the occurrence of financial crises including the current one.

The opinions here expressed are the authors' own and may not coincide with those of the institutions with which they are affiliated.

Introduction

Financial crises, from the Tulipmania in the 17th century and the South Sea Bubble in the following one to the current one initiated with subprime lending, are inexorably related to processes of mispricing and misperception of risk based on individual decision making in the context of financial deregulation and innovation. In all of those processes there are purposeful actions of market insiders to gain from the excesses of market euphoria, and as such financial booms and busts should be seen as intrinsic to the way in which capitalists promote accumulation. After all the collapses there are repeated calls for drastic financial reform, which may be effective, as in the case of the 1929 crash, or fruitless, as in the Savings and Loans crisis. Significant reform, however, must result from a careful rethinking of the theoretical and methodological foundations that were at the heart of the policies that led to the crisis.

The problem is that the current crisis has made no dent in the very conceptual foundations that provided the justification for the processes of mispricing of risk that in the first place led to the gestation and consecration of the crisis. Indeed, the conceptual foundations of finance and their policy implications are viewed by the mainstream as having little relevance for an understanding of the current crisis situation. This paper takes the contrary view. It argues that ideas matter and that these shape to a greater extent the policy orientation of institutions, including financial institutions, and the conduct of economic agents. Nor matter their origin, their conceptual formulation (whether formal or not) and their transmission mechanisms, they are inexorable linked to methodological issues and concerns. It would not be an exaggeration to argue that many key ideas in economics and finance sprung from concerns with methodology.

The importance of methodology is illustrated by the 2007-2008 Global economic crisis, which is from our point of view partly a by-product of the development of the theories of modern finance that sought to provide a 'scientific foundation' for the action and behaviour of economic agents. The scientific foundation expressed in hypothesis such as that asset prices move randomly, that returns are stationary, that risk and return have a definite linear relationship that finance can, under very specific assumptions, be irrelevant to investment decisions, or that it is always possible to create a risk-free portfolio, gave legitimacy to capital and stock market activity within a free market economy. It proved that no agents could obtain 'excess' profits within this institutional framework and the creation of a pyramid of financial assets and innovation was a good thing as it could eventually lead to the elimination of risk.

Viewed in the light of the history of economic and financial thought, scientific finance was a crowning achievement to separate *laissez-faire* from moral issues, a pervasive concern present since at least the 16th century, by extracting the acquisitive nature of economic behaviour from the workings of the free market economy.

However, the theories 'wildly unrealistic assumptions' and the fact that these did not provide fertile ground to empirical corroboration proved to be an obstacle to their consideration as legitimate science. A way to overcome this obstacle was to impose a methodological twist whereby theories instead of interpreting and predicting reality were conceived to shape and transform reality. This led eventually to practices by financial institutions that in fact amplified risk and financial and real fragility.

The remainder of the paper is divided in four sessions. The following session presents the main building blocks of modern finance, and shows that their core

propositions have a common conceptual and methodological unity. The second session shows that these theories had an important influence not only on the growth and development of the financial services industry, but also in promoting the process of financial liberalization and deregulation. The third session argues that modern finance is an offshoot of Arrow-Debreu General Equilibrium theory, and as such was seen as scientific by the economic profession. The elevation of finance to the status of legitimate science, on the other hand, required a methodological shift whereby theory was devised to shape reality. In other words, as Veblen said in a different context, invention is the mother of necessity; the invention of modern finance led to the "need" for a series of financial products and practices that proved to increase financial fragility and the chances of a crisis. The final session provides an assessment of lessons to be drawn from the crisis.

Modern finance and the myth of market efficiency
The core of modern finance can be encapsulated in four components, namely: the efficient market hypothesis (EMH), the trade off between risk and return encapsulated in the Capital Asset Pricing Model (CAPM), the Modigliani-Miller Theorem (M&M) and the Black-Scholes-Merton approach to option pricing. The efficient market hypothesis is the basis for the three other components of the core. It was formulated initially in its strong form stating that asset prices fully reflect all available information. This excludes the possibility that trading systems such as the stock market 'based only on current available information … have expected profits or returns in excess of equilibrium expected profit or return' (Fama, 1970, p. 384).

