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Modern Financial Market Theory – A Critique Based on the Logic of Human Action

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Abstract

The modern financial market theory (MFMT) – based on the efficient market hypothesis, rational expectation theory, and modern portfolio theory – has become the standard approach in financial market economics. In this article, the MFMT will be critically reviewed using the logic of human action (or: praxeology) as an epistemological metatheory. It will be shown that the MFMT exhibits (praxeo-)logical deficiencies so that it cannot provide investors with well-founded decision-making support in real-world financial markets.

Keywords: Efficient Market Hypothesis, Rational Expectation Theory, Modern Portfolio Theory, Capital Asset Pricing Model, Economic Methodology, Logic of human action, Austrian Economics

JEL Classification: B4, B41, E3, G1, G110, G14, G140, G41

"In choosing a portfolio, investors should seek broad diversification."

– Harry Markowitz

"Diversification is protection against ignorance, it makes little sense for those who know what they're doing."

– Warren E. Buffett

"We first consider the rule that the investor does (or should) maximize discounted expected, or anticipated, returns. This rule is rejected both as a hypothesis to explain, and as a maximum to guide investment behaviour."

– Harry Markowitz

"Beta and modern portfolio theory and the like – none of it makes any sense to me."

– Charlie Munger

"Praxeology is a theoretical and systematic, not a historical, science. Its scope is human action as such, irrespective of all environmental, accidental, and individual circum-

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stances of the concrete acts. Its cognition is purely formal and general without reference to the material content and the particular features of the actual case. … Its statements and propositions are not derived from experience. They are, like those of logic and mathematics, a priori."

– Ludwig von Mises

I. Introduction

The *modern financial market theory* (MFMT) – represented by the *efficient market hypothesis* (EMH), the *rational expectation theory* (RET), and the *modern portfolio theory* (MPT) – has gained tremendous influence on capital market analysis. It is widely used to explain (as a *positive* theory) price formation in financial markets (such as stock, bond, FX, commodity, and derivative markets) and (as a *normative* theory) to estimate equilibrium risk-adjusted cost of capital. No less important, the MFMT has a very strong influence on investor behaviour and shapes financial markets regulation, thus affecting the allocation of scarce resources in the economy.

Given its importance in theory and practice, the MFMT and its building blocks have been subject to a great number of extensive analyses, primarily to prove its empirical qualities.[1] This article wants to take a different route: It attempts to offer an *epistemological critique* of the MFMT by taking recourse to the *logic of human action* (or: *praxeology*). In other words, the logic of human action will serve as an epistemological *metatheory*. In doing so, I come to the (for some people perhaps quite irritating) conclusion that the MFMT suffers from severe *logical inconsistencies*; that it does not and cannot provide any logically valid knowledge of the real world. Here is why in a nutshell:

The validity of the EMH cannot be ascertained by logical means; it is nothing more than an *undecidable conjecture*. The RET is *incompatible* with the logic of human action – and, therefore, cannot come to the rescue of the EMH. The MPT must also raise serious questions with regard to its conceptualization of *investment risk*: The idea that market price changes (price volatility) could ever be equated with investor risk must presuppose the EMH and RET to be valid (but unfortunately, they are not). Finally, it should be emphasized that the validity of the MFMT (i. e. its building blocks) cannot be proven or disproven by empirical testing for epistemological reasons.

The rest of this article is structured as follows. In the following section (2.) the logic of human action and its categories is presented, and it is also explained

[1] For an overview see, e. g., *Lo* (2007). In their article, The Efficient Market Hypothesis: A Survey (2000), *Beechey*/*Gruen*/*Vickery* conclude that the EMH fails to explain some important characteristics of asset market behaviour such as price misalignments. For an explanation see *Belke*/*Polleit* (2009), pp. 237–246.

that economics qualifies as an *a priori*[2] science of human action, so that it requires a scientific method that is different from the method applied in the field of the natural sciences. Then, the EMH is delineated and critically reviewed based on the logic of human action (3). The same procedure is applied to the RET (4) and the MPT (5); in this context, the Capital Market Line (CLM) and Capital Asset Pricing Model (CAPM) are also be critically examined. The article concludes by emphasizing that 'scientific method matters' and highlighting some lessons to learn (6.).

II. Starting Point: The Logic of Human Action

Logic is the systematic study of the form of valid inference. It "may be conceived as ruling out what is absolutely impossible, and thus determining the field of what in the absence of empirical knowledge is abstractly possible."[3] The logically correct inference is an essential, indispensable part of the process (which we may call *scientific method*) of attaining scientific truth. With these remarks in mind, we can directly turn to the proposition that "humans act". Sounds quite trivial at first glance. But it is not. The proposition "humans act" is, from a logical point of view, irrefutably true.[4] You can*not* deny that humans act without creating a logical contradiction. Its truth value cannot be denied since such a denial would itself be a form of action.

The proposition "humans act" is *a priori* true: It is *self-evident;* it is universally true, irrespective of place and time, independent of any experience. From the *a priori* truth that humans act, we can deduce a number of *categories of human action* through *logical inference*.[5] For instance, human action is *purposeful*; it implies that the actor must employ *means* to achieve *ends*; that human action takes *time* (there cannot be timeless human action); that means are *scarce*; that human action implies *causality*; that actors have *time preference*: they prefer a higher quantity of means over a lower quantity of means, and they prefer an earlier satisfaction of wants over a later satisfaction of wants; and that the *originary inter-*

[2] The term *a priori* denotes knowledge that is independent of experience and at the same time necessarily true, irrespective of time and place. See *Tetens* (2006), pp. 36 – 37; auch *Höffe* (2007), pp. 57 – 63.

[3] *Cohen*/*Nagel* (1934), p. 21.

[4] In this context, see *Mises* (1998), pp. 4 – 142; also *Rothbard* (2011), 1. (3. Praxeology as the Method of the Social Sciences), pp. 29 – 58, 4. (Praxeology: The Methodology of Austrian Economics), pp. 59 – 79 and 6. (In Defence of "Extreme Apriorism, pp. 103 – 111); *Hoppe* (1995); *Polleit* (2020a).

