

The Logical Justification for “Active” Investment Management

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A. Introduction and Summary

The editor’s premise underlying the collection of essays in this volume is that “asset pools managed according to a clear philosophical foundation do better than those without such guidance”. But is this premise true? If so, which philosophical foundation for successful active management constitutes the best foundation, and why is this true? Our comments are intended to clarify precisely this point. In Part B, we shall set forth two new axioms that we believe to be “absolutely true”, to utilize the editor’s descriptor.

The first reason that these two axioms are of interest is that they underlie a new theory of asset market equilibrium recently developed at Stanford University, the theory of Rational Beliefs. This theory successfully generalizes the classical CAPM and Rational Expectations theories. Moreover, it possesses an explanatory power an order of magnitude greater than these antecedent theories. Indeed, it has recently been shown to explain away all six fundamental paradoxes arising within classical financial theory.

The second reason that these axioms are of interest is they make possible a proper philosophical foundation for successful “active” investment management. This is the subject of Part C, and we believe our analysis here to be “very probably true” – to utilize the editor’s descriptor once again. Specifically, we demonstrate that the two new axioms imply two very fundamental strategies for achieving enhanced returns from active management. We identify these two strategies, and argue that they are the only theoretically legitimate strategies that can exist. Finally, in Part D, we shall discuss some commonplace myths and half-truths that plague the investment management industry – propositions we consider to be “false”. The new theory we are proposing explains why these assertions are problematic.

B. The Two Axioms

To understand the two new axioms to be discussed, it is first necessary to review two of the most critical axioms that underlie classical financial theory. This theory is ordinarily referred to as the Efficient Market Theory, but it is more correctly known as the theory of a Rational Expectations Equilibrium. This concept was first clearly articulated by William Lucas and several “Chicago School” colleagues in the 1970s. The celebrated

CAPM model of finance should be thought of as a special case of this more general model. The two axioms in question pertain to the *knowledge* that all investors are assumed to possess about the economy and the markets:

AXIOM 1 – STATIONARITY OF THE ENVIRONMENT: The stochastic process of ‘news’ that drives the markets and the formations of investor expectations is a stationary stochastic process. This axiom is critical both in theory and in practice, and here is why. *In theory*, this axiom implies that, with enough data-mining, all investors will possess “perfect conditional foresight”. This means that they all know the correct conditional probability of the future state of the world (e.g., returns) *given* the current state of the world.

In practice, this axiom implies that the phenomenon of structural change does not and cannot occur. Thus, the founding fathers of modern finance gave us a world devoid of industrial revolutions, of the rise and fall of OPEC, of the advent of World Wars, etc. For non-stationarities of these kind cannot be incorporated within the asset market equilibrium model that they proposed. No amount of data-mining will permit investors to learn the “true” conditional probabilities when genuine structural changes occur.

AXIOM 2 - PRICING MODEL CERTAINTY: When any and every investor learns the “news” (of whatever kind), he knows exactly the correct new price that will prevail upon the dissemination of this news. As a historical note, this second axiom is less well understood than the first. It dates back to Kenneth Arrow’s foundational 1953 paper from which most all subsequent models of financial market equilibrium evolved. Its critical import for the foundations of theoretical economics was first articulated by Professor Roy Radner in 1979¹.

As in the case of the first axiom, this second axiom is critical both in theory and in practice. *In theory*, it implies (along with Axiom 1) the familiar orthogonality conditions of modern finance, conditions that in turn predict that returns are random walks, that trends (in returns) cannot exist, that it is impossible to outperform the market except by luck, etc. *In practice*, this axiom implies that momentum strategies and ‘herding behavior’ would be irrational and thus will not be observed. It can also be shown to imply that the volatility of asset returns will be some 80% less than is observed in reality, and thus that the risk premia on risky investments should be a fraction of what they are observed to be. Finally, this axiom implies that investors who have become very rich by the end of their lives owe it all to luck.

It is worth noting that no satisfactory justification of either of these axioms was ever given². Rather, they were makeshift axioms introduced in order to simplify the

¹ Mathematical economists sometimes refer to this axiom as that of the invertibility of the general equilibrium mapping from state to price, in Arrow’s sense.