As a result on average, asset prices cannot be too low or too high and will adjust rapidly to reflect new information, and they will behave randomly.[1] Prices are equal to their fundamental value and thus investors receive what they pay for. Two other variants of the EMH include the semi strong and weak form efficiencies. The semi strong version states that current prices fully reflect all publicly available information. Finally the weak form states that the current price fully incorporates past information. In any case, these two variants do not alter in any significant way the fundamental implications of the strong from of market efficiency. Since security prices behave randomly, no matter the variant of the market efficiency hypothesis, the best predictor of tomorrow's prices are today's prices and excess profits are ruled out.

The side effect of this particular view of market efficiency is that agents' cannot predict market prices, since random shocks to preferences, endowments and technology would lead to unpredictable changes in prices. In terms of market applications this would suggest that an investor would have no capacity of beating the market in a persistent way, and that investing in index funds would be as good as any other strategy. According to the EMH, success stories, like Warren Buffett's, are just a fluke.

The second component of the core of financial economics is the relationship between risk and return expressing that higher risk must be accompanied by a higher expected return. In other words, in order to obtain higher returns an investor must be

---

[1] Fama defined efficient markets in 1965 based on his 1964 doctoral dissertation and also concludes that stock market prices follow a random walk. Samuelson (1965) provides mathematical proof that in well-informed and competitive markets prices will behave randomly.

willing to accept greater risk. This follows from the fact that utility theory assumes that investors are risk-averse.

In financial theory the relationship between risk and return focuses on the explanation of the risk premia (the difference between expected returns and the riskless rate of interest) analyzed by the Capital Asset Pricing Model which is an extension of Harry Markowitz's mean-variance portfolio model.

Markowitz's model argues that, given the risk-averse characteristics of agents, they focus only on the mean and variance of their returns. In particular, investors chose portfolios to minimize the variance of returns, which is the measure of risk, for a given expected return and maximize expected returns for a given risk (Fama and French, 2003). The CAPM analyzes the relationship between risk and return under conditions of market equilibrium. In the CAPM model portfolio optimizing agents meet in the marketplace, their interaction drive prices to market equilibrium and they agree on the joint distribution of asset returns.

The return of an asset above that of a risk free asset such as a government bond, the premium of the asset, is proportional to the Beta statistic. Beta is a measure of the elasticity of the rate of return of an asset with respect to that of the market, that is, of its systematic risk. Thus, according the CAPM assets with higher systematic risk have a higher return than do assets with lower systematic risk, and that assets with the same systematic risk should give the same return. The importance of CAPM is that it allowed financial markets to quantify the risk of a portfolio.

The third component of the core of financial economics is the Modigliani-Miller theorem. It states that under certain assumptions (the financial markets work perfectly, there are no taxes and no bankruptcy costs) the way in which a firm finances its real activities, say whether with equity, debt or a combination of both, does not affect the cost of capital and has no bearing on its own market value or on the production and consumption decisions of other economic agents (Hoover, 1988). As put by Modigliani (1980, p. xiii):

> "… with well-functioning markets (and neutral taxes) and rational investors, who can 'undo' the corporate financial structure by holding positive or negative amounts of debt, the market value of the firm – debt plus equity – depends *only* on the income stream generated by its assets. It follows, in particular, that the value of the firm should not be affected by the share of debt in its financial structure or by what will be done with the returns – paid out as dividends or reinvested (profitably)."

Thus investment decisions are independent of finance or to put it another way, finance is irrelevant to investment decisions. This can be stated in terms of a firm's average cost of capital that is shown to be equal to the real rate of return on capital and independent of the firm's capital structure (Hoover, 1988, p.107).

The final pillar of modern finance is the Black-Scholes-Merton option-pricing model. An option is defined as a contract between a buyer and a seller that gives the buyer the right but not the obligation to buy or sell a particular underlying asset within a certain time period at a specified price (i.e., the strike price or the price at which the contract can be exercised). The underlying asset in question can include common stock,

property, or a physical commodity. Central to option pricing theory is to determine the cost or value of the option.

The value can depend on many factors including the current market price of the underlying asset, the exercise price of the option, the maturity date of the option contract, the speculative premium of the option (estimated deviation with respect to the price of the underlying asset over the life of the option), and the risk free interest rate. Using these variables, as noted by Taleb (2007, pp. 278-79), Black, Scholes and Merton "improved on an old mathematical formula and made it compatible with Gaussian general financial equilibrium theories." The formula already existed, but was not compatible with the risk free general equilibrium environment, and that was the contribution of Black, Scholes and Merton. Their model showed that it was possible to construct a riskless portfolio through dynamic hedging, that is, by taking positions in bonds (cash), options, and the underlying stocks. According to their reasoning changes in the value of the option would be offset by equal changes in the value of the underlying stock and cash.