[5] In the Kantian sense, a category denotes a *pure concept of understanding*, something that is presupposed. For an explanation of the categories of human action, see *Hoppe* (2006), pp. 275 – 278.

est rate is the manifestation time preference; that *uncertainty* is a category of human action; and more.

The categories of human action as *logical truths* rationalize the call for a *methodological dualism*: the epistemological position that the scientific method in natural sciences must be different from the scientific method in the field of human action (economics). To explain this, I will make four points. (1) The natural sciences (with its most prestigious branch: physics) deal with inanimate objects such as atoms, rocks, and planets. These objects of scientific interest do *not* act in the sense that humans act. The objects of the natural sciences merely respond (react) to a stimulus. Human beings, however, have preferences, formulate goals, and choose between alternative courses of action. Human action is, therefore, *categorically* different from the objects of interest in the natural sciences.

(2) In natural sciences, the scientist knows nothing about *final causes*. He bases his inquiry entirely on *causality*. For instance, he explains phenomenon *A* with phenomenon *B*, then he explains phenomenon *B* with phenomenon *C*, and so forth. In the field of human action, however, the scientist knows the *final cause* of his investigation from the outset: and that is the indisputable truth that humans act. In fact, we know that "for the sciences of human action, the ultimate given is the judgements of value of the actors and the ideas that engender these judgements of value."[6] Therefore, the a priori knowledge that humans act can serve as a non-disputable (*nicht hintergehbare*) starting point of scientific reasoning in economics.

(3) In the natural sciences, one can typically detect *regularities*, or *constants*, in the sense of "If *X*, then *Y*" or "If *X* increases by *a* %, then *Y* changes by *b* %". Such *behavioural constants* are impossible to find in the field of human action. The reason is humans' *ability to learn*: one cannot deny that humans can learn without causing a logical contradiction.[7] If you say, "Human beings cannot learn", you cause a *performative contradiction*. Because saying "Humans cannot

[6] *Mises* (1957), p. 306. He also explains why human action is an ultimate given and thus qualifies as a starting point for economics (p. 3): "The sciences of human action start from the fact that man purposefully aims at ends he has chosen. … [T]he denial of purposefulness in man's attitudes can be sustained only if one assumes that the choosing both of ends and of means is merely apparent and that human behaviour is ultimately determined by physiological events which can be fully described in the terminology of physics and chemistry." "Even the most fanatical champions of the 'Unified Science' sect shrink from unambiguously espousing this blunt formulation of their fundamental thesis. There are good reasons for this reticence. So long as no definite relation is discovered between ideas and physical or chemical events of which they would occur as the regular sequel, the positivist thesis remains an epistemological postulate derived not from scientifically established experience but from a metaphysical world view."

[7] See *Hoppe* (1983), pp. 22 – 26 and pp. 44 – 49.

learn" means admitting that you assume others to be in a position to learn what you say (otherwise you would not say it) – thus contradicting what you just said. And if you say, "Human beings can learn *not* to learn", you presuppose that learning is possible, which is an *outright contradiction*.

(4) Since the ability of human actors to learn cannot be denied, the conclusion is that there can be no "basis statements" in the field of human action. In natural sciences, repeatable experiments can be used to obtain homogeneous *basis statements*, which can be used to test the examined hypothesis. However, such basis statements cannot be identified in the field of human action. Each and every human action is contingent, unique, and represents a non-repeatable event. As a result, testing hypotheses by empirical means, as practised in the natural sciences, could not be justified by logical means in the field of human action.

Against this backdrop, we find that economics (the science of human action) can*not* be conceptualized as empirical science (in the same sense natural sciences can be) but that it can be consistently argued that economics is an *a priori* science of human action and that the *logic of human action* (i. e., *praxeology*) is the proper scientific method for economics. From the logic of human action, we know that there is a body of true economic knowledge (about reality) *independent* of experience. This is a rather important epistemological insight (which is, and this should be noted here, *rejected* by almost all the representatives of *mainstream economics*), and it will be put into use in the following.

The logic of human action – and its logically deduced categories – can be understood as a *metatheory*, as the *intellectual yardstick*, for judging the validity of the MFMT (i. e. its buildings blocks): *The categories of human action represent the conditions of the possibility of experience; they delineate, at the same time, the conditions of the possibility that the economic theory under review is valid and, at the same time, pertains to reality.*[8] Any theory that contradicts the logical categories of human action must raise serious doubts as to its validity, or, to put it less diplomatically, it must be rejected as *false* for logical reasons.

III. Critique of the Efficient Market Hypothesis

The *efficient market hypothesis* (EMH) goes back to the work of the French mathematician Louis Bachelier (1870 – 1946), who basically equated stock price movements to a random walk model.[9] In his 1965 article 'Proof that Properly

[8] For an explanation of the categories of the logic of human action conforming to reality (thus countering the critique of *idealism*) see *Hoppe* (1995), pp. 19 – 22.

[9] *Belke*/*Gros* (2018, 2021) have empirically analysed the EMH and random walk hypothesis (RW) in the context of the European Central Bank's quantitative easing (QE) policy. They found that QE might have lowered interest rates when QE was announced,

Anticipated Prices Fluctuate Randomly', Paul Samuelson (1915–2009) gave the EMH its first form, and the EMH was actually brought to prominence by the work of Eugene F. Fama (* 1939), in particular through his 1965 article 'The behaviour of stock market prices'.[10]

The EMH holds that the market prices incorporate all relevant information at all times. Therefore, an investor who uses the same information that the market receives cannot expect to generate excess returns:[11] Trading strategies that attempt to outperform the market consistently are doomed to fail if and when based on publicly available information. The EMH comes in three forms:

(1) The *weak form* of the EMH holds that the market uses *past information* and is thus efficient with respect to past prices. This means that stock selection based on past stock price movements is no better than random stock selection.

(2) The *semi-strong form* of the EMH means that all *past and present information* is incorporated in the stock price. By analysing this information, the investor cannot expect outperformance.

(3) The *strong form* of the EHM implies that market prices reflect *all information available* – past, present, and insider information. Under the strong form of the EMH, the investor cannot achieve outperformance.