² For axiom 2 to be justified in reality, all agents would have to know the true and invariant equilibrium mapping from state-to-price, *and* it would have to be invertible. Not even on Pluto could agents ever possess such knowledge!

construction of analytically tractable models of financial market equilibrium. Nonetheless, these critical assumptions caused such a loss of generality and hence of explanatory power that the resulting models never been able to explain much less to predict real-world asset market behavior. The situation is strictly analogous to that which arose in Galilean physics: Galileo's assumption of "no friction" within his airless bell-jar gave rise to a theory in which feathers and lead balls would fall at the same rate.

Note that neither in financial economics nor physics was there anything "wrong" with the theories implied by these axioms - *as long as the underlying axioms held true*. Rather, the problem lies with the stringency of the axioms themselves. When the respective axioms do not hold true, then neither theory is robust with respect to reality. While Galileo and his contemporaries certainly appreciated the limitations of his own idealized theory, the same was not true of most financial economists, pension consultants, and in particular the editors of such publications as the *Journal of Portfolio Management*. All too often, these parties endorsed the first serious theory of asset market equilibrium (the CAPM) ever proposed as if it actually were descriptive of reality.

Having canonized it, they then urged its adoption in practice, and this occurred throughout the pension consulting and financial planning communities. However, only two decades after its coronation, the Efficient Markets/Rational Expectations paradigm is crumbling due (i) to the empirical attacks on it by Robert Shiller and others, (ii) to the rise of the Behavioral Finance paradigm, and (iii) to the advent of the rise of an alternative and more successful asset market equilibrium theory, the theory of Rational Beliefs proposed by Professor Mordecai Kurz of Stanford University.

Here are the two axioms we propose as replacements for the original axioms. Both incidentally lie at the heart of the new theory of Rational beliefs.

AXIOM A - NON-STATIONARITY OF THE ENVIRONMENT: The stochastic processes generating the news both at the micro level (individual firms and sectors) and at the macro level (the economy) is fundamentally non-stationary. This is because of ongoing structural changes in the economy. As a result, knowledge of historical data does not permit agents to learn the "correct" conditional probabilities of what will happen next. Because this is true, agents will form diverse forecasts of the future, and most all agents will almost always be *wrong* in their forecasts of future news.

Now it turns out that, while the environment is indeed non-stationary, historical data can be relied upon to reveal a *subset* of forecasts that are in fact true. Specifically, certain long-run averages are revealed by the data to hold true as asymptotic limits within the underlying stochastic process. These include the average (real) returns on stocks, bonds, cash, the equity risk premia, the trend-growth rate of productivity, etc. Because of this fact, we modify Axiom A to

AXIOM A* – STOCHASTIC 'STABILITY' OF THE ENVIRONMENT: The term 'stability' here refers to the fact that, while the economic environment may be non-

stationary, it is ‘stable’ in that a subset of important parameters have fixed and knowable mean values that emerge as asymptotic limits as the sample size goes to infinity³. What this means in practice is that a careful study of historical data makes possible *restricted learning* by all agents. For example, everyone can learn that the long-run average equity risk premium is about 6%. They will and should agree in their forecasts of such variables, and their forecasts of these particular variables can be called objectively true. But they need not and generally will not agree on their forecasts of other parameters, especially those concerning the shorter-run behavior of the system (e.g., the level of the equity premium over the next few months). These are irreducibly subjective in nature. Given the plethora of such forecasts that different agents will inevitably hold, some forecasts will prove better than others, *ex post*.

AXIOM B: - PRICING MODEL UNCERTAINTY: When different agents learn the news about some investment or asset class, they will in *not* in general know the new price that will result once this information is disseminated. That is, they do not know how the market will “price” the news. As a result, agents will understandably have different forecasts of future prices when conditioned upon the same news. And once again, some forecasts will prove better than others, *ex post*.

To conclude this section, we reiterate that we are embracing Axioms A* and B with an extremely high degree of confidence. One reason why is that they pass the epistemological smell test that any “axiom” ought to pass: They make sense, and conform to our sense of reality. The classical Axioms 1 and 2 do not pass this test, and were conceded from the start to be unduly restrictive. The second and much deeper reason for our affirmation of Axioms A* and B is that they have recently been shown to imply a new theory of dynamic asset market equilibrium. This theory is known as the theory of Rational Beliefs (as opposed to classical Rational Expectations). It is a mathematical and conceptual generalization of the earlier theory, which it therefore subsumes as a limiting special case.

This new theory explains and (conditionally) predicts market behavior much better than any previous theory. Indeed, the new theory predicated upon our two axioms has recently been shown to explain away *all six principal paradoxes* arising within classical theory. And in doing so, no assumption of “irrational” behavior by investors need be introduced⁴.