The four building blocks of modern finance were developed separately, at different stages of the thinking in financial economics, under different circumstances and for different purposes (Fox, 2009). Nonetheless, these four theorems share, in the main, a common set of fundamental assumptions. These theorems assume some form of existence of perfect capital markets – no taxes, no transactions costs and in the case of M&M also no danger of bankruptcy – that agents have equal access to information and capital markets; agents and prices adjust rapidly and continuously to new information and that decisions are made solely on the basis of expected values and standard deviations of the returns on the portfolios and that all agents have homogenous expectations. Their conceptual similarity allows these to be articulated to form a coherent framework of analysis with definite implications for the practice of finance.

It should be noted that not only there is a notion of a perfect market, but also the notion of market efficiency used by modern finance is in line with the Arrow-Debreu model of General Equilibrium. The dominance of general equilibrium models of the Arrow-Debreu family is a very recent development in the profession, and a complete departure from the previously held view of market efficiency. While for classical authors, like Smith, Ricardo or Marx, efficiency meant that the economy would be more dynamic and capable of accumulation of capital (the wealth of nations) for the now dominant dynamic stochastic general equilibrium (DSGE) models every price, based on factor endowments, agents' preferences, and perfect information, is an equilibrium price. Market prices do not fluctuate towards long run equilibrium prices. In other words, every short-term price is an equilibrium one, if agents have the correct model and all the information. Allocative efficiency is what the modern neoclassical version rational markets mean.

The adoption of the Arrow-Debreu notion of efficiency is no accident, and provides authority to modern financial theory. Taken jointly the core propositions state that any asset (whether of the more standard type such as the common stock or the more sophisticated kinds such as options and derivatives) is tradable, and has a price and a rate of return determined in an efficient market. In such a market there are no arbitrage opportunities and the prices must equal to the present discounted value of expected future payoffs over the asset's life (EMH). The riskless rate of interest obtains because, the risk of any asset is independent of how the asset is financed (M&M) and is determined only

by systematic risk (CAPM). However, through hedging and thus increased trade in financial instruments (Black & Scholes), the systematic risk can be reduced significantly, and all assets can be made to be risk free.

However, over the years, the empirical evidence for the EMH has been shown to be less and less convincing, to the point that Eugene Fama, the high priest of market efficiency, suggested that markets produce consistent mistakes, even though that may not imply that a professional investor would be capable of beating the market. Shiller (1981) has shown, for example, that even though financial theory argues that stock prices are the current value of expected dividends, the evidence shows that the former are considerably more volatile than the latter. The critiques of financial theory within the mainstream are based on what has been called behavioral finance.

The main critique of behavioral finance is that agents are not completely rational, and if one adds the developments of information economics, one would conclude that market inefficiencies are somewhat pervasive and that bubbles, and crashes, should be relatively common features of the economy (Shefrin, 2000). At heart behavioral economics aims at greater psychological realism than the standard neoclassical models. Behavioral models start from empirical regularities and try to find assumptions that would lead to that particular result. In general, the empirical regularity implies that agents follow a simple rule of thumb and then derive the consequences, which may not be efficient in the aggregate.

Behavioral finance results undermine the basis for some of the EMH conclusions; however, behaviorists still would agree that informed investors would be unable to beat the market, even if markets are less than rational. The important implication is that bureaucrats that try to regulate the market would not be better than markets in evaluating risk, and as a result a hands off policy would still be recommended.

Modern finance and the real world
The core theorems of finance provide a premier and perhaps unique case where academic research has affected to a great extent real world views on finance, research on financial economics as well as the daily practice of all those engaged in financial transactions. The influence and interaction between financial theory and the growth of finance schools and that of the financial sector in terms of size, volume and instruments is well documented.

