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A critical look at teaching and doing research in finance

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Abstract: This paper aims to provide a critical analysis of finance, focusing on its development as both an economic and managerial discipline, its theoretical aspects, and the structure of finance modules designed for students, future professionals, and securities portfolio managers. From a methodological viewpoint, a literature review is conducted by examining the most trustworthy bibliographic sources before reflecting on the challenges of research and teaching in finance. The main conclusions suggest the need for reform in educational programs through an interdisciplinary approach to financial science that integrates knowledge from sociology, psychology, and economics.

Keywords: finance, modern finance, behavioral finance, university pedagogy.

Introduction

Research in finance has been significantly shaped by the volatility of financial markets and a series of economic and financial crises, spanning from the Great Depression of 1929 to the 2008-2009 crisis precipitated by the subprime mortgage crisis. This includes notable events such as the oil crisis of the 1970s, which adversely impacted financial markets, the stock market crash of 1987, and the collapse of the dot-com bubble in the early 2000s. Finance, as a discipline that derives from economic science under the umbrella of management, has held its current status since the 1950s, thanks to researchers' work on modern portfolio theory, the Modigliani and Miller theorem (1958), and the financial evaluation and valuation methods that followed. The modern portfolio theory, developed in the 1950s by Harry Markowitz, is founded on the theory of informationally efficient markets, which was theoretically formulated by Eugene Fama in 1970. These theories represent the main foundations of the dominant school of thought in finance—neoclassical finance—by analogy with the neoclassical theory of value.

Initially, nothing seemed to challenge the robustness of these theories and asset valuation models (such as the CAPM, which we will discuss further in this article), seen that as empirical tests demonstrated their ability to accurately predict the evolution of asset prices, particularly for stocks. It wasn't until the early 1980s that a series of studies revealed the relativistic nature of theoretical models based on portfolio theory, particularly under the assumption of efficient markets. Indeed, some observed phenomena (which we will discuss later) suggest that it is necessary to consider other dimensions to account for price volatility and irregularities, beyond what modern finance theorists propose.

Currently, in light of challenges to the fundamentalist approach to finance, which is rooted in the principle of financial value's objectivity (where each security has a fundamental value determined by discounting future income streams), there are numerous arguments incorporating additional dimensions into finance. These include the psychological dimension related to cognitive and behavioral human factors, the social dimension that considers value in its social context, and the neoclassical economic dimension, which treats expected utility as the fundamental determinant of individuals' preferences in the context of uncertainty.

In the theoretical context of the 1950s, finance was regarded as a precise science, capable of providing methods for the optimal allocation of resources and fulfilling its historical role of connecting those with funding capacity to those in need. However, to what extent can finance

be regarded as an exact science? To explore this fundamental question, we should remember, as Dell'Aniello (1965) notes, that theory serves primarily as a tool for forecasting and controlling future events. For instance, a physicist can accurately predict the position of a moving system if all initial conditions (such as initial velocity and forces) are known with certainty. In contrast, economists face a central challenge in finance: the ability to predict future price movements accurately, given the incomplete knowledge of all initial market conditions and available information. Otherwise, is it still possible for a financier or economist (assumed to be rational in the context of financial theory) to adopt fundamentalist calculation approaches? If certain relevant elements are ignored due to the unavailability of specific information—what we might consider the market's initial conditions—wouldn't traditional models be limited in their predictive accuracy? Wouldn't it be more appropriate to acknowledge the multidimensional nature of financial market dynamics to reduce imprecision, considering the significance of information flows?

Believing that different fields of knowledge interact to serve financial science raises several questions: about the true role of finance; about the existence of a genuine financial theory; and the role of research in finance; and finally, about the relevance of the programs offered to students at top business schools and universities dedicated to financial training. To understand the role of research in finance and draw relevant conclusions about the performance of current educational programs—considering the diversity of approaches adopted by researchers in their respective fields—we focus on the following question:

To what extent can contemporary finance, with its multidisciplinary nature, provide researchers and university educators with a robust theoretical framework that ensures relevant financial evaluation methods, given the persistent instability of the global financial system and recurring financial crises?

