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FINANCE THEORY, CRISIS AND INSTABILITY

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Abstract

The finance theory underlying the standard approach in financial economics is prone to dismiss crisis and instability because that theory postulates a timeless equilibrium abstracted from the functioning of a capitalist economy that is supposed to generate the returns on financial assets and the institutions that operate in financial markets. This report presents a critical reassessment of finance theory in the form of the standard theories of portfolio allocation and asset valuation using a stylized concept of risk. The key theories include the Capital Asset Pricing Model and the Efficient Markets Hypothesis, as well as the Modigliani-Miller Theorem, option and derivatives pricing formulae, and a strand of theory more critical of the rational investor operating in instantaneously adjusting markets, such as behavioural finance. All of these theories have been questioned in the wake of the financial crisis of 2008.

Key words: Finance, Derivatives, Capital Asset Pricing Models, Efficient Markets, Modigliani-Miller Theorem, Financial Crisis

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The financialisation approach argues that the structural change that has taken place in credit and financial markets has led to financial crisis and instability. This is demonstrated exhaustively in Work Package 3 of this research project. In this study it is shown that the finance theory underlying the standard approach in financial economics is prone to dismiss crisis and instability. This is because that finance theory postulates a timeless equilibrium abstracted from the functioning of a capitalist economy that is supposed to generate the returns on financial assets and from the institutions that participate in financial markets. The most advanced financial theory dealing with recurrent crisis (e.g., Eichengreen, Hausmann and Panizza 2007; Shiller 2001; Bikhchandani, Hirshleifer and Welch 1992; Bernanke and Gertler 1989), structures it as a response to exogenous 'shocks' rather than a systematic features of production and exchange in a capitalist economy with increasingly sophisticated financing. This report presents a critical reassessment of finance theory. The following section examines the standard theories of portfolio allocation and asset valuation.

1. Portfolio Allocation and Asset Valuations

Traditional theories of finance emerged on the margins of the neo-classical synthesis, rationalising portfolio choices. Asset valuation (rather than, say, liquidity or regulation) is held to be the fundamental factor in determining portfolio choices. Those theories have dominated the finance literature since the 1950s. They have come under scrutiny since the onset of the financial crisis of 2007-08. The theories have not only been the core foundation for finance students to learn about finance across the globe, but also have served as a foundation for investors, managers and even regulators. Such theories shared amongst other elements, core assumptions of markets being efficient, or tending towards such efficiency, and rationality in which precludes systematic recurrence of crises (Shabani and Toporowski 2015). However, the events during the crisis proved otherwise. In the recent

years behavioural finance has challenged the traditional asset pricing theories arguing that investors have bounded rationality so that explain asset price fluctuation may be explained in terms of human psychology. But even these maintain the fiction that the markets are dominated by individual agents make portfolio choices.

Traditional finance theories presuppose that investors make rational decisions and assume that all investors are risk averse and hence need to be compensated for taking on more risk. This is justified by appeal to criteria according to which individuals are held to be maximizing 'utility' that is supposed to depend on return and attitude towards risk. Portfolio theory, which was born in the early 1950s, introduced the concepts of portfolio choice and diversification. In his 1952 essay 'Portfolio Selection' Markowitz formalised traditional views of portfolio diversification, laying the basis for finance theories that have evolved since then. The risk averse assumption indicates that investors would choose that investment opportunity that would yield the highest expected returns that is associated with lower risk, as measured by the standard deviation or variance. So in effect investors would carefully choose those securities in relation to the risk-return trade off. The main idea of his theory is that, to minimize risk, investors should not concentrate their wealth in a single particular security. On the contrary, a combination of securities in a portfolio would minimise risk. Instead, the rational investor is supposed to be seeking an optimal portfolio that gives the highest expected returns for a given level of risk, the so-called mean variance approach. In this view the return for a set of securities is the weighted average of the expected returns for each security. However, the risk of the whole portfolio can be reduced by means of diversification. This concept states that the expected returns of the securities should not perfectly correlated. This way portfolio diversification reduces risk.

