

# THE MINIMAX REVIEW

## GREAT READS

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### RESOLVING THE INFORMATION OVERLOAD PROBLEM – The Undervalued Role of Good Theories in Permitting This –

By H.W. Brock, Editor-in-Chief



***Editor's Note:** All too often, investment professionals joke amongst each other that some proposition is “merely theoretical.” The implication is that what is theoretical is unlikely to be practical as well. The lie here is given by perhaps the snobbiest comment in the history of science, namely Einstein's retort to Niels Bohr about the integrity of the theory of general relativity: “Yes, Niels, I do like good theories. They work better.”*

*My observation over the past two decades is that most investors who significantly outperform the market over the longer run do so because of their implicit or explicit utilization of good theories along the way. In using these, they prove less wrong than the consensus and thus end up richer; they know how to recognize specious logic on the part of the consensus and how to exploit it; they sound smarter to the clients whose money they manage; and perhaps most importantly, they manage their information overload problem much better than others do. For good theories clarify what to focus on and why—as well as what to ignore and why.*

*To sum up, the single greatest oversight of investment professionals may be to underestimate the true usefulness of good theories in better explaining and understanding the past, as well as in better forecasting the future—using the least information required. Included amongst such theories is the theory that clarifies when we should statistically extrapolate the past in predicting the future, versus when we should not. The following essay unifies all of these insights in a novel manner. It amounts to a restatement of why we are in business.*

## RESOLVING THE INFORMATION OVERLOAD PROBLEM – The Undervalued Role of Good Theories in Permitting This –

By H.W. Brock, Editor-in-Chief

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Introduction
The Correct Way to Resolve the Information Overload Problem
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Everyone knows that accelerating information overload is one of the central problems besetting investment professionals in today's Bloomberg era. Bombarded by ever more factoids and divergent perspectives, it is difficult for an investor to know what issues, much less what variables, to focus on. Paralysis can easily result, in the sense of the parable of Buridan's Ass originating in Aristotle's *De Caelo*: "An entirely rational ass, placed exactly in the middle between two stacks of hay of equal

size and quality, will starve since it cannot make any rational decision to start eating one rather than the other."

But how can the problem of information overload be *successfully* resolved rather than merely talked about? There is a reason that this challenge is inevitably dodged, or else lost in some ancillary discussion of "improved management information processes." The reason is that the correct way to resolve the information overload problem is highly counter-intuitive. It is lodged within the utterly unfashionable discipline of the philosophy of science—the branch of philosophy that focuses on what makes a theory a *good* theory. A principal goal of this essay is to apply appropriate findings within the philosophy of science to the information overload problem.

Yet we go further, and a second goal is to demonstrate that the particular research strategy utilized in *The MiniMax Review* carries out the very research programme prescribed by the philosophy of science. Accordingly, we shall demonstrate how our research essays can help clients better manage their information overload problem. We should have done this many years ago, but failed to do so because the author did not perceive the relevant linkages. This failure is ironic, since he personally has contributed to the relevant branch of the philosophy of science. It also testifies to the subtlety of the underlying logic.<sup>1</sup>

In Part A below, we propose a theory for resolving the information overload problem. The essence of this theory is that the use of *good* explanatory theories, as opposed to poor ones, will resolve the information overload problem in an *indirect* manner. Then in Part B, we show that the utilization of good theories pays two additional dividends of great importance to investment professionals. First, utilizing good theories is by far the best way to increase alpha. Second, utilizing good theories renders investment professionals far more articulate in explaining what

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<sup>1</sup> The most extensive discussion of the philosophical issues involved can be found in Brock, H.W., "Game Theory, Symmetry, and Scientific Discovery," in *Rational Interaction: Essays in Honor of John C. Harsanyi*, Edited by Reinhard Selten, Springer-Verlag, Berlin Heidelberg, 1992, pp. 391-418. [In 1994, both John Harsanyi and Reinhard Selten shared the Nobel Prize in Economics with John F. Nash of "A Beautiful Mind" fame.]

they are thinking and doing to *their* clients. And these clients increasingly want to understand the financial environment.

Finally, in Part C, we present three case studies that substantiate the ability of the new theory to generate the three kinds of dividends just cited. Interestingly, all three case studies are drawn directly from past research essays we have produced with MiniMax and our Cred-Intel research services. This substantiates our claim of a longstanding linkage between the new theory and our own research programme.