To address this question, the current research aims to clarify three distinctive areas. First, a strong emphasis is placed on an evolutionary historical analysis of financial science, starting with early attempts to develop a theoretical framework governing the dynamics of securities trading on financial markets. Secondly, this paper illustrates how certain significant events have made it essential to consider the behavioral dimensions of individuals and collective market sentiment as crucial components of financial asset prices. Thirdly, the final area provides a brief overview of the causes of estimation errors in financial values produced by the most popular

models and methods, reflecting on the shortcomings of educational content in university programs and exploring potential solutions to ensure these programs do not fall behind developments in market practices and the rational agents posited by modern financial theory.

1. Searching for theoretical foundations of finance (1863-1950)

1.1 The birth of the random walk model in finance

In his book "***Calcul des chances et philosophie de la bourse***," published in 1863, Jules Regnault[1] aimed to introduce a theoretical framework for stock market investment. Regnault's study was pioneering in contemporary finance research, focusing on the behavior of stock prices. Inspired by the work of mathematician Adolphe Quételet (1796-1874), Jules Regnault's reflections as a stockbroker centered on determining the laws of nature that could represent stock market fluctuations. In other words, he wanted to introduce a statistical approach to understand these fluctuations. The central issue in Regnault's publication revolves around the role that the financial market is supposed to play, assuming there exists a fundamental rule capable of ensuring fair play among market participants. In his demonstration, the researcher considered two groups of speculators: one group comprised of those who believe in price increases and a second group consisting of those anticipating price declines.

The conclusion of this study emphasized the importance of highlighting an average value around which stock prices revolve. This value, which corresponds to what we now consider the fundamental value, enables accurate estimation of worth and serves as a reference for various market participants. From a statistical perspective, the existence of a center of gravity for overall market prices implies that these prices are normally and randomly distributed, making it impossible to forecast future prices derived from past data. Hence, this led to the birth of a model that would later become the famous Random Walk Model (RWM).

Jules Regnault's model lacked sufficient mathematical formalism to be presented as a scientific rule governing the turbulence of financial markets. It was not until the results of Louis Bachelier's mathematical demonstration in his thesis *Théorie de la Spéculation*, supervised by

[1] A detailed biography of the Frenchman Jules Regnault is presented by Jovanic Franck in his article *"**Eléments biographiques inédits sur Jules Regnault (1834-1894), inventeur du modèle de marché aléatoire pour représenter les variations boursières**,"* in the journal *"Histoire des Sciences Humaines"* (2004).

the renowned mathematician Henri Poincaré in 1900, that significant answers were provided to Regnault's issue. As a mathematician, Bachelier's focus was on modeling randomness through the introduction of a probability law capable of explaining the price movements observed in financial markets, as part of a comprehensive research project on continuous-time probability laws. Bachelier's work was therefore a crucial step in what is now called *'mathematical finance.'*

From real market data, Bachelier empirically demonstrates that the probability law is the only natural law governing financial markets. This is explicitly conveyed in the following statement: *'If, regarding several questions addressed in this study, I compared the results of observation to those of theory, it was not to verify mathematical formulas, but merely to show that the market, unknowingly, obeys a law that governs it: the law of probability'* (Bachelier, 1900).

Regardless of the judgment on the originality of his work compared to Regnault, Bachelier was able to illustrate how the new probabilistic laws describe randomness. From an economic perspective, the initial intuition was realized via the demonstration of the Random Walk Model (RWM), which stipulates that prices follow an unpredictable random evolution.

1.2 Towards a practical approach to random walk model

The introduction of the random walk model in finance has its origins in the work of Cowles (1933). Indeed, the stock market crash of 1929 raised many questions about the usefulness of financial analysts and the effectiveness of strategies predicting price movements grounded in technical analysis.