In practice, the Markowitz approach confuses the *ex ante* notion of risk, that is supposed to be considered when selecting a stock to add to a given portfolio, with the *ex post* mean variance of that stock's value (see also McGoun 2007). Markowitz himself, in an interview during the financial crisis, admitted that the diversification methods used by financial

engineers had a key role in the crisis. He argued that the practice by which financial instruments are combined by a number of securities with same risk characteristics is not diversification: 'just as with all securities, the fundamental exercise of the analysis and understanding of the trade-off between risk and return has no shortcuts ... Arbitrary assigning expected returns absent an understanding of the risks of the securities is precisely how the economy arrived at this point' (2008, quoted in Crovitz 2008).

The same line of reasoning is given by Beyhaghi and Hawley (2013) which look at the implication of the modern portfolio theory (MPT) with the focus on the risk management of institutional investors. The authors give an overview of how the MPT has been adopted in the legal regulation of risk management of pension funds in EU and US since the 1970s. With the underlying assumptions of the portfolio theory diversification became a common technique for managing systematic risk for many, including here pension funds. The systematic risk, or market risk, is the risk that cannot be eliminated unlike unsystematic risk that can be eliminated by diversification. Beyhaghi and Hawley (2013) argue that the risk managements undertaken by financial institutions have contributed to the rise in the systematic risk. This became evident as many assets became highly correlated, thus increasing risk rather than eliminating it.

Building on Markowitz' work, the capital asset pricing model (CAPM) was developed independently by Sharpe (1964), Linter (1965), and Mossin (1966). The CAPM aimed to capture the relationship, between risk and the return on a financial asset that could be used in determining the price of that asset. It introduced the idea that the expected returns of a security move linearly with the actual market returns. The sensitivity of a security to the market return is measured by the beta (β) coefficient. The main idea of this model it to choose those securities that would make the excepted returns of a portfolio as close as possible to the market return. So if a security increases the risk of a portfolio compared to the market portfolio, then the price of that security will fall, since demand will decline, and the excepted returns will be above that of the market, and vice versa (Pilbeam 2010). So in

effect the CAPM is a single-factor model, in which only the rate of market returns affects all securities (ibid). Over the years the CAPM has received much criticism. Many studies have empirically examined the effectiveness of the CAPM in explaining asset returns and have found little evidence of this theory holding. Typically, this empirical examination studied *price* data, rather than the changes in the structure of the financial markets that is the focus of financialisation studies.

In 1973 Merton introduced the Intertemporal CAPM (ICAPM) model arguing that investors are prone to other risk factors that can influence their future consumption. In other words the ICAPM suggest that stock markets participants give more importance to permanent cash flows than temporary discount rate movements (Economic Science Prize Committee of Royal Swedish Academy of Science 2013). However the model introduced by Merton does not specify how many and which are exactly the extra risk factors that investors face over their future consumption (Pilbeam 2010).

Extending the CAPM model, Fama and French (1993) introduced a three factor model, which includes in addition to the market beta, the market value and the book-to-market ratio. The market value factor is the difference between returns for small stocks and big stocks. Whereas the book-to-market (value/growth) factor represents the difference between returns for high book-to-market stocks and low book-to-market stocks. They find evidence that the these two additional risk factor can account for the differences in average stock returns across stock. Furthermore, these two variables account for a considerable amount of time-series variation in stock returns (Fama and French 1993). These findings indicate that using a three-factor model produces better predictabilities in relation to risk and return of stocks than just the one factor model. This is of course to be expected, since in general it is rare for the predictability of a model not to rise with the number of independent variables included in the model.

Scholars of asset pricing commonly treat crisis as a shock that affects a given market structure. For example Bianchi (2015) used the ICAPM model to study the financial markets using data from December 1928 to June 2009, thus including both the Great Depression and Great Recession periods, but without allowing for structural change. He found similar results for the period during the great Depression and also for a short period during the financial crisis in 2009. The results suggest that during the 1920s stock market crash the Value spread- measures as the log book-to-market ratios of small value and small growth stocks- increased significantly. The probability of this happening again remained zero in the sample data until the beginning of 2009, and lasting only for two months. Most revealingly, this paper classified the two crisis periods under consideration as 'rare' events or using Bianchi's words '...I document a series of similarities between these two rare events by examining the behaviour of financial markets' (2015, pg. 2).