### A. The Correct Way to Resolve the Information Overload Problem

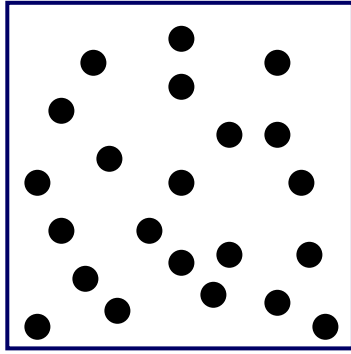
How should the problem be resolved? The answer is for investment professionals to utilize a *good* theory when attempting to analyze an investment issue in a superior manner. But how does doing so help solve the information overload problem? It does so in two ways. First, a good theory provides guidance as to *which* of many potential variables actually matter to the topic at hand, as well as which are spurious and should be ignored. Second, it specifies the true interrelationships *between* these variables. In doing so, a good theory implicitly identifies which variables (and hence factoids) and which specious relationships should be ignored. Additionally, familiarity with convincing theories will give the analyst the confidence to ignore most of the news, and to focus on what matters. These are the payoffs for the information overload problem—and they are enormous.

To summarize all of this in diagrammatic terms, visualize the information overload problem as a Black Box consisting of thousands of dots, each representing some factoid, or bit of “information,” as in Figure 1. An analyst armed with a good theory will then know which *subset* of dots (variables) matter—typically a small subset. Moreover, he will understand how to interconnect these dots via the right lines (relationships). To state this more colloquially, a good theory will permit an analyst to know which news matters and why, which news doesn’t matter and why, and how to interpret the news that does matter better than others can.

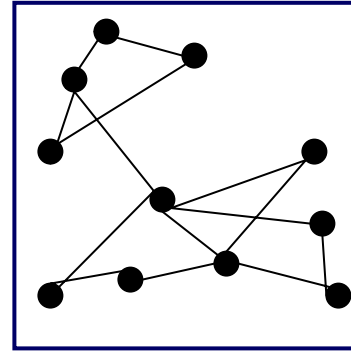
**“Good” Theories:** But what is a good theory? What makes a given theory better than rival theories, and how can an investment manager find such theories? The best theories possess five normative properties: “Parsimony”, high explanatory power, high predictive power, falsifiability, and a foundation based upon intuitively compelling axioms. In regard to this fifth property, the conclusions and predictions of the best theories in modern times have been *deduced* from first principles or axioms via mathematical analysis. Inductive logic (e.g., data analysis and statistical modeling) is primarily useful in testing the predictions implied by the theory—not in theory creation itself.<sup>2</sup>

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<sup>2</sup> For example, Einstein’s 1916 theory of general relativity was deduced from axioms about the nature of general theories of motion—as were Newton’s Laws for that matter, nearly three hundred years earlier. The theory made certain strange predictions, e.g., the prediction that a ray of light in the presence of a large mass would be bent by a precise numerical amount. This deduction was spectacularly confirmed (via inductive logic) during an eclipse of the sun in 1919. Yet Einstein famously declined to see the photographic plates demonstrating victory, stating: “I do not need to see them. The theory had to be correct given the self-evident truth of its underlying axioms.”

**FIGURE 1: RESOLVING THE INFORMATION OVERLOAD PROBLEM****Drowning in Excess Information**

Think of each dot as a factoid or some analyst's opinion

**Swimming in Superior Inferences**

The relevant factoids *and* their true interrelationships  
– Identified via Good Theories –

**Parsimony:** The concept of parsimony is particularly compelling, and is directly pertinent to the information overload problem. A parsimonious theory has the property of greatest possible simplicity, other things being equal. Specifically, a parsimonious theory makes the *fewest* number of assumptions necessary to explain the *greatest* range of observable phenomena and to generate the greatest number of predictions about the subject matter at hand. In micro and macro economics, and in finance, this translates into theories calling for relatively little information in order to most accurately predict the future.

Parsimonious theories often strike people as “surprisingly simple.” The reason why is that, in a parsimonious theory, everything that is irrelevant has been explicitly identified and discarded during the process of theory construction itself. The point being made here is much more profound than it may appear: If a good theory is constructed correctly, then the theory that results (e.g., the equations of relativity theory, game theory, or co-evolution in biology) gets shaped by an *a priori* specification of variables and relationships that are deemed irrelevant and that must play no role in the final theory that emerges.