In a (financial) market transaction, buyer and seller surrender something they consider less valuable than what they receive in return. The seller of a stock values the money he receives higher than the stock he gives up; and the buyer values the stock higher than the quantity of money he surrenders. The occurrence of a market transaction is thus an expression of an *inequality of wants*. The question now is: where does this inequality of wants in financial markets come from? There might be several answers: Investors might use different (sub-)sets of information or interpret the same information differently. Unfortunately, however, the EMH does not provide a clear answer (we will return to this issue in Chapter 4).

At this point, I would like to point out the *empirical fact* that many investors continue to buy and sell *selectively chosen* (or: hand-picked) stocks and/or bonds. Obviously, they do *not* consider financial markets to be information efficient. Because if they did, these investors would refrain from 'stock picking' and

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but that this impact was transitory – as the RW was firmly rejected. The authors noted in particular that the risk premiums for peripheral bonds did not follow a random walk, implying that the announcement effects associated with QE may not have been permanent and that QE has not changed the stochastics of these premiums.

[10] *Fama*'s articles 'Random walks in stock market prices' (1965) 'Efficient capital markets: a review of theory and empirical work' (1970) were also influential.

[11] It goes without saying that *not all* investors could potentially outperform the market. In a stock market, for example, an investor can only do better if others are doing worse.

hold a diversified *world financial market portfolio* at all times. This observation as such does not contradict the EMH. It may be that investors have become victims of a 'false theory': They believe – in contrast to the message of the EMH – that it is possible to earn unusual returns. But is there any reason why investors could be systematically wrong? And, if so, why don't investors *learn* from their mistakes?

The answers to these questions may be found by critically reviewing the EMH (and the behavioural finance literature, which will be done later). Let us start with the issue of empirical testing. Unfortunately, any such effort comes up against the well-known *induction problem*. It says that experience, for logical reasons, cannot prove or disprove the validity of a theory. Take, for instance, the case in which the EMH is supported by testing US stock market prices over the period from 1970 to 2019. However, such a positive result would *not* verify the EMH. It would merely say that in the period under review, the EMH has not been falsified. However, this result does not provide any logical reason to assume that this will also be the case for future observations: the EMH could be refuted (or not) by the arrival of new data.

Likewise, if the test result shows that some investors in the stock market have made abnormal profits, it does not mean that the EMH is falsified. For it might be possible that in the future, when new observations are made, no investor will earn abnormal returns. The point is that experience can neither validate nor refute the EMH. Worse still, any attempt to apply empirical testing to the field of human action is doomed to failure. This is why: In the natural sciences it is possible to set up laboratory experiments and analyse how a change in factor X affects factor Y, while all other influencing factors are kept constant. In natural sciences, we can draw on homogenous *basic statements* to test the theory, or hypothesis, under review.[12]

In the field of human action, this is categorically different. Humans act; they adopt preferences, set goals, and choose between alternatives; they *learn*. Data about human action observed in the past (e. g. changes in the prices of stocks, increases or decreases in the level of industrial production, or the rise or decline in the demand for certain goods) represent unique, contingent, inhomogeneous and unrepeatable events. This data cannot be lumped together as input for empirical analysis. We conclude that whether the EMH (like any other economic theory) is right or wrong cannot be validated by analysing historical data.

Two additional problems with the EMH must be addressed. *First*, and this may be a minor issue, the EMH is *not* a hypothesis: an "if-then" statement that

[12] Even if we examine an event that happened once (such as an earthquake in China), natural sciences consider it an example of the operation of general laws of nature. See *Mises* (1957), p. 90 – 91.

can be empirically tested. It is better described as a *conjecture*: a statement that cannot meet a rigorous logical requirement of proof and/or cannot be empirically proved or disproved.[13] *Second*: If you want to prove the EMH in a logical and/or empirical analysis, you must provide a *demonstrable specification* of the EMH. However, this is easier said than done. For the (weak, semi-strong, or strong form of the) EMH does not specify what qualifies as relevant information. Only company-specific information (and if so, what information: turnover, profit, and/or return on equity?) or macro-economic issues as well (interest rates, liquidity, FX, etc.)? The EMH does not tell us.

To sidestep these problems, the following procedure is commonly used in empirical tests of the EMH: An empirical test is carried out in which the stock price in period $t+1$, P_{t+1}, is explained by (regressed on) the stock price in period t, P. The test equation is:[14]

$$P_{t+1} = \mathrm{a} + \mathrm{b}\, P_t + \varepsilon_{t+1},$$

whereas a is a constant, ε is the ('white noise') error term. The EMH then says that if P_t incorporates all relevant information, and if the only reason the stock price has changed from t to $t+1$ is the arrival of unpredictable 'news', then P_t should be the best (unbiased) estimator for P_{t+1}, and one would expect $b = 1$. What is more, the forecast error from t to $t+1$ should be zero on average: $\varepsilon_{t+1} = P_{t+1} - \mathrm{a} - \mathrm{b}\, P_t = 0$. It should be uncorrelated with all information that was available at the time the forecast was made. This is known as the *orthogonality property*. If the orthogonality property is serially correlated, then would be useful in predicting the future stock prices – and the EMH would be challenged.

The important question in this context is: How do we know that P_t is information efficient? Because it has to be the case, otherwise P_t cannot qualify as the best estimator of P_{t+1}. The answer is: EMH empirical tests *assume* that P_t is information efficient – but it is *not* proven. This, in turn, amounts to *circular reasoning*: a *logical fallacy* (in the sense of '*A* is true because *B* is true; and *B* is true because *A* is true'). As outlined earlier, empirical testing cannot prove that P_t is information efficient: empirical observation can neither prove nor disprove a theory once and for all, and empirical testing is impossible in the field of human action for epistemological reasons.

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[13] This is the conclusion drawn by *Dias de Sousa*/*Howden* (2015), pp. 388 – 389. The efficient market *conjecture* is (so far) nothing more than a "best guess"; it may well be characterised as an *undecidable conjecture*. Once a conjecture is proven, it is no longer a conjecture but a theorem.

[14] See *Cuthbertson* (1996), pp. 93 – 115. On the ability of dividend yields to predict future stock returns in Germany assuming efficient markets and rational expectations, see *Belke*/*Polleit, T.* (2006).