Alfred Cowles[2] decided to conduct his own investigation into the usefulness of studying forecasts to predict stock market movements. The initial findings from his investigation were published in 1933 in an article titled *'Can Stock Market Forecasters Forecast?'* Cowles concluded that, on average, randomly chosen investments outperform securities recommended by financial services and advisory agencies.

[2] In 1929, Alfred Cowles founded the "***Cowles Commission***" as a research group in collaboration with the "International Econometric Society" to address issues related to the failure of financial analyses to anticipate crises like that of 1929.

It is assumed that this researcher's work will lead to the development of econometrics within a framework that combines propositions, the search for laws, and statistical procedures (Jovanic and Le Gall, 2002). Furthermore, what matters to Cowles is the validation of the hypothesis regarding the unpredictability of quoted price variations. This supports the random walk model introduced by Bachelier in its mathematical form, although history provides no evidence that Cowles was inspired by Bachelier's model. Cowles' conclusions were reinforced by the findings of the statistician Working (1934), who, continuing Cowles' analysis, demonstrated that the variation of two successive prices can be mathematically interpreted as a random walk of prices when considered as white noise[3].

As a final point, during this phase of seeking a theoretical framework for financial discipline, the random walk of prices was not yet accepted as a formal theory. Indeed, the aforementioned studies had a practical dimension, prioritizing an econometric approach without a theoretical explanation. Research on the Random Walk Model (RWM) began to shift toward a more theoretical perspective starting in the 1960s, laying the initial groundwork for the Efficient Market Hypothesis.

2. Modern portfolio theory and the construction of efficient market hypothesis (1950-1980)

2.1 On modern portfolio theory

Regardless of the work on the Random Walk Model (RWM), starting in the 1950s, research in finance has focused on the concepts of risk and return to demonstrate that investors operate within a variance-return expectations framework, where variance pertains to the volatility (risk) of asset returns, and return expectations relate to the anticipated future gain. There is thus a positive linear relationship between risk and expected return. In his Portfolio Theory, Markowitz (1952) distinguishes between two types of risks: systematic (market) risk, which is common to all financial assets, and specific risk, which pertains to individual securities. The latter, being diversifiable, can be eliminated depending on the total number of assets and the correlations between the various securities within a portfolio. Markowitz asserts that a well-diversified portfolio helps reduce risk for a given level of return.

[3] If we denote p_t and p_{t+1} as the prices at time t and t+1 respectively, the variation $\Delta p_{t+1} = \varepsilon_t$ where ε_t represents white noise.

Portfolio theory is the origin of several popular concepts, such as the beta coefficient, which measures a security's sensitivity to market fluctuations; the security market line, which explains a security's (or a portfolio's) return based on the return of a benchmark index; and the efficient frontier, which indicates that within the risk-return space, there exists a set of optimal portfolio choices that minimize risk for a given level of return.

Portfolio theory provided a rigorous theoretical framework for the development of the Capital Asset Pricing Model (CAPM), which was developed simultaneously and independently by Sharpe (1964), Lintner (1965), and Mossin (1966). The CAPM establishes a linear relationship between the return of a security (or portfolio) and the market risk premium.[4] The CAPM is now the most popular model in finance; it allows for the calculation of return determined by systematic risk that cannot be eliminated by diversification and the return of a risk-free asset. Its introduction was the result of research building on Markowitz's (1952) portfolio theory.

2.2 Recognition of Bachelier's work and the construction of efficient market hypothesis

At this stage of development, it's important to note that the CAPM is built on certain assumptions, including the assumption of *'**transparency**,'* which implies free access to all available information. This creates a fair playing field among a large number of investors. This assumption has since evolved into what we now call the *'efficient market hypothesis.'* However, the development of this hypothesis, often described as a theory, occurred in two essential phases. The first phase was marked by the recognition of Bachelier's random walk model, particularly when Samuelson (1965) noted that an informationally efficient market is one where prices follow a random walk, implying the unpredictability of stock prices derived from past data.