These “irrelevances” are known as the underlying “symmetries” or “invariances” of the theory. It is the specification of these symmetries that *cause* the resulting theory to be parsimonious, simple, and thus informationally less demanding than would otherwise be the case. At the deepest level, they capture the true meaning of “less is more.”<sup>3</sup>

<sup>3</sup> Quite literally, and astonishingly, the prior specification of the appropriate symmetries plays an important mathematical role in shaping the nature of the equations that embody the resulting theory. The branch of

**Origins of Good Theories:** Finally, where do very good theories come from? Usually they are the work of brilliant scholars, regardless of whether in economics, finance, physics, or medicine. Good theories usually have the property that they include predecessor theories as “limiting special cases.” Thus, Newton’s theory of gravity was not *replaced* by Einstein’s 1916 theory as is commonly assumed, but rather was *subsumed* by it—remaining a theory that works brilliantly in a very circumscribed set of circumstances. Likewise, the equations and predictions of classical Efficient Market finance remain nested within the new and more general theory of Rational Beliefs developed at Stanford University during the 1990s.

Given the paucity of great minds, it is no surprise that for every truly good theory in any subject, there will typically exist hundreds of poor ones. Given the importance of possessing good theories, how can an investment manager have access to good theories? The best way of gaining such access is to work with research shops whose professionals are trained in the ability to identify good theories, have a good track record in applying them, and are passionate about explaining them to others—*since explanation is usually needed*. As readers of these reports know only too well, this has been MiniMax’s principal mission from the start.

**Conclusion:** To conclude, an investment manager can successfully manage his information overload problem by availing himself of the right theories of the right subjects at the right time. They provide guidance as to which information matters and to how to interpret it, as well as to which information to ignore.

## **B. Adding Alpha and Sounding Smarter to Your Own Clients – Additional Dividends of Understanding and Utilizing Good Theories –**

Utilizing good theories pays two dividends above and beyond helping to resolve the information overload problem.

**Adding Alpha:** First, since theories are judged “good” because they work better, investors who utilize them will make better forecasts, will outperform others, and thus add alpha. This point is as simple as it is powerful. The fact that it is never made reflects the single greatest oversight in today’s investment management profession: The abject failure of information-and-model driven managers to understand the true power of *good* theories to generate superior forecasts and thus returns. The case studies cited in Part C below make this point all too clear.

They will also make clear an additional benefit stemming from the use of good theories. Since good theories must have a high degree of *explanatory* power (not mere descriptive power), their usage will permit an investment manager to claim: “Not only were we right in our bet, but we

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mathematics that is used here is the algebraic theory of symmetry groups. Moreover, a theory that is maximally parsimonious has the property that the number of equations that embody it must equal the number of independent parameters of the irreducible symmetry group underlying the theory (e.g., see Einstein, A., “A Generalization of the Relativistic Theory of Gravitation,” appearing in *Annals of Mathematics*, 46, 1945, p. 578, and Sachs, M., “On the Most General Form of a Field Theory from Symmetry Principles”, appearing in *Nature*, 226, 138, 1970, and Brock, H.W, 1992, op. cit.)

can demonstrate that we were right for the right reason.” This is a very powerful message for an investment manager who is attempting to market his services to others! Without the use of a good theory with explanatory power (the case of most statistically-based theories), no such claim can be made.

Importantly, it is good theories that determine which “models” should be used, which models should *not* be used—and why. If successful forecasts are made with a given model, the reason why lies in the underlying theory that generated the model in the first place. The converse is false. Yet most analysts trained in quantitative modeling will probably not understand what this assertion means. This reflects the sorry state of most courses in quantitative methods. These typically omit the all-important issue of “theory-versus-model” that clarifies the “contingent nature” of almost every model. Nor do such courses stress the role of non-stationarity in severely limiting the validity of most statistically-based models.<sup>4</sup>

This last omission explains why most “chaos theory” models constructed some fifteen years ago failed to pay off. Investment bank quants spent tens of millions of dollars to develop models now largely derided as costly white elephants that never worked. Anyone properly trained in theory construction would have foreseen this denouement—and we repeatedly warned clients about this at the time when “non-linear dynamics” was all the rage. The same critique can be levied against today’s obsession with data-mining and the willy-nilly use of time series analytics for anything and everything. The inductive logic utilized implicitly assumes the stationarity of the stochastic process generating the data. Such logic offers the wrong foundation for modeling a non-stationary world and for attempting to add alpha.