2. Market Efficiency and Behavioural Finance

A common doctrine in finance is the market efficiency hypothesis that rationality is at the heart of it. Fama (1970) notes that for a market to be efficient prices have to reflect all the available information, thus markets are perfect. Fama tested market efficiency by postulating three types of efficiency: weak form efficiency, semi-strong form efficiency and strong-form efficiency. With weak form efficiency current prices are supposed to reflect all historical information of historical prices, so it is impossible to predict future prices using past historical asset prices, for example, by technical analysis of stock prices. The semi-strong form of the efficient market hypothesis suggests that the current prices contain all publicly available information. Such information includes not only past historical prices but also any additional details on companies such as earnings, announcements, as well as economic conditions (Fama 1970, Pilbeam 2010). And finally the strong form of efficiency postulates that prices reflect not only to all public information but also all private information, such as inside information that employees of the firm that issued the stock and its bankers, as well as specialists in the market possess.

The consensus that asset prices reflect all available information was not new to the academic literature. The idea was first introduced by Bachelier in 1900, and was vindicated later in the research conducted by Manderlbrot (1963) and Samuelson (1965). The common factor of their research was that asset returns couldn't be predicted over a short time horizon, within a rational expectation framework where markets are efficient. In such circumstances, prices will reflect all available information and thus making arbitrage opportunities impossible.

The efficient markets literature claimed that the predictability in variation of the expected return on stock reflects the productivity of the economy and the efficiency with which rational investors use the information that markets give them in valuing securities. In contrast behavioural economics claims that variation on expected stock returns reflects psychological factors. Behavioural economists are very critical to the market efficiency scholars and have long argued that the model, the present value model, does not hold. More than three decades ago Shiller (1984) stated that 'The argument for the efficient markets hypothesis represents one of the most remarkable errors in the history of economic thought (1984 p. 459).

Behavioural economics relates the features of securities markets to human psychology, a field known as behavioural finance. Behavioural economists argue that stock price movements are subject to 'social movements', such as attitudes or fashions, or 'rules of thumb' used in portfolio decisions. So when, for example, news about an investment in the stock market, is transmitted through word- of -mouth or media, that investment will be perceived as being profitable and this will attract other investors. Investors' demand for stock will drive up the price of the security in question. This price increase can again initiate further interest and prices will again increase. A number of rounds of this process will lead to a speculative bubble, which Shiller defines as 'an unsustainable increase in prices brought on by investors' buying behaviour rather than by genuine, fundamental information about value' (Shiller 2000 pg. 5). However, as the rising price disconnects with actual or

foreseeable earnings per share (the ratio of the profits of the firms to the stock issued by the firm) the stage is set for the bubble to burst.

3. Corporate finance

Corporate finance is concerned with the 'optimal' financing of economic enterprise. Here the most influential theories derive from the seminal work, evaluating the value of firms and their investment decisions, of Modigliani and Miller (1958,1961). They put forward a 'theorem' that, under perfect competition, with perfect knowledge of the future and no market distortions, including taxes, the value of any given firm will be determined by the future returns to its capital. In other words the market value of a firm is independent of its capital structure, its debt/asset ratio and the weighted average cost of capital remains the same whether a firm finances itself with debt or equity. This is because when a firm chooses to increase the level of debt, then the cost of equity financing increases, as equity becomes more expensive, so that the weighted average cost of capital remains the same (Miller 1988).

However when taxes are introduced, their theorems states that if the interest rates are tax deductible the value of the firm will increase as debt increases. This way a firm's optimal capital structure could indeed be just debt financed. Thus, in a world with taxes the capital structure of a firm is not irrelevant. Ariff et al 2008 addressed some of the literature on corporate finance and provide arguments that are in contradiction to what the MM theorem states. There is plenty of evidence that the higher the debt levels the higher the financial distress of firms (see Gilson 1989, Nikolaos et al 2002, Bongini et al 2000, etc).