What about the central conclusion of the EMH that no investor can earn abnormal returns, that no one can consistently outperform the market? How could we possibly establish the truth value of this statement? From the statement "all relevant information is incorporated in financial asset prices", we can*not* logically conclude that no one might be able to achieve an outperformance by (systematically) taking advantage of the arrival of price relevant 'news'. Because every action (processing new information or buying and selling) takes time. Why could there not be at least some investors who always act first, thereby reaping abnormal returns?

Suppose we want to test the proposition "No one can outperform the market", we need to know what the market return is – for outperformance is calculated as the individual investor's return minus the market return. For example, one might think of using the CAPM to determine the equilibrium return on the market. However, the CAPM is based on the EMH (and its assumptions). That said, using the CAPM for testing the assertion of the EMH that "no investor can consistently outperform the market" would inevitably lead to *circular reasoning*. In fact, any empirical efforts to test the EMH lead to unsolvable logical-epistemological problems. Against this backdrop, there is no reason to take sides with the core message of the EMH, which is that it is impossible to beat the market consistently.

Digression: The Behavioural Finance Critique

In this context it should be noted that in the 1970s the EMH became increasingly subject to criticism due to 'anomalies' that were not compatible with the theory.[15] Numerous studies found that 'weekend effects', 'January effects', 'small-firm effects', 'closed-end funds effect' and 'winners curse effects' indicate that stock market prices can deviate substantially and even persistently from their fundamental values (as determined by information efficiency), thus contradicting the EMH.[16] However, the interpretation of these test results is difficult. For instance, if the EMH is refuted, it could mean that the market is truly inefficient or that a false market equilibrium model has been used. In any case, the persistence of anomalies incompatible with the EMH prompted researchers to look for new approaches.

Most notably, in the early 1990s, the discussion about the validity of the EMH moved away from 'pure' econometric analyses of time series (using prices, dividends, earnings, etc.) and towards *behavioural finance*, that is developing models of human psychology and incorporating them into financial market theo-

[15] An overview is given by *Siegel* (2002); also *Campbell/Lo/MacKinlay* (1996).

[16] See, for instance, *Cuthbertson* (1996), Chapter 8, pp. 169 – 205.

ries.[17] Nobel Prize winners Robert J. Shiller (*1946) and Richard H. Thaler (*1945) were most influential in shaping and developing behavioural finance.[18] By including psychological research into economics and financial market theory, in particular, it is expected to gain a better understanding of asset price formation. Behavioural finance-oriented studies offer many indications that the functioning of 'real life' financial markets does not comply with the EMH, that prices may often and even persistently deviate from their equilibrium levels.

For example, people are exposed to waves of optimism and pessimism. On one occasion, they can drive stock prices well above, on another occasion push them well below their fundamentally justified levels,[19] a notion that is consistent with Kahneman and Tversky's behavioural decision theory (1982). Investors can also fall victim to 'herding', putting stock prices in a "price-to-price feedback" that, if left uninterrupted, produces after many rounds of speculative bubbles.[20] What is more, the capital market can be assumed to be populated by 'smart money' and 'ordinary investors', and because the former may not always offset the latter's foolishness, the market becomes inefficient.[21] That said, there seem to be many behavioural-psychological factors suggesting that the EMH may not hold up. At the same time, however, the concept of behavioural finance should not be overrated as far as the validity of its claims to rejecting the EMH are concerned.

The findings of behavioural finance are certainly helpful in at least two ways. First, they help to understand how and to what extent psychological factors influence investor decision-making. This, in turn, helps with the interpretation of events such as the rise and the eventual bursting of self-fulfilling 'bubbles'. Second, the insights provided by behavioural finance may help individual investors improve their decisions by, for instance, avoiding common investing mistakes.[22] However, behavioural finance cannot provide a "formula" or "trading rule", which would allow the investor to exploit and eliminate market inefficiencies fast and reliably. The reason is that in the field of human action – and this applies to economics and psychology or behavioural finance, for that matter – it is impossible to predict with any scientific precision how people will behave in the

[17] See *Shiller* (2003), p. 89.

[18] A survey of the field of behavioural finance is provided by *Shefrin* (2000); also *Shleifer* (2000).

[19] See *DeBondt*/Thaler (1995).

[20] See *Shiller* (2003), p. 91.

[21] See *De Long*/*Shleifer*/*Summers*/*Waldmann* (1990).

[22] Investment mistakes include, for instance, attempting to time the market, which many investors fail to do successfully; or letting emotions such as greed and fear determine the investment decision; or a lack of patience, which is often required to achieve reasonable returns.

future. Because in the field of human action there are no behavioural constants: different individuals react differently to the same impulse; this will be explained in greater detail below.

IV. Critique of the Rational Expectation Theory

The rational expectation theory (RET) was put forward by John F. Muth (1930 – 2005) in his seminal article *Rational Expectations and the Theory of Price Movements* in 1961. In particular, it was popularised by Robert E. Lucas (* 1937) and Thomas J. Sargent (* 1943) in the early 1970s.[23] The RET is based on three assumptions. (1) People use all available and relevant information to form their expectations about future developments. (2) They understand how the economy works; they are aware of the correct structural model of the economy. (3) People know the relative frequency distribution of all future developments so that their expectation error is *unbiased* and has an expected value of *zero*.

The RET has become an important building block in a great number of macroeconomic theories such as the theory of policy ineffectiveness, the permanent income theory, the theory of hyperinflation and – this is of particular interest in this article – the MFMT. Upon closer inspection, however, it becomes evident that the RET suffers from logical inconsistencies.[24] First of all, the RET implicitly assumes that people have a complete and exhaustive *list* of all possible future events – because without such a list it would be impossible to know the relative frequency of all possible future events. However, presumably no one in their right mind would argue to be in possession of such a list, has ever been, or will ever be. More importantly, it is *impossible* to believe that such a list could possibly exist in a world of human action. For human action means changing the natural course of events, i. e. affecting something that does not yet exist.

For instance, tomorrow's entrepreneurs will develop new products that are not yet known today. In the future, consumers will demand goods and services that are not yet known in the present. If a complete and exhaustive list of all future events could exist at all, it would have to be constantly changing: 'old' events would be dropped from the list, and new events would be added to the list. However, how could something that does not exist yet appear on such a list (which claims to be complete and exhaustive)? Even an entrepreneur would not know today what his imagination will create next year. Furthermore, any new product that comes onto the market and appears on the complete and exhaustive list of all possible future events will necessarily alter the relative frequency distribution of the various events.