Moreover, the theoretical formulation of this hypothesis was developed by researcher Eugene Fama (1970, 1991), who defined three forms of informational efficiency. The weak form is closely related to the random walk hypothesis, while the semi-strong form implies the existence of a fundamental value around which prices fluctuate, indicating that prices adjust

[4] The market risk premium, or excess return of the market, represents the difference between the return of a benchmark index (the market) and that of a risk-free asset, such as government bonds. This premium compensates for the additional risk taken, given that specific risk can be eliminated by diversification.

immediately to new information about the fundamentals of companies and/or the economy. Finally, the strong form stipulates that even with private information, it is impossible to deviate significantly from the market average (Elotmani et al., 2024).

The efficient market hypothesis implies that actual prices never deviate from economic fundamentals. It assumes the existence of an objective value, which is obtained by discounting the future cash flows associated with holding an asset. This is, in fact, the golden rule in modern finance. For stocks, a well-known model is the famous Gordon-Shapiro formula (1966). This model states that when dividend flows are perpetual and grow at a constant rate, it is possible to easily obtain a reference value. Under the efficient market hypothesis, this value converges to the average of the prices, and these prices are distributed according to a Gaussian-Laplace distribution. Now, how do certain phenomena observed in global financial markets violate the assumptions of efficiency and the random walk of prices?

3. The emergence of behavioral finance (1980-1990)

From the late 1970s, a series of phenomena observed in major global financial markets cast doubt on the validity of the foundational assumptions of modern financial theory. Indeed, studies by Basu (1977), Shiller (1981), LeRoy and Porter (1981), and Banz (1983) highlighted the first deviations in observed prices, contradicting both the unpredictability of stock prices as a condition of the random walk and the existence of a single objective reference value, thereby violating the semi-strong form of market efficiency and price formation models such as the Gordon-Shapiro model. The CAPM, considered the only model capable of predicting securities' returns within the risk-return framework, was subject to early criticism, even after its empirical validation by researchers such as Jensen and Scholes (1972) and Fama and Macbeth (1973).

Moreover, the studies by Shiller (1981) and De Bondt and Thaler (1985) mark the beginning of reflections on a new paradigm in contemporary finance. Robert Shiller's work on the phenomenon of 'excessive volatility' reveals that actual prices are more volatile than those predicted ex-post by the dividend discount model. Shiller's conclusion about the difficulty of predicting a fundamental value by discounting future income flows was supported by the results of his 1987 study with Campbell, in which they applied cointegration methods to price and dividend data.

Bondt and Thaler (1985) highlighted a phenomenon (anomaly) of long-term trend reversal (Reversal Effect), concluding that stock prices overreact to the arrival of information.

Other anomalies, such as the size effect (the performance of small-cap stocks), calendar effects (where certain times, days, weeks, or months are more profitable than others), or the value effect, represent irregularities in prices compared to what is predicted by the dominant theoretical framework in finance.

To find explanations for these phenomena, particularly to account for excessive volatility and the formation of financial bubbles (which are characterized by a significant and persistent gap between fundamental value and the value actually observed in the market). Shiller's (1989) study on investor behavior following the 1987 stock market crash suggests that investor overconfidence is present during periods of turmoil and the amplification of financial bubbles.

Behavioral overconfidence is considered one of the biases that contradict financial theory's representation of investor decisions under uncertainty. By way of illustration, and not exhaustively, biases such as **conservatism bias**, **mental accounting**, **overreaction**, **overconfidence**, **mimicry**, and **confirmation bias** are individual behaviors that affect price mechanisms in financial markets.

An analysis centered on investor behavior, known as ***'Behavioral Finance,'*** now represents an alternative approach to the neoclassical theory of finance. These behaviors are often described as phenomena arising from judgmental heuristics, which have been tested and validated via laboratory experiments in the fields of sociology and cognitive psychology.[5]

4. The reinforcement of the basic theoretical framework (1990-2001)

4.1 The noise trader approach

In order to substantiate the findings of researchers such as Robert Shiller and Richard Thaler regarding the legitimacy of the psychological dimension as a determining component of financial asset prices, a new approach, known as the "***Noise Trader Approach***," was introduced

[5] The work of psychologists Kahneman and Tversky, conducted between 1974 and 1979 on "Prospect Theory," presents a new function of value and individual preferences, contrary to what is proposed by the dominant financial theory. These studies are related to behavioral phenomena within cognitive psychology.

through the works of De Long, Shleifer, Summers, and Waldmann (1990), as well as Shleifer and Summers (1990).