In the past five decades the output of business master's degrees has expanded considerably. In the mid-1950's, the annual output of US business masters was a little over 3,000. Close to three decades later, in 1981, the number of business master's degrees reached 55,000 (Rosett, n.d.). By 1997-1998, the number had expanded to reach over 100,000. In comparative terms to other professions, the number of MBA degrees surpassed the combined output of Lawyers and Medical Doctors in the 1980 and in 2000 doubled the BAs awarded in engineering (Steinbock, 2005; Capital Flow Analysis, 2009). In 2001, as a sign of the times, Bush became the first MBA graduate to assume the US presidency. The expansion of business schools was not unique to the United States as attested by the experience of a similar trend in other countries.[2]

---

[2] China and India are two illustrative examples. In China the enrolment in MBA programs increased from 86 in 1990 (the year the first MBA program was introduced) to 10,000 in 2004. India also registered an important growth in MBA programs and enrollment. According to Global Study Magazine there are currently over 900 MBA programs in India.

Finance theory not only encouraged the rise in business schools, but also was instrumental in the growth and extensive development of the financial sector, in particular since the middle of the 1980s. Available data for the period 1980-2007, show that in 1980, the value of the stock of financial assets, including derivative contracts, was slightly above that of GDP (129% of GDP including derivatives). In 1990, the value of the stock of financial assets was more than twice that of GDP (253% including derivatives). By 2001, the value of the stock of global financial assets was roughly six times that of world GDP and by 2007 it represented 13 times the value of world GDP.

Figure 1: Global financial depth (Value of the stocks of assets as percentage of World GDP, 1980-2007 (Selected years)
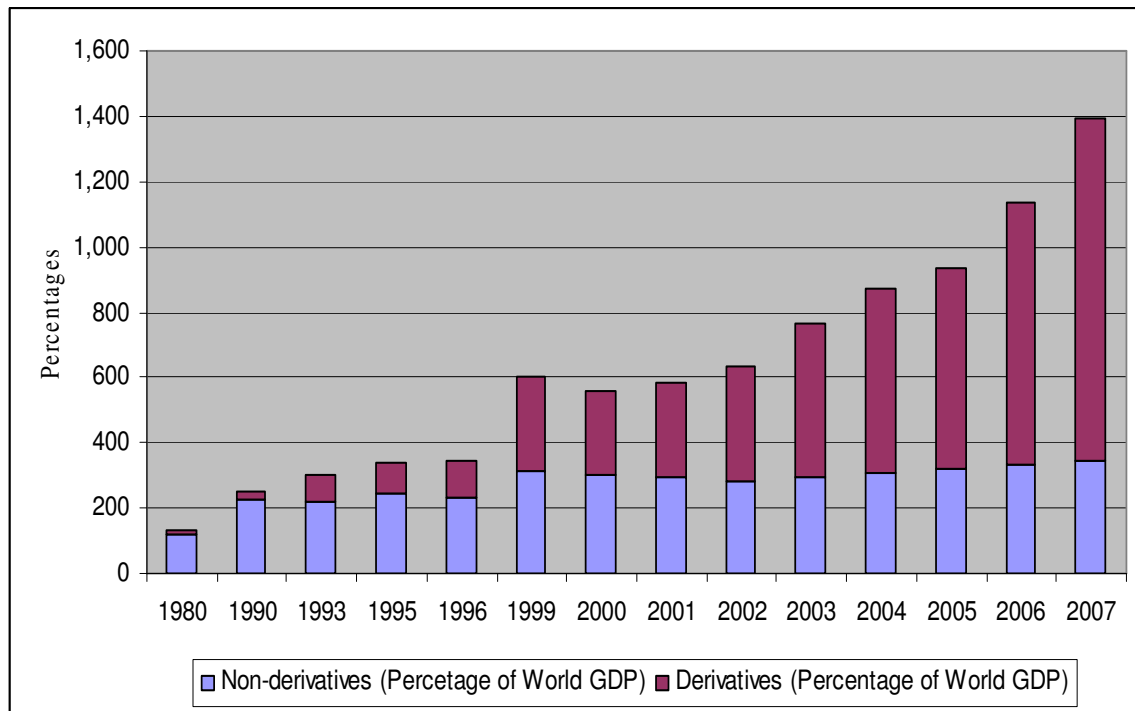
Source: MacKinsey Global Institute (2006 and 2009).

The rise in global financial depth is explained mainly by the exponential growth in derivatives. Between 1980 and 2007, derivative contracts expanded from 1 to roughly 600 US$ trillion. In percentage terms derivative contracts represented 7% of the global stock of financial assets in 1980 and 28% by the middle of the 1990's becoming the most important contributor to financial asset growth. In 2007, the value of derivative contracts represented 75% of the global stocks of financial assets. The unprecedented expansion of derivatives was accompanied by a shift away from banks and towards market institutions as the main financial intermediaries. In 1980 the value of equity and private debt securities equaled that of bank deposits (US$ 5 trillion dollars). By 2007, the value of equity and private debt doubled that of bank deposits (US$ 110 and 56 trillions respectively).