Their theorem also states that, again under certain assumption, the dividend policy is irrelevant to a firms' value. The assumptions under which this holds are the following: 'the firm's investment policy is fixed and known by investors; there are no taxes on dividends or capital gains; individuals can costlessly buy and sell securities; all investors have the same information; investors have the same information as the managers of the firm; and there are

contracting or agency costs associated with stock ownership.' (The New Palgrave Dictionary of Economics, Vol.1, p.896, quoted in Pasinetti 2011).

In such a world, with perfect capital markets and perfect information, the dividend policy and capital structure of a firm are irrelevant to its value. What is relevant in valuing a firm is the expected cash flows that it will generate from its productive activities. However, in the aftermath of the 2007-08 financial crisis such a purist outlook has received much criticism. Much of the criticism is revolved around the assumptions under which the theorem is supposed to hold.

Kashyap and Zingales (2010) expressed their concern that, just as in many macroeconomic models such as IS/LM models, the real business cycle, the New Keynesian dynamic stochastic general equilibrium models not only is the financial sector completely ignored, but also those models fail to distinguish between different forms of money. Similarly the MM theorem classifies different types of bonds as one type. For example both government bonds and corporate bonds are treated the same, thus ignoring any differences between the two types. In sum, they argue that the assumptions used in the MM theorem are far from reality.

Campbello et al (2010) look at whether corporate structure had affected investment decision during the 2008 crisis. They surveyed 1,050 chief financial officers, CFO's, in a total of 39 countries located in North America, Europe and Asia in last month of 2008. The aim of the survey was to look at whether the financial crisis had affected investments plans of financial constraint and unconstraint firms. The data obtained from such survey revealed than more than 50% of the firms either cancelled or postponed their investment plans during the crisis, due to financial constraints. Furthermore, the authors classified firms according to size, growth prospects dividend payout policies, profitability, credit rating scores and ownership to identify firms as financially constrained and financially unconstrained. Such classification is based on the answers by CFO's whether the financial

crisis had and to the extent it had affected their external finance access. This classification then served to compare the investment plans of the constraint with the unconstrained firms. The results indicate that financial constrained firms cut their spending much more than unconstrained firms. In short, while the financial crisis reduced firm investment in general, this reduction was not equally distributed among firms. In effect the financial position of firms does affect investment. This is clearly at odds with the assumptions of the MM theorem which states that 'investment decisions are independent of finance or put it another way, finance is irrelevant to investment decisions' (Caldente and Vernengo 2010 pg. 5).

4. Financial Innovation

Since the financial crisis, much of the discussion of finance has focused on the process of securitisation, which was widely used by many banks prior to the financial crisis. The main concern of many studies has been linked to the MM theorem, according to which, as previously mentioned, the value of firms does not change regardless of the way is financed. So by creating different types of financial securities, such as collateralized debt obligations, the value of the firms issuing them does not change; they neither gain nor lose value. Kashyap and Zingales (2010) highlight the study conducted by DeMarzo (2005) in which the process of securitization is explained as a way of financial institutions dealing with asymmetric information. Piskorski et al (2010) on the other hand argue that through securitization financial institutions lose value. Their argument derives from their empirical analysis in which they find that securitization does have a negative effect on the probability of foreclosures, thus reducing the value of banks.

The increasing instability of asset prices from the early 1970s onwards affected the structure of financial markets through the development of futures markets ostensibly designed to fix future values for holder of a particular asset. This could only be understood as a response to growing instability and structural change in the financial system. However, the response of academic finance research was to reinforce the notion of determining

equilibrium values in markets, which acted as a baseline or trend for the highly stylized risk that is estimated in derivatives pricing models, or the subjective risk measured by the Vix index of volatility. Market efficiency was retained as a key assumption in the Black-Scholes option-pricing model. The model is based on a complex mathematical formula and has been used widely in finance since 1973 when Scholes and Blackⁱ introduced it in their article 'The Pricing of Options and Corporate Liabilities'. More importantly the formula used to price options, was associated with the substantial increase in derivative trading in global financial markets. The higher turnover may be credited to the Black-Scholes option-pricing model since it provided a simpler way to price complex financial derivatives such as options. It is worth noting here that even though the formula is based on highly mathematical grounds, its use was simplified by creating a computer-based analysis to price options. As the CAMP, illustrated above, the Black-Scholes formula is also aimed at eliminating market risk. In the case of options, market risk is (believed) eliminated by the use of Black-Scholes formula, which estimates the value of these derivative instruments. This way, the options are hedged in such way that allows investors to make the right decision of whether to purchase/sale the underlying asset, hence minimising systematic risk.