The **first hypothesis** of this approach, as stated by Shleifer and Summers (1990), is that of limited arbitrage. Indeed, arbitrageurs are considered to take positions during periods of instability with the aim of restoring the market to equilibrium. However, arbitrageurs taking positions to counteract the actions of noisy speculators require that the holding horizon of these positions be indefinite, so that they can be kept until the market returns to equilibrium. The two researchers assume that when such a mechanism is not respected, paradoxically, one should expect the actions of irrational agents to exacerbate the imbalance.

The **second hypothesis** of the "Noise Traders" approach is that market sentiment is one of the essential components of financial markets. Indeed, having just discussed the intervention of arbitrageurs, Shleifer and Summers (1990) argue that changes in securities demand are not necessarily linked to changes in fundamentals; some are related to investor sentiment and may not be tied to available information.

4.2 On Fama and French three-factor model (1993)

Behavioral finance has found, following research on the "Noise Traders" approach, a rigorous theoretical framework to explain market imbalances in the presence of ignorant agents forming their anticipations irrationally. Furthermore, Fama, the founding father of the Efficient Market Hypothesis, was convinced that financial anomalies cannot be explained by phenomena outside the scope of economics, particularly those involving human psychology. In Fama's view, these anomalies arise from methodological errors, such as the irrelevance of tests and measurement tools, or they are merely temporary or exceptional phenomena that persist due to factors associated with market microstructure. These arguments, among others, were discussed in a paper titled *'Market Efficiency, Long-Term Returns, and Behavioral Finance,'* published in 1998.

Fama's reasoning in defense of his hypothesis materialized in the development of a new asset pricing model, created in collaboration with Kenneth French in 1993 in response to criticisms of the CAPM. The Fama-French model, known as the *'Three-Factor Model'* (from its 1993 version), includes two additional factors beyond the market risk factor or premium: company size and the value factor, accounting for these anomalies to predict returns. The model

introduced these factors as components of a company's specific risk while retaining the market risk factor as a measure of systematic risk. The Three-Factor Model has been tested in several markets as an alternative to the CAPM, providing a new framework for estimating securities returns while accounting for certain financial anomalies.

During this same period, Jegadeesh and Titman (1993) demonstrated the presence of the *"momentum effect"* as a financial anomaly that accounts for the phenomenon of short-term trend continuation. Momentum means that the trend is likely to continue in the near future. Stocks with momentum are those that continue to follow the same short-term trend. This reveals a dependence within the series of prices (or returns), contradicting the weak form of the efficient market hypothesis. In 2015, Fama and French introduced the momentum factor into an enhanced version of their base model, identifying two additional factors beyond the three previously mentioned.

Towards the end of the 1990s, the amplification of a financial bubble, particularly the technology bubble associated with the rise of the Internet, provided the field of behavioral finance with a favorable area of investigation to support its assumptions about irrational behavior and its role in explaining phenomena of excessive volatility (Benos (1998), Shiller (2000), Gervais and Odean (2001)).

5. Role of market collective opinion (2001-2024)

5.1 Investors' collective irrationality

In the aftermath of the 2001 financial crisis, marked by the bursting of the Internet bubble, a new focus on human behavior emerged. In this same perspective, we argue that market sentiment, introduced to understand the dynamics of stock market fluctuations, is based on two different but complementary views: one rooted in the contributions of behavioral finance researchers and a newer perspective inspired by the notion of ***'Convention'*** in finance, which some contemporary researchers are trying to elevate to a special status to understand the movements of speculative crowds.