The contribution of the modern theories of finance to the development of financial derivatives is recognized in the communiqué of the Committee, which awarded the Nobel Prize in 1997 to Merton and Scholes. As well, the Counsel of the Chicago Board Options

Exchange, which was one of the 'first modern financial derivatives exchanges and a prototype of other derivative exchange centers such as the London International Financial Futures Exchange (LIFE) and the Deutsche Terminborse (Eurex),' explains the influence of financial theory on practice. As he puts it, "the Black-Scholes was really what enabled the exchange to thrive" (quoted in MacKenzie and Millo, 2003, p. 121, Mackenzie, 2003, p. 854 and MacKenzie, 2005, p. 18).

However, the influence of option price theory was not only limited to the development of derivatives and actually had an important impact on the entire financial services industry. In his Nobel Lecture, Merton emphasizes that the influence of option price theory was not limited only to the derivatives markets. In his words (1997, p.87):

> "The influence of option price theory on finance practice has not been limited to financial options traded in markets or even to derivatives securities generally. …Option pricing technology has played a fundamental role in supporting the creation of new financial products and markets around the globe. In the present and in the impending future, that role will continue expanding to support the design of entirely new financial institution, decision-making by senior management, and the formulation of public policy on the financial system."

Finally, and most important, Merton argues that, while cognizant of the feedback between financial theory and financial innovation, the expansion of the derivative industry was also largely accountable for the rate and pace of financial globalization. It is worth to quote him at length on this point (ibid, p. 89):

> "A central process in the past two decades has been the remarkable rate of globalization of the financial system…This was made possible in large part by the derivative securities functioning as 'adapters'. In general, the flexibility created by the widespread use of contractual agreements, other derivatives, and specialized institutional designs provides an offset to dysfunctional institutional rigidities. More specifically, derivative-security contracting technologies provide efficient means for creating cross-border interfaces among otherwise incompatible domestic systems, without requiring widespread or radical changes within each system. For that reason, implementation of derivative-security technology and markets within smaller and emerging-market countries may help form important gateways of access to world capital markets and global risk-sharing. Such developments are not limited only to the emerging-market countries with their new financial systems. Derivatives and other contracting technologies are likely to play a major role in the financial engineering of the major transitions required for the European Monetary Union and for the major restructuring of financial institutions in Japan."

While the quotes of Merton and Counsel of the Chicago Board Options Exchange refer to the Black-Scholes-Merton equation for option pricing, the rest of the theories also had important practical implications. The CAPM is known to have provided the foundation for 'a vast industry in portfolio management' (Jarrow, 1999, p. 3). As well the M&M

theorem had important ramifications for the choice of the composition of capital structure and its relation to the asset side of firms.

Finally, the EMH is a central component of the Black-Scholes-Merton, the CAPM and the MM and thus indirectly contributed to the policy impact of these theorems. The EMH foundations of these theories certainly contributed, at least in part, to the spur for deregulation and liberalization of financial markets. It must be noted, in this context, that modern finance was not primarily an instrument for understanding the functioning of real financial markets, but a devise to promote its transformation, and for favoring certain social groups at the expense of others.

Invention is the mother of necessity
From our point of view, the practical triumph and significant influence of the core financial theories can be explained, because they provide a successful attempt to constitute economics and finance into a scientific discipline rendering irrelevant the moral concerns associated with capitalism and *laissez-faire*. That was possible, to some extent, because modern finance freeloaded on the prestige of Arrow-Debreu, with which it shares several assumptions, and because the Nobel committee was "largely responsible for giving credence to the use of the Gaussian Modern Portfolio Theory" by giving prizes to several of the authors that developed theories described in the previous section (Taleb, 2007, p. 277).

Historically, the wealth gathering and moneymaking activities associated with capitalism and *laissez-faire* were looked upon with disdain and suspicion and stood lower in the scale of societal values than other activities. Political economy, and its underlying belief system, played a fundamental role in making the pursuit of mercantile and banking activities appear legitimate.