[23] For an overview see, for example, *Taylor* (1983).

[24] In the following see *Hoppe* (1997), esp. pp. 56 – 59.

In addition, the notion that there could be a complete and exhaustive list of all possible future events implies a denial of the *ability of learning* – and leads to a (praxeo-)logical contradiction.[25] The existence of such a list would mean that the actors already know everything they will ever know (thus denying the ability to continue learning). But if the list had to be changed at some point, the actors must be assumed to be learning – and the list would not qualify as a complete and exhaustive list of all possible future events. How could actors even know about the existence of such a (possibly) complete and exhaustive list in the first place? Of course, *they must have learned it* because such knowledge is inconceivable to be part of actors' innate knowledge.

To argue that people can*not* learn is contradictory in itself. Because if someone says, "actors cannot learn", he assumes that those who hear or read this proposition can possibly understand and learn something they do not yet know, implicitly presupposing their ability to learn. Not only that. Listening to the response of those brought into contact with the proposition "actors cannot learn", he cannot avoid assuming that he is capable of learning, that he can possibly learn from what others have to say. Without the assumption of the ability to learn, it would be pointless to engage in communication and argumentation. The fact that the proponents of the RET engage in writing and researching shows that they presuppose the ability to learn – thereby contradicting one of the core elements of their theory.

What is more, the RET assumes that, by and large, people make correct predictions; that their *random error* of expectation is *zero* on average. This implies that every actor possesses the same knowledge: *A* knows what *B* knows, and *B* knows what *A* knows. For if the actors' respective knowledge were different, it would be impossible to assume that their forecasts could be equally correct or equally wrong. The expectation error would not be random but systematic. However, we know from *experience* that peoples' knowledge is, in fact, different: Who would challenge the proposition that I know something you do not know and that you know something I do not know? I do not think anyone (who is not

[25] According to literature, the RET explicitly assumes that actors have the ability of learning. See, for instance *Bullard* (1991); and *Sargent* (2007). Upon closer reflection about the relation between RET and the ability of learning, however, I come to the following conclusion: *As long as there is learning on the part of actors, the 'RET regime' has not yet been established. And if and when the 'RET regime' has been established, learning on the part of actors is no longer possible*. In fact, the RET and the ability of learning is, in logical terms, not compatible. The ability of learning is an *a priori*, as implied by the undeniably true statement that "Humans act": One cannot deny a human actor's ability of learning without causing a logical contradiction. A situation in which the RET holds cannot possibly arise – as it would assume that actors can no longer learn, but this is impossible to think; one could not even think of the shortest possible span of time in which the RET regime could arise.

out of their mind) would do that. However, as actors differ in terms of their knowledge, their expectation errors also differ.

The idea that all actors have the same knowledge is untenable. For saying "all actors have the same knowledge" leads to an inevitable contradiction. If we all had the same knowledge, there would be no need to make such a suggestion – because everyone would know already. Communication and reasoning would not take place if everyone's knowledge were identical. The fact that the supporters of the RET do communicate and reason belies the assumption of the RET that human knowledge would be and could be identical. And if actors have different knowledge, their expectation error cannot be random. Some actors will be better; some will be worse at making predictions. That said, it is vain to hope that the RET could come to the rescue of the EMH.

V. Critique of the Modern Portfolio Theory

The modern portfolio theory (MPT) was put forward by Harry M. Markowitz (* 1927) in the 1950s. In its original form, it is an *investor manual* that advocates an investment rule that "assumes that there is a portfolio which gives both maximum expected return and minimum variance, and it commends this portfolio to the investor."[26] Most notably, Markowitz defines "risk" as the "variance" of stock price changes: the higher the probability that actual stock returns in the future deviate from their expected returns, the greater is the risk associated with these stocks.

According to the MPT, investors should put their money in the *efficient market portfolio*, as it offers the highest expected return for a given level of risk. The efficient market portfolio is a *diversified portfolio*. The key message of the MPT is that the variance of a stock portfolio can be reduced if the correlation coefficients of (expected) stock returns are *below* 1. And the efficient market portfolio is determined by (expected) securities returns, the risk of each security, and the covariance of each security with every other security in the portfolio. But how can one explain convincingly that security price variance (nowadays called *volatility*) should be the appropriate measure for risk?

The answer is: One must assume that the market prices of securities always contain all relevant information, so that, e. g. stock prices are, at all times, equal to their 'fundamental values'. If this is so, then changes in stock prices can indeed be interpreted as changes in the firms' fundamental value. However, this assumption – which is actually what the EMH says – is problematic: its truth value cannot, as already outlined, be logically or empirically proven. What is more, the concept of volatility is not what investors intuitively perceive as risk:

[26] *Markowitz* (1952), p. 79.

Table 1

Volatility as a Measure of Investment Risk

	Year:					
	0	1	2	3	4	Volatility
Case 1:						
Return in % p. a.	…	10	–15	20	7	12.78
Amount, US$	100.00	110.00	93.50	112.20	120.5	
Case 2:						
Return in % p. a.	…	–10	15	–20	–7	12.78
Amount, US$	100.00	90.00	103.50	82.80	77.00	

Source: own calculations.

namely, a permanent loss of capital. Indeed, it is hard to see how volatility could ever possibly qualify as a measure of *real-world* investment risk. To demonstrate this, let us take a look at a simple example (Table 1).