³ The correct definition of stability here is that the stochastic process be Weakly Asymptotically Mean Stationary, or WAMS. In such processes, the probability measure of the process decomposes into the sum of two mutually singular measures: one is the stationary measure containing all that can be learned from the data as “objectively true”. The other is the non-stationary measure containing all the other information about the process, in particular the information about such “structural changes” as render the process non-stationary in the first place.

⁴ Specifically, when these axioms are utilized in constructing a full general equilibrium model of the economy and of the asset markets, then the following paradoxes are resolved: the existence of an equity risk premium ten times higher in reality than in a classical Rational Expectation equilibrium; a return on the riskless asset (cash) one tenth that predicted by classical theory; a standard deviation of equity returns four times that predicted by classical theory; a standard deviation of the P/E ratio some fifty times greater than that predicted by classical theory; the paradoxical existence of GARCH phenomena impossible under Rational Expectations theory; and the existence in “forward bias” in the forex markets. See M. Kurz and M. Motolese, “Endogenous Uncertainty and Market Volatility”, *Economic Theory*, 17, 2001.

One consequence of this is that the currently fashionable Behavioral Finance programme has been rendered redundant to a significant degree. For what Rational Beliefs has shown is that it is the *mistakes* of investors and of the market as a whole – not “irrationality” – that is the culprit explaining real world market chaos. Mistakes explain why markets are so volatile (chaotic), why assets are almost always mispriced, why equity risk premia are and should be very high, why long- bull and long-bear market regimes exist, etc.

Importantly, mistakes reflect an absence of information – not irrationality. In particular, mistakes are made because the environment is non-stationary and because agents confront Pricing Model Uncertainty. They simply cannot know what classical theory *assumed* that they know. If Behavioral Finance is being rendered redundant, it is just as well since this programme has never yielded an equilibrium model capable of predicting future prices and quantities that is logically coherent much less falsifiable.

We now extend the foregoing analysis and advance our main hypothesis, one which we believe to be “very probably true”. It is a very bold one: these same two axioms A* and B that underlie Rational Beliefs theory and thus make possible a satisfactory *descriptive* theory of asset markets also underlie a *prescriptive* theory of how individual investors can and should legitimately outperform the market. This assumes, of course, that an investor is willing to invest the time and money to implement the strategies consistent with this prescriptive theory.

C. Two Legitimate Strategies for Enhanced Return

To succeed in outperforming the market amounts, an investment manager must be less wrong than the consensus in forecasting some subset of future prices. This follows from two observations. First, in a non-stationary world with Pricing Model Uncertainty, almost all investors will be “wrong”. Indeed, the hope of being “right” by virtue of possessing the right model is vitiated by the phenomenon of non-stationarity (or even stochastic stability). Thus, outperforming the market simply implies being less wrong than the consensus.

But less wrong about what? About the level of future asset prices. This is because “success” is quantitatively measured in terms of superior returns, and returns are functions of future prices. This is even true of so-called arbitrage strategies. For to know at what rate and by what date two prices will “converge” (if in fact they do) is a special case of price forecasting⁵.

This being so, the foundational question for a normative theory of active management becomes: What are the logically defensible bases for superior price forecasting – assuming there are any? The answer is that there are two and only two strategies for forecasting future asset prices better than the consensus does, assuming that the following two attractive desiderata are to be satisfied.

⁵ This point is overlooked when arbitrage products are sold as if the problem of price forecasting gets sidestepped in arbitrage. It is not. For proof, simply consider what cost Long Term Capital their business.

First, the strategies must be consistent with a satisfactory descriptive and explanatory theory of how markets work in reality.

Second, the strategies must be “defensible” in that an investor who successfully utilizes them can claim *ex post*, “I was right for the right reason”.

What exactly are the two strategies that meet these criteria? And what justifies our strong claims just above? The existence, nature, and “legitimacy” of the strategies follows from the observation that all price changes – both *ex ante* and *ex post* – factor into two component parts: first, news of some kind, and second, the quantitative reaction of price over time to this news⁶. Thus superior price forecasting ability requires expertise either in better anticipating the timing and nature of “news”, or else in better anticipating how prices will react to news as and when the news is disseminated⁷.

What strategies permit an investor to claim superiority in either (or both) of these skills? And what is it that might make such strategies both theoretically legitimate and defensible?