The estimated value of the options is a function of the underlying asset price, time, the risk-free interest rate, and most importantly the implied volatility of the asset. Apart from the market efficiency, stated above, the options valuation formula is subject to a number of other assumptions such as: constant variance of the return on stocks, constant and observable interest rates, no dividends, no transactions costs and the returns of the underlying asset follow a normal distribution. The formula applies to European optionsⁱⁱ (Black and Scholes 1973).

Since its introduction and the adoption by many participants in financial markets, the literature over the years has highlighted a number of drawbacks with the option-pricing model, most importantly with the assumptions associated with it. One of the main

drawbacks has been the assumption of constant volatility. In order to account for this many have included a time-varying volatility when applying the model (Moyaert and Petitjean 2011).

The model and the assumptions associated with it, have received much criticism in the aftermath of the global financial crisis. Given the high volume of derivatives tradedⁱⁱⁱ in financial markets across the globe, many have put some of the blame on the Black-Scholes formula. Steward (2011), however, argues that the mathematical formula was not the root cause of the crisis per se, but rather its 'abuse' by markets. Such 'abuse' is linked to other mathematical formulas and techniques adopted by financial institutions that were rooted to the Black-Scholes formula.

Conclusion

Modern finance theory emerged from the middle of the twentieth century, as financial markets recovered from the 1929 Crash and its aftermath in the Great Depression and the Second World War. It emerged principally to service corporations, and the correspondingly large investment funds or institutional investors that were necessary to finance corporations. However, the theory rationalized the portfolio investment decisions of individuals and businesses that did not organize their finances in the complex way that corporations operate that is characterized by holding company structures and balance sheets with liquidity requirements. Nor has that theory been satisfactory for the vast majority of businesses that fall into the category of small and medium-sized enterprises, whose financial needs are supposed to be met by specialist venture and development capital funds, whose activities are in no way integrated into finance theory. Not surprisingly, the 2008 financial crisis exposed the abstracted character of finance theory.

Notwithstanding the ingenuity of models showing how 'shocks' can cause market responses that mimic features of financial crises, or the measures of risk, reduced to price volatility, the finance theory that is taught in business schools remains insulated the

institutional structure of business and finance as it currently exists, and lacking in a comprehensive theory of market breakdown.

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THE ABSTRACT OF THE PROJECT IS:

The research programme will integrate diverse levels, methods and disciplinary traditions with the aim of developing a comprehensive policy agenda for changing the role of the financial system to help achieve a future which is sustainable in environmental, social and

economic terms. The programme involves an integrated and balanced consortium involving partners from 14 countries that has unsurpassed experience of deploying diverse perspectives both within economics and across disciplines inclusive of economics. The programme is distinctively pluralistic, and aims to forge alliances across the social sciences, so as to understand how finance can better serve economic, social and environmental needs. The central issues addressed are the ways in which the growth and performance of economies in the last 30 years have been dependent on the characteristics of the processes of financialisation; how has financialisation impacted on the achievement of specific economic, social, and environmental objectives?; the nature of the relationship between financialisation and the sustainability of the financial system, economic development and the environment?; the lessons to be drawn from the crisis about the nature and impacts of financialisation? ; what are the requisites of a financial system able to support a process of sustainable development, broadly conceived?

THE PARTNERS IN THE CONSORTIUM ARE:

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ⁱ Their option pricing formula was also later reinforced in Merton's 1973 article.

ⁱⁱ The difference between a European and an American option is that the former can only be exercised upon expiry, and hence cannot be exercised at any time unlike the latter.

ⁱⁱⁱ By 2007, the value of traded derivative globally reached one quadrillion dollar yearly (Steward 2011).