The initial investment is 100 US$. In case 1, the investment will grow to 120.05 US$ over the next four years. In case 2, it is assumed that the annual returns actually correspond to those assumed in case 1, but they carry a *negative sign*. After four years, the investment in case 2 is therefore worth only 77.00 US$. In both cases, however, volatility is 12.78 %. From the point of view of the MPT, both investment cases are considered to be equally risky. However, case 1, which yields 20.05 per cent, is, of course, less "risky" than case 2, which costs you 23 per cent. Common sense would tell us that the *investment risk is* – in stark contrast to what the EMH/MPT suggests – *the possibility that the investor ends up with a permanent loss of capital* (and not volatility). In this context, it seems to be instructive to let investor legend Warren E. Buffett (* 1930) explain investment risk as illustrated in the example above:

"[T]he problem is that the people who have written and taught about volatility do not know how to measure – or, I mean, taught about risk – do not know how to measure risk. And the nice thing about beta, which is a measure of volatility, is that it's nice and mathematical and wrong in terms of measuring risk. It's a measure of volatility, but past volatility does not determine the risk of investing. I mean, actually, take it with farmland. Here in 1980, or in the early 1980s, farms that sold for $2,000 an acre went to $600 an acre. I bought one of them when the banking and farm crash took place. And the beta of farms shot way up. And, according to standard economic theory or market theory, I was buying a much more risky asset at $600 an acre than the same farm was at 2,000

an acre. Now, people, because farmland doesn't trade often and prices don't get recorded, you know, they would regard that as nonsense, that my purchase at $600 an acre of the same farm that sold for 2,000 an acre a few years ago was riskier. But in stocks, because the prices jiggle around every minute, and because it lets the people who teach finance use the mathematics they've learned, they have – in effect, they would explain this a way a little more technically – but they have, in effect, translated volatility into all kinds of – past volatility – in terms of all kinds of measures of risk. … [I]f you understand the economics of the business in which you are engaged, and you know the people with whom you're doing business, and you know the price you pay is sensible, you don't run any real risk."[27]

The MPT – which has already been characterized as an *investor manual* – has had a rather important impact on the analysis of financial markets and, as a result, on how money is invested.[28] In 1961, William F. Sharpe (*1934) developed a *normative* model of the financial market, the *capital market line* (CML).[29] It essentially states that the (risk-averse) investor should choose a combination of risk-free return and the return of the efficient market portfolio: $E(R_i) = R_f + (E(R_m) - R_f) \cdot \sigma_i/\sigma_m$, whereas $E(R_i)$ = expected return of the portfolio *i*, R_f = risk free return, $E(R_m)$ = expected market return *m*, σ_i = standard deviation of the portfolio and σ_m = standard deviation of the market portfolio *m*.

What about the (*positive*) explanatory quality of the CML? The CML (in a *normative* sense) argues that (1) there is a *positive* relation between risk (as defined by the MPT) and return. It also states that (2) *all* investors *should* hold the (same) efficient market portfolio. This begs the question: how could all investors possibly arrive at the *same* efficient market portfolio? This *either* implies that all investing actors have the same knowledge that fuels their expectations; *or* that all investors arrive at the efficient market portfolio by *chance*. The latter certainly does not qualify as a scientifically satisfying explanation. And the former is (praxeo-)logically contradictory, as pointed out earlier. That said, the CML is not and cannot be convincing.

The CML was developed further into the *Capital Asset Pricing Model* (CAPM) by William F. Sharpe, John V. Lindner (1916 – 1983), and Jan Mossin (1936 – 1987).[30] The CAPM determines the equilibrium return on an individual security (or a subset of assets) in the efficient market portfolio (which is possible since the individual security is part of the efficient market portfolio). The CAPM takes the following form: $E(R_i) = R_f + (E(R_m) - R_f) \cdot ß_i$, whereas $ß_i$ = is the *beta-fac-*

[27] *Buffett* (2019), Annual Meeting.

[28] See *Bernstein* (2005), pp. 75.

[29] *Sharpe*'s article 'A simplified model for portfolio analysis' was published two years later in 1963.

[30] *Sharpe* (1964), *Lintner* (1965) and *Mossin* (1966).

tor which is: $ß_m = \sigma_{im} / \sigma^2_m = \text{COV}(R_i, R_m) / \text{VAR}(R_m) = k_{im} \,.\, \sigma_{im} / \sigma_m$. Here, k_{im} = correlation coefficient between the return of security *i* and the market portfolio *m*. The CAPM has been the subject of various theoretical and empirical critiques.

As the theoretical building blocks of the CAPM are the EMH, RET, and MPT, it is easy to see that all previous criticisms also apply to the CAPM. However, here is a good place to highlight a problem raised by the CAPM (and also by the CML): namely, that there is, and necessarily so, a *positive relation between risk and return*. While intuitively appealing, it is a conclusion that arises directly from the assumptions made by the CAPM (and which have been previously criticized and refuted for praxeological reasons). In an information *in*efficient market, however, a very different conclusion emerges. To explain this, let us consider the following example. The intrinsic value of stock *A* is 100 US$, and its market price is also 100 US$. Shortly after that, for some reason (e. g. panic among investors, but no fundamental issue), the market price of stock *A* drops to 50 US$.

The result of this decline in the stock price is that its volatility (as defined earlier) goes up, indicating increased risk. But wait a minute: After the price drop, you as an investor can buy something that is worth 100 US$ for 50 US$! Why should this represent an increased risk situation? In fact, the opposite is true: If you can buy something for 50 US$ that is worth 100 US$, it certainly means that the investor is facing a *reduced risk*! If the intrinsic value of the stock were to decline to 80 US$, you would still earn a pretty decent return. What is more: If you manage to buy something that is worth 100 US$ for 50 US$, you are sure to enjoy a particularly attractive return. Now we have it: If the capital market is not information efficient, there is an opportunity for the (intelligent) investor to increase returns on investment at low(er) risk – the very opposite of what the MFMT preaches.

VI. Way Forward: Less Government Interventionism

Reviewing the MFMT – or better: its building blocks EMH, RET, and MPT –, based on the logic of human action (praxeology), has delivered a rather sobering result: it has become obvious that the MFMT suffers from logical inconsistencies. This finding deserves attention (and possibly further discussion), I would argue, as the MFMT has no doubt a great influence on peoples' ideas as far as calculating equilibrium capital market returns calculation, risk measurement, and making investment decisions are concerned; and it also has a strong impact on financial market regulation, thereby influencing institutional investor capital allocation choices and thus economic growth.

The article's findings support the notion that 'scientific method matters': The scientific method is essential when it comes to identifying necessary conditions

for a valid inference that enable us to discern *false* reasoning from *true* reasoning. It has been argued that the 'correct' scientific method in the field of human action is the 'logic of human action'; and that empirical facts are not required to prove or disprove economic theories and theorems.[31] In other words, the science of human action and its most advanced field, namely *economics*, can be understood as *a priori* science – which is categorically different from the scientific method applied in natural sciences.