This was accomplished initially by showing the compatibility of self-interest with the well being of society as epitomized by Adam Smith's 'invisible hand' metaphor. In a similar way, it was argued as demonstrated by Hirschman (1977) that an acquisitive society could harness dangerous passions that could flourish under capitalism such as greed and avarice into being benign interests. This line of argument in defense of the free market permeated economic thought well into the 20th century as shown by the following quote of Keynes (1936, p. 374):

> "Dangerous human proclivities can be canalized into comparatively harmless channels by the existence of opportunity for money making and private wealth, which, if they cannot be satisfied in this way, may find their outlet in cruelty, the reckless pursuit of personal power and authority and other forms of self-aggrandizement."

A further step in this direction was undertaken in the 19th century by the Marginal Revolution theorists, mainly William Stanley Jevons and León Walras, who explicitly and definitively removed moral issues and the problem of good and evil from the concerns of political economy. In order to become a science as warranted by Jevons and Walras, political economy had to exclude those issues not amenable to the calculus of pain and pleasure or to utility analysis.

In this regard, in his *Elements* (1952, p. 21), Walras explains that there is no point in considering the morality or immorality of the need satisfied by a good. Modern finance sharpened this line of thought by making moral concerns an irrelevant issue to the workings of the free market. It accomplished this by postulating, as analyzed in a previous section, above a series of assumptions including arbitrage and informational efficiency.

As a result no market participant could beat the market and make excess profits and on average every market participant receives what he pays for. Since no market participant could predict nor influence the market for securities, fluctuations in prices were purely exogenous to economic behavior and external to the financial system. Also, given information, initial endowments, and the preferences of participants all prices are equilibrium prices, and any kind of regulation would distort market efficiency.[3] Finally, it could be shown that financial market activity could create risk free portfolios of financial assets, no matter their characteristics.

This view is reminiscent of the approach taken by the Marginal Revolution theorist, William Stanly Jevons which understood market forces to lead to a configuration 'insuring maximum happiness … that could only be deflected' by exogenous forces outside human activity and control such as solar cycles (Mirowski, 1984; De Goede, 2001). As a matter of curiosity, Jevons' sunspot theory provided the basis for the computation of the Dow Jones Industrial Average in 1896 by Charles Dow and for the introduction of informational efficiency to describe stock market behavior (Brown *et al.*, 1998).

In other words, modern finance rendered legitimate stock and capital market activity by extracting the acquisitive nature from the workings of the free market and in general of capitalism. Moral issues simply had no place in this scientific approach to finance. The statement of the former counsel of the Chicago Board Options Exchange puts it succinctly with respect to the Black-Scholes-Merton equation and its influence on the view of derivatives and option prices as casino like activities: "It wasn't speculation or gambling, it was efficient pricing. I think the SEC [Securities and Exchange Commission] very quickly thought of options as a useful mechanism … and it's probably the effect of Black-Scholes" (apud McKenzie, 2009, p. 18).

The influence of modern theories of finance on the change in the perception of the acquisitive nature of market activities was not limited to the stock and capital markets but, in fact, permeated also the rest of economic activities. Indeed, the formulation, formalization and development of the main tenets of modern finance including informational and arbitrage efficiency, predated the Rational Expectations Revolution which gave birth to modern macroeconomics. These assumptions are at the heart of modern macroeconomics and it is difficult to assume that agents form their expectations rationally without at the same time assuming that markets, asset, goods and factor markets are also efficient.

As put by Fama (2007): "…rational expectations stuff is basically efficient markets; they're pretty much the same thing. If you are talking about the macroeconomy, I don't see how you can avoid financial markets." And further: "you can't test models of market equilibrium without market efficiency because most models of market

---

[3] Self-fulfilling expectations can give rise to rational bubbles, since the asset prices would move towards the expected ones with no change in fundamentals (Blanchard, 1979).

equilibrium [and we assume this includes New Classical models] start with the presumption that markets are efficient. They start with a strong version of that hypothesis, that everybody has all the relevant information. Tests of market efficiency are tests of some model of market equilibrium and vice versa. The two are joined at the hip."

Legitimizing the theories of modern finance by elevating them to the rank of a scientific discipline requires not only the formalization of theory, as epitomized by the introduction of the Brownian equation of motion as an integral part of the Black-Scholes-Merton approach to option pricing but also to show that these theories are useful in practice.

Yet as explained above their assumptions are simply very unrealistic and stringent as recognized by the authors themselves. As well, these theories are not known for their capacity to explain the past or to replicate the workings of the real world. In general the empirical validity of all of these theorems and their propositions has been a constant source of controversy and it is not uncommon to find critical and harsh judgment of their practical applicability.