Generic Strategy #1 - Exploiting Non-Stationarity: Axiom A* postulates the non-stationarity (more correctly, stability) of the stochastic process generating the market-relevant “news”. This is the basis upon which the phenomenon of structural change (whether at the company, industry, or economy-wide level) can be incorporated into asset market equilibrium theory, as it is in the theory of Rational Beliefs. But given the inherent subjectivity of forecasts of structural change, then some investors will possess better theories of such changes than will others. In particular, an investor who invests time and money to understand such changes should possess and will possess an edge. Specifically, he will ascribe better probabilities to future news than will other investors – in particular those who stick their head in the sand and ignore structural change, as many of us are tempted to do.

Note that the possibility of superior performance in this regard is theoretically legitimate, since the underlying theory of asset market equilibrium postulates the existence of non-stationarities of many forms. Note also that an investor who successfully hones these skills can claim *ex post* to have been right for the right reason. This is because the news

⁶ We are being a bit sloppy here, since prices *can* in fact change when there is no “exogenous” news – a longstanding paradox within financial theory prior to the advent of Rational Beliefs theory. This paradox has been resolved as follows. A change in the market’s Belief Structure about future returns is sufficient to alter an asset’s price, and Belief Structure changes can occur independently of exogenous news about the state of the world. Price changes of this kind constitute one form of “endogenous risk” analyzed by M. Kurz and his colleagues. This form of endogenous risk can be incorporated within the theory we are developing herein by interpreting a change in Belief Structure as a type of “news” that can impact prices.

⁷ Given these observations, it is curious that neither financial economics courses nor AIMR courses offer a program in price forecasting. It is arguably the most important topic in the field of investment management. A true understanding of it *and* of its limitations is in fact presupposed by a proper understanding of well-posed asset market equilibrium theories.

that is ultimately released and upon which he has bet will be observable by all, and it will be clear that his bet was more on target than the market's bet⁸.

Examples: Stock-picking strategies based upon fundamentals, sector selection strategies, and demographic and political “macro” bets are all predicated upon non-stationarities of one kind or another.

Generic Strategy #2 – Exploiting Endogenous Risk: Endogenous risk refers to the degree to which asset prices change in response to news more than they are supposed to in classical theory, as in market “overshoot”. The concept of endogenous risk emerged theoretically in the work of M.Kurz, where Pricing Model Uncertainty (and various other forms of ignorance) are critical in explaining when and why such price “overshoot” occurs. Endogenous risk has also been quantified, not only by Kurz and his colleagues, but much earlier by scholars such as Robert Shiller.

Now that overshoot of this kind has been analyzed theoretically – in a causally significant manner – a new profession is beginning to arise dedicated to understanding what kinds of environments and news announcements give rise to how much overshoot, how much subsequent “reversion”, etc. An investor willing to devote time and money to learning about these phenomena will command an edge over the market in anticipating the magnitude of price response to news. As in the case of Generic Strategy #1, this opportunity is theoretically legitimate (since modern asset market equilibria postulated Pricing Model Uncertainty) and defensible (since an investor will be able to show that the postulated conditions for overshoot and reversion were fulfilled).

Examples: Any strategy based on forecasting the quantitative response of price to news is an example of our second generic strategy. So is any arbitrage strategy predicated upon convergence of a given price spread between two (or more) securities. So are all strategies of market-timing that exploit long-term bull and bear markets. “Return cycles” of this kind are of course wholly illegitimate in the random walk world of classical finance. But they are very much at home in a Rational Beliefs Equilibrium and can be shown to represent a particular form of endogenous risk.

In sum, the ability of active investment managers to exploit both non-stationarity and Pricing Model Uncertainty makes possible two strategies for outperforming the market in a legitimate way. We conjecture that no other strategies exist for doing so. Or to express the point differently, any legitimate strategies or doing so can probably be shown to reduce to some combination of these two strategies. It is for this reason that we have called them “generic”.

⁸ It is important in this regard that surveys are now routinely taken as to what the market expects about almost everything.

D. Myths and Half-Truths in Finance

As a result of the foregoing discussion, we simply list a few of the myths and half-truths of the financial literature. In the editor's terminology, these are assertions which we deem to be problematic if not false with a high degree of confidence.