Against this backdrop it can be shown that the MFMT does not only suffer from logical inconsistencies but also appears to be quite "reductionist". It assumes (but unfortunately cannot and never will be able to prove this assumption) that market prices are efficient, that any deviation in actual prices from their equilibrium prices does either not occur; or, if it occurs, is short-term and not persistent. That said, the MFMT ignores or rejects the notion that there might be (short or long term) imbalances in financial markets.[32] It actually encourages investors to think that prices are 'correct' at any point in time. However, such conclusions contradict the teachings of the well-known 'Austrian business cycle theory' (ABCT).[33]

The ABCT, which is firmly based on the logic of human action, provides a theoretical framework for integrating financial market price action into macroeconomic developments. It explains that in an unbacked paper, or: fiat money, regime, the central bank (in close cooperation with the commercial banks) increases the quantity of money through credit expansion – that is, increasing the supply of credit not backed by "real savings"; it amounts to creating money out of thin air. The excess credit supply lowers the market interest rate – below the level of interest that would prevail had there been no increase in credit supply.

The artificially suppressed market interest rate causes savings to dwindle, consumption to rise, and investment to increase. This way, an artificial upswing ("boom") is put into motion, affecting price action in financial markets. For instance, suppressed discount factors increase the present value of firms' expected profits and thus their stock prices. In addition, lower interest rates lower firms' credit costs and improve their profit outlook, thereby contributing to firms' increased stock prices. As long as the central bank manages to maintain the boom, market disequilibria are not corrected. The boom can lead to persistent distortions of asset prices, causing "irrational price bubbles", something the EMH rules out.[34] That said, adopting the logic of human action as scientific method

[31] For a discussion of Popper's critical rationalism in this context, see *Polleit* (2020b).

[32] See *Mueller* (2001), p. 12.

[33] See *Ebeling* (1996); *Mises* (1998), Chapter XX. Interest, Credit Expansion, and the Trade Cycle, pp. 535 – 583; *Rothbard* (2000); *Hoppe* (1983), pp. 64 – 78.

[34] For instance, *Fama* (2014) does not believe that security prices exhibit price "bubbles," which he defines in his Nobel Lecture as an "irrational strong price increase that

in the field of financial market theory appears to be promising – especially in view of the MFMT's epistemological shortcomings.

Such a *methodological re-orientation* of economic reasoning would presumably have far-reaching consequences as far as government interventions in financial markets are concerned. Not only would it question the validity of the MFMT for explaining developments in 'real world' financial markets. Against the backdrop of the ABCT, it would also identify government interventionism as a source of price distortions in financial markets (due to, say, the lowering the market interest rates below its 'natural level') that makes financial markets inefficient. For instance, stock prices may be driven into speculative bubble territory (thus contradicting the EMH) as the state-sponsored central bank allows for excessive credit expansion and artificially suppressed market interest rates; or investors feel assured that central banks provide a 'safety net', which encourages them to disregard risks and invest in stocks even at elevated valuation measures.[35]

What is more, the MFMT considers price volatility as an adequate measure of risk. However, this idea becomes highly problematic if and when the EMH does not hold up. Because in this case, investors overlook the potential for persistent market disequilibria and underestimate the 'true' investment risk (in terms of permanent capital impairment). As a result, they may put too little capital aside to absorb potential losses, thereby making shocks to the financial and economic system even more severe. That said, it appears that government interventionism (especially in the form of monetary policy) is at the heart of potential financial market inefficiencies, that it undermines the ability of financial markets to provide for an efficient allocation of scarce resources. If this is the case, however, reduction, not expansion of government interventionism, would be necessary to optimize the function of financial markets in terms of mobilizing savings and directing them into the most productive uses – which is essential for advancing the material well-being of the people.

References

Beechey, M./*Gruen*, D./*Vickery*, J. (2000): The Efficient Market Hypothesis: A Survey, Research Discussion Paper 01, January, Reserve Bank of Australia.

Belke, A./*Gros*, D. (2021): QE in the euro area: Has the PSPP benefited peripheral bonds? Journal of International Financial Markets, Institutions and Money, 73, p. 101350.

implies a predictable strong decline" (p. 1475) For a discussion see *Greenwood*/*Shleifer*/*Yang You* (2019).

[35] See, for instance, *Mueller* (2001), pp. 12.

Belke, A./*Gros*, D. (2018): Event studies and the random walk hypothesis: Why the end of bond buying by the ECB is a non-event, Voxeu, CEPF, 21 December, https://voxeu.org/content/event-studies-and-random-walk-hypothesis-why-end-bond-buying-ecb-non-event.

Belke, A./*Polleit*, T. (2009): Monetary Economics in Globalised Financial Markets, Springer, Heidelberg, London, New York.

Belke, A./*Polleit*, T. (2006): Dividend Yields for Forecasting Stock Market Returns. An ARDL Cointegration Analysis for Germany, in: Ekonomia, Cyprus Economic Society and University of Cyprus, Vol. 9(1), Summer, pp. 86 – 116.

Bernstein, P. L. (2005): Capital Ideas. The improbable origins of modern Wall Street, John Wiley & Sons, Inc., Hoboken, New Jersey.

Buffett, W. E. (2019): Annual Meetings, Warren Buffett Archive, 5 April, www.buffett.cnbc.com/video/2007/05/05/afternoon-session---2007-berkshire-hathaway-annual-meeting.html.

Bullard, J. B. (1991): Learning, Rational Expectations and Policy: A Summary of Recent Research, Federal Reserve Bank of St. Louis, January/February, Vol. 73, No. 1, pp. 50 – 60.

Cohen, M. R./*Nagel*, E. (1934): An Introduction To Logic And Scientific Method, Simons Publications Inc., Safety Harbour.

Cuthbertson, K. (1996): Quantitative Financial Economics. Stocks, Bonds and Foreign Exchange, John Wiley & Sons, Chichester et al.

DeBondt, W. F. M./*Thaler*, R. (1995): Does the Stock Market Overreact? Journal of Finance, 40, pp. 793 – 805.