The French economist André Orléan argues that value is the consequence of collective beliefs and market opinion (Orléan, 1999, 2001, 2008, 2009, 2011). A conventionalist approach to financial markets is therefore proposed as a theoretical framework that distinguishes itself

from both the fundamentalist approach and behavioral finance. To understand such reasoning, we should recall that the history of financial crises since the *Tulip Mania*[6] clearly shows that speculative bubbles follow a mechanism that typically repeats itself and is likely identical with each amplification of a bubble. When prices rise, the phenomenon continues persistently, sometimes reaching critical levels, and dramatically ends with prices collapsing, triggering the onset of a prolonged crisis phase. According to André Orléan (2009), financial markets are not governed by the law of supply and demand like ordinary goods and services markets, because investors do not seek intrinsic utility when purchasing securities. The latter is desired for its yield and remains in high demand even when overpriced, as people believe they can sell it at an even higher price, underestimating the likelihood of its collapse at any moment. Orléan illustrates this mechanism by stating, *'The increase in prices, as it leads to high profitability, enhances the attractiveness of the asset and boosts demand, which, in turn, exerts upward pressure on prices. This is how a self-sustaining cycle of price increases is formed'* (Orléan, 2009, p. 19).

Taking into account the beliefs of speculators during periods of high market turbulence, the phenomena of volatility and financial bubbles are closely linked to the herd-like, mimetic behavior of speculators. Indeed, while some individual behaviors reveal the limits of individual rationality by means of heuristics and neuroeconomics, the limits of collective rationality refer to the collective behaviors of speculative crowds through the concept of mimetic behavior. In this analytical context, when agents confront their lack of information and ignorance about how markets function, it becomes evident that an alternative strategy is to follow the actions of those perceived to be better informed. Investors may adopt a mimetic strategy due to their lack of understanding of market mechanisms, hoping to benefit from these actions.

5.2 Collective irrationality versus individual irrationality

The subprime crisis of 2008 once again illustrated the inadequacy of mainstream finance in explaining the magnitude of financial crises, thereby violating the fundamental assumptions of the field. Analyses focused on investor sentiment have sought to explain the circumstances of the 2008 crisis and the recurring nature of speculative crises. In this regard, a debate is

[6] Ladouceur (2011), as one of the few authors who have explored the issues of this crisis, shows that it was a tulip price surge due to excessive demand for these flowers, which were considered a symbol of wealth in the Netherlands during the 17th century.

ongoing around two fundamental views: the first focuses on the irrationality of individual behavior, while the second is contingent upon the collective opinion of the market, addressing investors' herd behavior to understand price mechanisms. But is it individual or collective behavior?

In his 2016 book *"**Faut il avoir peur des bulles financières? : L'exubérance irrationnelle des marchés**,"* Robert Shiller shows that herd behavior is consistent with individual rationality but is more often interpreted as a form of collective irrational behavior. This author claims, *"Even if they are completely rational, individuals can exhibit herd behavior when they consider the judgments of others, even if they know that everyone is behaving in the same way. Although the behavior is rational on an individual level, it leads to collective irrational behavior. This herd behavior is said to arise from information cascades"* (Shiller, 2016, p. 262). Therefore, while one of the pioneers of behavioral finance may not explicitly share the same views as André Orléan on the nature of mimetic behavior, mimetism can at least be considered as one of the psychological factors or behavioral biases interpreted as a form of human behavior that is quite different from what behavioral finance proponents suggest. Otherwise, it would be difficult to analyze it from the perspective of irrationality, such as the *'noise traders'* approach, and it would not be interpreted from the viewpoint of prospect theory.

To resolve this conceptual dilemma around mimetism, Orléan (2009, 2011) interprets it from the perspective of collective irrationality among informed, yet individually rational, agents. Rather, it is a self-referential mechanism that persists and is fed by investor action, which, apart from what fundamental analysis might suggest, believes that investors should actively participate in trading by choosing stocks with a remarkably upward trend. This is now considered a new form of rationality referred to as '**Mimetic Rationality.**'

6. Issues in teaching and conducting research in finance

After presenting the key aspects of the recent history of finance, this section aims to focus first on the sources of errors in asset value estimation (both financial and non-financial) by the models currently used by professionals. Following this, we will discuss possible solutions by reconsidering certain rules that lead to poor practices.