1. Markets are "efficient" in that all news gets correctly priced. Truth: Markets are almost always inefficient in that virtually all agents – and hence "the market" – do not know how to price news correctly since they do not possess Pricing Model Certainty. As a result, markets almost always misprice every asset. Specifically, the price we observe is very different from the price we would observe *were* agents able to possess Pricing Model Certainty.
2. The advent of Bloomberg-era technologies have given us the most efficient markets in history. Truth: The US stock market is currently the most inefficient in history in the specific sense that the sequence of asset prices we observe correspond *less* than ever before to the predictions of Efficient Market Theory. More specifically, the level of endogenous risk (e.g., price overshoot) in the stock market has soared in the past half century, as the present author (among others) has demonstrated. It should be kept in mind that the "efficiency" of a market is properly measured by the deviation-from-theory we have noted here, and *not* by the magnitude of transactions and communications costs involved in trading. These costs are lower than ever before.
3. Because the real world behavior of asset prices fails to conform to that predicted by the Efficient Market Theory, we must conclude that agents are not in fact rational. [This inference led to the rise of Behavioral Finance.] Truth: There were always several assumptions of the EMT theory that – if violated in reality – would lead to data inconsistent with the predictions of the theory. What Rational Beliefs theory has demonstrated is that it was the assumption that all agents can hold Rational Expectations (based upon classical axioms 1 and 2) that was the problem. More specifically, if we *retain* the concept of "rationality" in the form of expected utility maximization but relax the assumption that agents hold Rational Expectations – requiring them merely to hold Rational Beliefs and hence to make mistakes – then the resulting equilibrium model is fully compatible with real-world data. In this sense, we now know that no assumption of irrational behavior is *needed* to explain the real-world behavior of asset markets, and indeed to resolve all six paradoxes of finance, as noted above⁹.

⁹ The point being made here is important. It should be noted that the founding fathers of expected utility theory, in particular Ramsey, von Neumann and Morgenstern, and Savage never assumed that agents knew the "true probabilities" of the events in the lotteries at stake. That is, modern utility theory never assumed the existence of a stationary environment that would make such knowledge empirically possible. The subsequent transformation of the concept of rationality into Rational Expectations occurred within economics – not decision theory and game theory – and it reflected the need for economists such as Lucas to "close" their models. Incidentally, it is now clear from hindsight why such an assumption was needed at that stage in the evolution of economic theory: The difficulties of characterizing equilibrium without Rational Expectations proved to be formidable, both mathematically and conceptually.

4. The average 6% equity risk premium (over the mean return on cash) is too high, and is theoretically unjustified. Truth: This observed premium is fully justified since investors must be compensated not only for the exogenous risk of hold stocks over the long run, but the endogenous risk as well – in particular the “regime shift risks” of long bull and bear markets that can arbitrarily destroy an investor’s retirement nest egg for good. [What extra premium would you ask for to compensate you for the risk of retiring on the eve of a bear market regime (e.g., 1967) that would cost you 66% of your real nest egg? This is a risk having nothing to do with the standard deviation of annual returns from stocks, the usual measure of equity market risk.]

5. Market-timing is an inherently subjective strategy since it entails “calling” market turning. You are better off sticking with to a classical fixed asset allocation where the underlying data utilized in constructing the efficient frontier are objective Truth: Cycles of returns exist in all asset classes, and are now known to result from a particular form of endogenous risk - that arising from the “stochastic persistence” of correlated belief structures. New econometric techniques make it possible to assess the means, variances, and covariances of these *return cycles* in an objective manner. With such data in hand, utility maximization requires the utilization of these data to determine an optimal state-dependent (“contingent”) asset allocation at each point in time. This is the correct meaning of “dynamic” asset allocation, and it is strategic not tactical in nature even though it may require frequent reallocations of funds¹⁰.

E. Conclusion

We have attempted to demonstrate how a simple pair of axioms – each highly commonsensical – underlie two very different theories. The first is a *descriptive* and explanatory theory of how asset markets actually work in reality, namely the theory of Rational Beliefs. The second is a *prescriptive* theory as to how investors can legitimately outperform market indices. Because of the duality of these two theories, it may finally be possible to arrive at a fully unified theory of investment management in which description and prescription happily coexist in a logically satisfactory manner. Heretofore, this has not been possible.

¹⁰ Note that this construct amounts to a straightforward mathematical and conceptual generalization of classical portfolio theory. The difference is that the relevant data are not VAR/COV of returns but of *cycles* of returns, where a given cycle can be parametrized by its mean amplitude and periodicity. These data are objective, not subjective, and in utilizing them it is not necessary to “call” turning points any more than it is necessary to “call” returns in classical theory.