**Superior Communication with Clients:** A second dividend from understanding and utilizing good theories is the degree to which doing so permits an investment manager to communicate better with others, and sound smarter to them. If you are an investment manager today, then more than ever before, you are in the lifelong education business. Your clients (whether pension fund boards or wealthy individuals) increasingly look to *you* to explain what you are doing with their money, and why. Above and beyond this, your clients need help in assessing, “What is really going on? What should I be paying attention to, and how can I better read the tea leaves myself?” Any compelling answer to such questions will be based upon your own familiarity with theories that furnish a satisfactory explanation of what is actually going on. The more comfortable you are with such theories, the smarter you will sound.

One and two generations ago, education of this kind was not an issue. Most clients did not hear or care about economic and financial news. To begin with, there was little or no financial news on network TV, and network TV was all there was. Additionally, many clients had no incentive to learn about financial matters, since their most significant asset—their defined benefit pension plan—was managed for them by “professionals.” Finally, there was a “Father Knows Best” aspect to financial stewardship. Women of wealth, for example, were not supposed to involve themselves in such unlady-like matters as asking about the management of their money.

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<sup>4</sup> Blalock, Jr., Hubert M., *Theory Construction: From Verbal to Mathematical Formulations*, 1969, Prentice-Hall, Inc., Englewood Cliffs, NJ.

But today, everything has changed. The better your ability to explain the world and to justify your strategy to your clients, the better your business will be. This is an issue that is becoming as important as relative performance in gaining and retaining clients.

### C. Three Case Studies

It will be helpful to explain all of this by presenting some real-world examples as to how the utilization of good theories both helps to resolve the information overload problem, *and* to add alpha at the same time. All the examples are drawn from finance and economics, and each is directly relevant to the strategy problems of investment professionals:

**Example 1: Forecasting the Impact of Government Deficits on Inflation:** In forecasting inflation, do not focus on the size of the government deficit, as many analysts have done during the past three decades. For the size of the deficit is usually irrelevant to inflation. Specifically, government deficits only impact inflation when they are “monetized” (printed away). This has been the case in Zimbabwe during the period of 2003–2007, when classical money printing caused the inflation rate to soar to today’s level of 1800%. But this was *not* the case in either Japan or the US during this same period. Large deficits were not monetized, and inflation remained low despite the deficits.

There is one exception to what has been asserted here. Suppose that the deficit rises at a time that the economy is running at full throttle. Then increased government spending, not offset by higher taxes, will “overheat” the already full employment economy and will cause demand-pull inflation. The most notable example of this phenomenon in the US was the overheating of the economy and thus of inflation during the Vietnam War. Indeed, the policies of that era became known as “guns-and-butter” policies because of the implicit assumption that you could have more of both without anyone being taxed to pay for it all.

The important point here is that investment professionals attempting to forecast inflation and hence bond prices and monetary policy can benefit from good theories. For these theories specify which variables are worth tracking, *and* what the true interrelationships are between such relevant variables. Good theories lead to fewer mistakes, better forecasts, and higher returns.

**Example 2: Forecasting Long-Term Equity Returns:** In forecasting *long term* stock market returns, do not overestimate the importance of earnings and interest rates, as is tempting given the emphasis on these twin variables in the media. For the truly important variable is the *valuation* of earnings (e.g., the P/E ratio of the market). This tends to move in long-cycles from a low value of about 9 to a high of about 25, and back. As investor Warren Buffet has correctly pointed out, valuation cycles of this kind are by far the most important determinant of longer-run equity returns. However, most investors ignore this critical variable which is rarely in the news.

This misunderstanding has caused great confusion within asset allocation theory. As was stressed in Cred-Intel’s September 2004 essay, “A Reconstruction of Portfolio Theory,” the static portfolio theory of Markowitz will only be correct in a “no memory” or “random walk” environment in which there are no valuation cycles at all—indeed no predictable patterns at all to

be exploited. When the stochastic process of market returns is *non-i.i.d.* (e.g., the market has “memory” and there are cycles, as everyone agrees is the case), then as Paul Samuelson showed decades ago, no optimal fixed portfolio can exist.<sup>5</sup> Rather, what is needed is an optimal strategy which indicates which portfolio is optimal when.