6.1 Implications of errors in asset values estimation

If we first consider that finance is the discipline that serves as the science of ***valuation*** in the broadest sense, we can intuitively assert that the sources of valuation errors are directly related to the models used, and indirectly represent the practical implications of the theoretical framework.

After each financial crisis, analyzing the circumstances of market declines raises doubts about the robustness of modeling with equations that assume there is only one type of economic agent deemed rational as per modern financial theory. One of the most popular models is, of course, the CAPM, which has shown its limitations due to its highly restrictive and difficult-to-verify assumptions. Currently, the determination of asset profitability, particularly for stocks, is mainly anchored in the CAPM despite all the criticisms and the difficulty of its empirical validation. In fact, we note that the CAPM is the model used to estimate returns determined by the market risk premium as indicated by the following equation:

$$R_{it} = R_f + \beta\left(R_m - R_f\right) + \epsilon_{it}$$

With R_{it}, R_m *et* R_f representing the returns of asset (or portfolio) *i* at time *t*, the market, and a risk-free asset, respectively, ϵ_{it} represents the error term or residual.

To uncover all the secrets of the model, only a diagnosis of the model's errors (innovations) can reveal its lack of robustness, as these are supposed to be Gaussian white noise. The term "white noise" is used because it is assumed that there is no autocorrelation between observations at a given time *t* and past observations at *t-k* (where *k* is the number of time lags), that the variance is constant (homoscedasticity), and "Gaussian" in the sense that the observed errors are assumed to follow a normal distribution. In practice, if these assumptions cannot be verified, the model would be automatically rejected. The question now is: why should we reject a model that has served as a reference framework for investors and financial analysts? To answer this question, it is necessary to briefly review the model's assumptions: **transparency** (referring to the hypothesis of informationally efficient markets), **atomicity** (a sufficient number of investors), the **absence of transaction costs**, **homogeneity** of investors' expectations (the same expectations of future income streams), and the **ability to sell and buy short assets** that one does not own.

If all these assumptions are met, statistically speaking, it is likely that the error term would follow a normal distribution and satisfy the conditions of random walk and homoscedasticity. Otherwise, the model would be rejected, meaning that the market premium should not be considered the sole and only factor of the model. To improve the predictability of returns while adhering to the same framework, it is necessary to add other variables, whether they are hidden or unobservable. Another legitimate question is: why should we refer to a model to estimate returns? And which returns are we talking about exactly?

The return estimated by the CAPM includes two types of expected returns. Indeed, the model's Beta parameter measures a security's sensitivity to market movements. A high Beta (greater than 1) implies strong sensitivity of the security and, in return, offers a high expectation of the market risk premium, which represents the excess return over the risk-free rate, as outlined by the model's equation. The theoretical return represents what an investor hopes for and requires from their stock; hence the term 'required return,' which takes risk into account in light of the value of the Beta parameter as a measure of risk.

In line with the law of one price, any given asset must have the same price in two different markets; thus, the principle of no-arbitrage opportunity emerges, meaning it is impossible to make a profit by buying in one market and selling in another. Following the same principle, assets should have the same valuations, and required returns will be accurately estimated by the markets. When reality contradicts this situation, the presence of arbitrage opportunities constitutes a violation of this assumption, undermining the entire logic behind the estimation method and leaving investors without a benchmark to measure the returns of future investments.