Economic theories, whatever their methodology, are formulated to interpret reality, events or explain types and modes of economic organization or predict behavior. In one of the earliest methodological essays, Lionel Robbins (1940, pp. 99-100) explains the nature of economic analysis consists of deductions from postulates derived mainly from 'universal facts of experience.' Friedman (1953) saw theory as serving a predictive function. More recently Lucas (1980, p. 697) understood theory as: "an explicit set of instructions for building a parallel or analogue system – a mechanical imitation economy."

Contrarily, Merton and Scholes used their model to transform reality, the reality of markets, so that that reality was conceived as an empirical replication of a theoretical construct, and in this case of an equation (the option price equation). In a nutshell, Merton and Scholes by logical and methodological construct became market creators. This was made clear in Merton's Nobel Lecture (1997, p. 109):

> "There are two essentially different frames of reference for trying to analyze and understand changes in the financial system. One perspective takes as given the existing institutional structure of financial service providers … and examines what can be done to make those institutions perform their particular financial services more efficiently and profitably. An alternative to this traditional institutional perspective – and the one I favor – is the functional perspective, which takes as given the economic functions served by the financial system and examines what is the best institutional structure to perform those functions."

The empirical replication of theory requires by logic that reality conform to its assumptions. In the particular case of the Black-Scholes-Merton equation, the replication of its main message, that everything is an asset, every asset has a price and is tradable, and almost any risk is diversifiable through dynamic hedging, demanded that reality conform to the assumption of perfect capital markets (complete markets with no transactions costs).

This required the creation of, at least, as many securities as there are states of nature, that trading in securities must be a continuous on-going and growing activity and

that agents be able to transfer income between the different states of nature by trading in securities. As put by De Goede (2001, p. 158): "Merton was dedicated to finding the 'right' price for all kinds of explicit and implicit uncertainties and called his market vision the 'financial-innovation spiral' in which limitless amounts of custom-designed financial contracts spiraled towards the utopia of 'complete markets and zero marginal transaction costs.'"

The consequence of this methodological twist – the invention of modern finance that led to the creation of new financial instruments – was to promote strategies that actually have created more risk. In that sense the regulatory failure cannot be separated from the intellectual background that provided the fuel for the incredible expansion of financial instruments.

Also, the question posed by the current global crisis is not whether we need more and better mathematical models that can deal with the complexity of economic reality (Colander *et al.*, 2009) or better understanding of the institutional and historical features of real economies (Lawson, 2009), even though better models are possible and the mainstream lacks the tools for understanding institutional complexity. The problem is at a deeper level than the methodological use, or not, of mathematical modeling.

From our point of view, there is a strong need for discarding the methodological presupposition enshrined by modern finance according to which theory can shape reality, and to recognize that this methodological stance was an instrument for promoting the increasing the power of financial groups at the expense of other groups in society. It should not come as a surprise that the incredible rise in finance was connected with increasing inequality around the globe. This also suggests that the validity of theories that do not recognize the role of social conflict for the determination of income and wealth distribution, as is the case with the mainstream neoclassical that is the basis of modern finance, should be seriously questioned. Financial reform can only be effective if the ability of financial practitioners to transform the market is severely constrained.

Conclusion
The interaction of ideas and policies is central for the understanding of the evolution of social and economic change. Ideas shape policy, and the effects of policies on the real world feedback and produce new ideas. The dialectical interaction between financial theory and the policies that shaped financial practices and outcomes is no different than in other human activities. However, modern financial theory went beyond the conventional methodological stance, according to which theories are built to understand and/or predict reality (which may have indirect implications on how we comprehend and, hence, intervene in the real world), and directly promoted a significant transformation of reality.

The long history of financial institutions in capitalist societies indicates that the new methodological stance should be seen as a new instrument to promote capital accumulation. It should be noted that in the process of creating wealth, capitalism has always had the paradoxical effect of destructing a lot of the pre-existing riches. That is the basis of Marx's view that in capitalism everything that is solid melts in the air, and everything that is holy is profaned, and of Schumpeter's notion of creative destruction. It must also be noted that accumulation sometimes means simply the extraction of surplus from less privileged groups in society, rather then the construction of material wealth.