An optimal strategy of this nature can be determined by stochastic dynamic programming, and it will generate *far more return per unit of risk* than those prescribed by classical portfolio theory—just as a farmer who recognizes the existence of seasons and who therefore rotates his crops, will earn much greater returns than one who pretends there are no seasons, plants one mix of crops for all seasons (the equivalent of a Markowitz optimal portfolio), and predictably goes bankrupt.

Our 2004 paper also shows that from this more general perspective, traditional concepts of “rebalancing” are problematic since there is no “fixed optimum” towards which to rebalance. We furthermore show that, properly understood, there is no difference between tactical and strategic asset allocation. For via Bellman’s Principle of Optimality in dynamic programming, optimal strategic and tactical allocation are necessarily one in the same.

**Example 3: Forecasting the Behavior of Future Asset Prices:** In forecasting asset returns, do not pay much attention to all the daily news on your Bloomberg about savings rates, government deficits, and foreign capital inflows. For as James Tobin of Yale taught us decades ago, what matters most to interest rates are not these “flow-of-funds” variables that are always in the news, but rather the way in which people who own the total “stock-of-wealth” from time to time choose to *redeploy* their assets.<sup>6</sup> For example, total household net worth in the US is now about \$55 trillion. A stock-of-wealth reallocation of some \$8 trillion out of housing or equities and into bonds will depress bond yields, and in doing so will *swamp* the upward pressure on yields from a \$40 billion reduction in the domestic savings rate, or from a \$60 billion reduction in Asian central bank purchases of US securities.

*But this is rarely pointed out, and investment professionals thus waste time and money attempting to forecast a host of flow variables about which “news” is perpetually available—but of very limited usefulness. They fail to focus and obtain information about the right variables (and there are usually very few of these), and they obtain masses of “information” about the wrong variables. Still worse, they then usually misinterpret the data they have culled given the absence of a valid theory with which to properly interpret the true drivers of asset price changes. This is the crux of the information overload problem.*

**Postscript:** This stock/flow distinction we have stressed is not merely academic. For example, it largely explains the paradox of very low bond yields in recent years widely known as the “Greenspan Conundrum,” as we have stressed in our own prediction and explanation of low

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<sup>5</sup> Samuelson, P., “Lifetime Portfolio Selection By Dynamic Stochastic Programming”, *The Review of Economics and Statistics*, Vol. 51, No. 3 (Aug., 1969), pp. 239-246.

<sup>6</sup> Tobin, J. and Brainard, W.C. “Pitfalls in Financial Model Building”, in *American Economic Review*, 58, 2, May 1968, pp. 99-122.

bond yields during the past four years. Investors first became disenchanted with equities around 2001 (hence the 45% drop in the P/E ratio of the broad US market since then), and are now becoming disenchanted with real estate. With nowhere else to go, aging baby-boomers, increasingly desperate for yields in a no-defined-benefit pension environment, have been investing in annuities and other types of fixed income securities. The result: Bond yields have been driven down *despite* soaring oil prices, soaring Fed funds rates, a healthy economic upturn, etc.

### Conclusion of Essay

Good thinking pays. Good thinking is based on the utilization of good theories—and rarely upon mindless data-mining. Good theories, in turn, lead to the correct resolution of the information overload problem. They help investment professionals reap greater alpha. Finally, they help managers sound smarter and more compelling to their own clients. How could markets possibly be “efficient” in any meaningful sense of the word if this message is not understood by the vast majority of investors? Well, most everyone now concedes that markets are not—even the founders of the Chicago school. And, as a corollary, should anyone who derides serious theory be taken seriously?

From its inception, Cred-Intel’s and MiniMax’s approach to investment management has been an antidote to this sorry state of affairs. From the start, we have attempted to identify which theories are good theories and why, and which information therefore does matter. Our forecasts are based upon these. The only new insight to us is the role that this enterprise can play in resolving the information overload problem, the principal thrust of the present essay.

### Forthcoming Topics in *The MiniMax Review*

- Inflation on Wall Street versus Inflation on Main Street
- An Arbitrage Bet on Commodity Prices
- The Truth About Globalization
- A Logical Justification for Active Investment Management—A Wholly New Logic
- Paradoxes of Globalization and Social Insecurity
- Emerging Markets Overshoot—the Important Role of “Model Uncertainty”
- Widespread Confusion about “Risk Appetite”
- US Economic Forecast and Risk Assessment (with special focus on Energy, CAPEX, Productivity, Inflation, and Earnings)

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