De Long, J. B./*Shleifer*, A./*Summers*, L. H./*Waldmann*, R. J. (1990): Positive Feedback Investment Strategies and Destabilizing Rational Speculation. Journal of Finance, June, 45:2, pp. 379 – 395.

Dias de Sousa, R. E. C./*Howden*, D. (2015): The Efficient Market Conjecture. Quarterly Journal of Austrian Economics, Vol. 18, No. 4, Winter, pp. 387 – 408.

Fama, E. F. (2014): Two Pillars of Asset Pricing. American Economic Review, 104, pp. 1467 – 1485.

Fama, E. F. (1970): Efficient capital markets: a review of theory and empirical work. Journal of Finance 25, pp. 383 – 417.

Fama, E. F. (1965): The behavior of stock market prices. Journal of Business 38, pp. 34 – 105.

Fama, E. F. (1965): Random walks in stock market prices. Financial Analysts Journal 21, pp. 55 – 59.

Greenwood, R./*Shleifer*, A./*Yang*, Y. (2019): Bubbles for Fama*. Journal of Financial Economics, Volume 131, Issue 1, January, pp. 20 – 43.

Hartwig, K.-H. (1976): Kritisch-rationale Methodologie und ökonomische Forschungspraxis. Zum Gesetzesbegriff in der Nationalökonomie, Peter Lang, Frankfurt a. M., Bern, Las Vegas.

Höffe, O. (2007): Immanuel Kant, Verlag C.H. Beck, München.

Hoppe, H.-H. (2006): On Praxeology and the Praxeological Foundation of Epistemology, in: The Economics and Ethics of Private Property. Studies in Political Economy and Philosophy, 2nd ed., Ludwig von Mises Institute, Auburn, US Alabama, pp. 265 – 294.

Hoppe, H.-H. (1997): On Certainty and Uncertainty. Review of Austrian Economics 10, No. I, pp. 49 – 78.

Hoppe, H. H. (1995): Economic Science and the Austrian Method, Ludwig von Mises Institute, Auburn, US Alabama.

Hoppe, H.-H. (1983): Kritik der kausalwissenschaftlichen Sozialforschung. Untersuchungen zur Grundlegung von Soziologie und Ökonomie, Studien zur Sozialwissenschaft, Westdeutscher Verlag, Opladen.

Kahneman, D./*Slovic*, P./*Tversky*, A. (eds.), (1982): New York and Cambridge, Cambridge University Press.

Lintner, J. (1965): The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. The Review of Economics and Statistics, Vol. 47, No. 1 (Feb., 1965), pp. 13 – 37.

Lo, A. W. (2007): Efficient Markets Hypothesis. The New Palgrave: A Dictionary of Economics, L. Blume, S. Durlauf (eds.), 2nd Edition, Palgrave Macmillan Ltd.

Machlup, F. (1978): Methodology of Economics and Other Social Sciences. Economic Theory, Econometrics, And Mathematical Economics, Academic Press, New York, San Francisco, London.

Markowitz, H. M. (1952): Portfolio Selection. The Journal of Finance, Vol. 7, No. 1. March, pp. 77 – 91.

Mises, L. v. (1998): Human Action. A Treatise on Economics, Ludwig von Mises Institute, Auburn, US Alabama.

Mises, L. v. (1957): Theory and History. An Interpretation of Social and Economic Evolution, Ludwig von Mises Institute, Auburn, US Alabama.

Mossin, J. (1966): Equilibrium in a Capital Asset Market. Econometrica, 34, pp. 768 – 783.

Mueller, A. (2001): Financial Cycles, Business Activity, and the Stock Market. The Quarterly Journal of Austrian Economics, Vol. 4, No. 1, Spring, pp. 3 – 21.

Muth, J. F. (1961): Rational Expectations and the Theory of Price Movements. Econometrica, Vol. 29, No. 3., July, pp. 315 – 335.

Polleit, T. (2020a): A Critique of Economic Knowledge. The Economic and Politics of Freedom for the III Millennium, Essays in Honor of Prince Hans-Adam II of Liechtenstein, Kurt R. Leube (ed.), van Eck Publishers, pp. 85 – 96.

Polleit, T. (2020b): Die Rolle des Kritischen Rationalismus in der Volkswirtschaftslehre, LI-Paper, Oktober, https://www.libinst.ch/publikationen/LI-Paper-Polleit-Kritischer-Rationalismus-Volkswirtschaftslehre.pdf.

Rothbard, M. N. (2011): Economic Controversies, Ludwig von Mises Institute, Auburn, US Alabama.

Samuelson, P. (1965): Proof that properly anticipated prices fluctuate randomly. Industrial Management Review 6, pp. 41 – 49.

Sargent, T. J. (2007): Evolution and Intelligent Design, AEA Presidential Address, New York University.

Sargent, T. J. (1972): Rational Expectations and the Term Structure of Interest Rate. Journal of Money, Credit and Banking, 4(1), pp. 74 – 97.

Sargent, T. J./*Wallace*, N. (1975): Rational Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule, in: Journal of Political Economy, 83, pp. 241 – 254.

Sargent, T. J./*Wallace*, N. (1971): Market Transaction Costs, Asset Demand Functions, and the Relative Potency of Monetary and Fiscal Policy. Journal of Money, Credit and Banking, 3 (2, Part 2), pp. 469 – 505.

Sharpe, W. F. (1964): Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. The Journal of Finance 19(3), pp. 425 – 442.

Sharpe, W. F. (1963): A simplified model for portfolio analysis. Management Science, Vol. 9, January, pp. 277 – 293.

Shefrin, H. (2000): Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing. Boston, Mass., Harvard Business School Press.

Shiller, R. J. (2003): From Efficient Markets Theory to Behavioral Finance. Journal of Economic Perspectives, Volume 17, Number 1, Winter, pp. 83 – 104.

Shleifer, A. (2000): Inefficient Markets, Oxford, Oxford University Press.

Siegel, J. J. (2002): Stocks for the Long Run, third Edition, New York, McGraw-Hill.

Taylor, J. B. (1983): Rational Expectations Models in Macroeconomics, NBER Working Paper No. 1224, November.

Tetens, H. (2006): Kants "Kritik der reinen Vernunft". Ein systematischer Kommentar, Philipp Reclam jun., Stuttgart.