The use of new financial instruments, and the push for deregulation allowed certain groups to amass incredible riches. But history also teaches that those that play with the Promethean fire may very well end up burned. It is the task of those responsible for financial reform to make sure that the second lesson is also learned.

References

Blanchard, O. (1979) Speculative bubbles, crashes, and rational expectations. Economic Letters, 3, pp. 387-89.

Brown, S.J., W.N. Goetzmann, and A. Kumar (1998) The Dow Theory: William Peter Hamilton's Track Record Reconsidered. *The Journal of Finance*, Vol.53, No.4, pp.1311-33.

Capital Flow Analysis (2010) MBAs and Ethics. http://www.capital-flow-analysis.com/investment-essays/mba.html.

Colander, D., H. Foellmer, A. Haas, A. Kirman, K. Joselius, B. Sloth, T. Lux (2009) Mathematics, Methods, and Modern Economics. Real World Economics Review, No 50, pp. 118-21.

De Goede, M. (2001) Discourses of Scientific Finance and the Failure of Long-Term Capital Management. New Political Economy, Vol.6, No.2.pp149-170.

Fama, E.F. (1970) Eficient Capital Markets: A Review of Theory and Empirical Work. The Journal of Finance, Vol.25, No.2.pp. 383-417.

Fama, E.F. and K. French (2003) The Capital Asset Pricing Model: Theory and Evidence. Working Paper No.550. Center for Research in Security Prices (CRSP). University of Chicago.

Fama, E.F. (2007) Interview with Eugene Fama. http://www.minneapolisfed.org/pubs/region/07-12/fama.cfm

Fox, J. (2009) The Myth of the Rational Market. New York: Harper.

Global Study Magazine 4.3 (2009). The evolving MBA. http://www.ashridge.org.uk

Hirschman A.O. (1977) The Passions and the Interests. Princeton: Princeton University Press.

Hoover, K.D. (1988) The New Classical Macroeconomics. Cambridge: Basil Balckwell

Jarrow, R.A. (1999) Speech in Honor of Robert C. Merton. 1999 Mathematical Finance Day Lifetime Achievement Award.

Jevons, W.S. (1965) The Theory of Political Economy. New York: Kelley Publishers.

Jorion, P. (2000) Risk Management Lessons from Long-Term Capital Management. European Financial Management 6.pp.277-300.

Lawson, T. (2009) Contemporary Economics and the Crisis. Real World Economics Review, No 50, pp. 122-31.

Lucas, R.E. (1980) Methods and Problems in Business Cycle Theory. Journal of Money, Credit and Banking, 12, part 2, 696-715.

MacKenzie, D. (2005) Is Economics Performative? Option Theory and the Construction of Derivatives Markets. Paper to be presented to the annual meeting of the History of Economics Society, Tacoma, WA, June 25, 2005.

MacKenzie, D. (2003) An Equation and Its Worlds: Bricolage, Exemplars, Disunity and Performativity in Financial Economics. Social Studies of Science, Vol.33, No.6, pp.831-868.

MacKenzie, D. and Millo, Y. (2003) Constructing a Market, Performing Theory: The Historical Sociology of Financial Derivatives Exchange. The American Journal of Sociology, Vol. 109, No.1, pp. 107-145.

MacKinsey & Company (2009) Global Capital Markets: Entering a new era. MacKinsey Global Institute.

MacKinsey & Company (2008) Mapping Global Capital Markets. Fourth Annual Report. MacKinsey Global Institute.

MacKinsey & Company (2006) Mapping Global Capital Markets. Second Annual Report. MacKinsey Global Institute.

Merton, R.C. (1997) Applications of Option-Pricing Theory: Twenty-Five Years Later. Nobel Lecture.

Nobel Prize. Nobel Prize Press Release. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1997.
http://nobelprize.org/nobel_prizes/economics/laureates/1997/press.html.

Robbins, L. (1940) An Essay on the Nature and Significance of Economic Science, London: Macmillan.

Shiller, R.J. (1981) Do Stock Prices Move Too Much to be justified by Subsequent Changes in Dividends? American Economic Review, American Economic Association, 71(3), pages 421-36.

Steinbock, D. (2005) U.S. Business Schools. Origins, Rankings, Prospects. Helsinki: Academy of Finland.

Taleb, N.M. (2007) The Black Swan: The Impact of the Highly Improbable. New York: Random House.

Walras, L. (1952) Elements D'Economie Politique Pure. Paris :R. Pichon et R. Durand-Auzias.