In corporate finance, the assessment of the profitability of future projects is relies on actuarial calculations that heavily consider the impact of time on value. The cash flows generated by these projects must be discounted in accordance with the investors' expectations using a discount rate. This discount rate is estimated using a benchmark model (often the CAPM). In light of all the mentioned criticisms, the Discounted Cash Flow (DCF) method may not be the optimal choice for business valuation for several reasons. First, the discount rate might be a biased estimation of the required return and the cost of capital. Next, this rate is assumed to be constant over time, ignoring changes in market conditions. Finally, the method lacks reliability when assuming that cash flows are known with certainty, whereas the future is inherently uncertain.

6.2 How to rethink teaching and research in finance?

Given the criticisms of asset valuation methods and the underlying valuation logic, it has become evident that certain programs for students in prestigious schools and universities need to be redefined, as there is an interdependence between research and teaching. For finance researchers, it is essential to move away from the classical view rooted in doctrines from the period (1950-1980), which are founded on calculation methods grounded in fundamentalist rationality and perfect market theories.

In this perspective, it would be more legitimate for researchers to base their reflections on current market realities, as the succession of financial crises is likely to provide a solid foundation for revising and rethinking certain evidence. Certainly, the field of behavioral finance offers an alternative in this regard. However, since there is still no consensus on the true mechanisms of price formation, the ***researcher-teacher*** must adopt a pedagogical approach that considers the cyclical nature of financial markets and the economy as a whole.

During periods of stability, which generally coincide with post-crisis phases, markets gradually return to their normal pace, and prices move closer to their fundamental values. In this phase, rationality is likely to prevail. Therefore, a program built on traditional methods is recommended to acquire the basic techniques for managing a portfolio of securities.

During periods of volatility, estimation methods derived from modern financial theory have demonstrated their inadequacy and lack of reliability in providing optimal valuations. A portfolio manager should remain flexible regarding the methods used, incorporating complementary strategies that consider the opinions of a market influenced by a form of collective irrationality, or what was previously referred to as mimetic rationality. Consequently, pedagogical content that introduces psychological aspects and the dimension of market sentiment would be highly recommended.

Regarding ad hoc asset valuation models, such as the Fama and French model in its various variants, the taught program should also include a practical component in the form of simulations. This would allow for a comparison of different techniques and facilitate the development of students who will become future managers.

Finally, artificial intelligence (AI) could be a promising alternative to these methods, given the vast number of variables that can explain asset price movements. The development of a comprehensive system of algorithms would enable the identification of numerous factors influencing price dynamics. In this regard, we recommend implementing an introductory module on artificial intelligence. Before reaching this stage, we suggest establishing a continuing education program dedicated to financial discipline educators.

Conclusion

In this work, we aimed to chronologically and coherently outline the evolution of market finance, identify and document its significant developmental phases, and consider theories that offer rigorous explanations for financial anomalies.

From the random walk model to portfolio theories and informational efficiency, and extending to behavioral finance, a critical review of the literature has allowed us to definitively conclude that market finance research has experienced substantial growth on an international scale. This growth has led to the emergence of new theories that either replace or complement traditional finance paradigms, exerting a significant impact worldwide. However, universities have remained anchored in a reductionist approach since the 1980s, relying on methods and models that manage and optimize investor choices based on the efficient markets hypothesis or rational expectations theory. These approaches are confined to a single framework of reasoning: that of objective value.

In this analytical context, educational programs focused on financial markets and corporate finance are found to be inadequate for training future finance professionals and portfolio managers. This underscores the need to reorganize training curricula by adopting a multidisciplinary approach and incorporating supplementary modules, such as behavioral finance.

Given the complexity of price formation mechanisms, the recent history of global financial markets illustrates the failure of traditional models to prevent and anticipate speculative bubbles and highlights the unpredictable nature of financial crises. However, to understand the nature of financial securities transactions in light of financial anomalies that contradict the myth of objective value, there is a need today to rethink finance as a discipline that, while certainly maintaining a degree of autonomy from other management fields, is also a

social science drawing from theoretical advancements in various areas of knowledge, including psychology, sociology, physics, and mathematics. This approach aims to provide flexible analyses in the face of ambiguous situations that are often poorly understood by the simplistic reasoning of proponents of the foundational assumptions of modern finance.

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