DOI : 10.21111/jocrise.v3i02.79
Received : November 30th, 2024
Revised : November 30th, 2024
Accepted : Januari 24th, 2024

jocrise
Journal of Critical Realism in Socio-Economics
P-ISSN: 2964-2930 | E-ISSN: 2964-3317
Vol. 03, No. 02, January 2025

Pascal's Wager and Theory-Induced Blindness

Joseph Mark Haykov
Arbitrator of RBC Capital Markets and Free Lancer
Financial Specialist, United States
joe@hh-research.com

Abstract:

Pascal's Wager asserts that, based on the descriptions of God in the Bible, an individual is better off believing in the New Testament God than not. This God, referred to as Yahweh in the Torah and as Allah in the Quran, provides a consistent concept of the Biblical God across these texts. Pascal suggests that the hypothesis that the Biblical God is real could turn out to be true. According to the New Testament, Torah, and Quran, it is more beneficial to believe in God than not. From this shared viewpoint, belief leads to heaven, while disbelief, by definition, does not result in heavenly rewards. However, Pascal's Wager has historically not been taken seriously due to theory-induced blindness. This paper explores this concept in more detail. This paper explores theory-induced blindness as a cognitive bias that influences rational decision-making, particularly in religious and philosophical contexts. By examining its foundations in cognitive psychology, mathematical logic, and set theory, this study highlights the role of implicit axioms in shaping belief systems. It further critiques the dual-hypothesis approach of Pascal's Wager and discusses its limitations. Through interdisciplinary analysis, this paper demonstrates how unrecognized assumptions can distort logical reasoning, thereby questioning the validity of Pascal's proposition and its broader implications in decision theory.

Keywords : Pascal's Wager; Theory-Induced Blindness; Cognitive Bias; Rational Decision-Making

Introduction

A Short Overview of Theory-Induced Blindness

Theory-induced blindness is a cognitive bias—a form of irrational behavior—described by Daniel Kahneman in his 2011 book, *Thinking, Fast and Slow*. Instead of summarizing the concept, here is a direct quote from Kahneman:

"The mystery is how a conception of the utility of outcomes that is vulnerable to such obvious counterexamples survived for so long. I can explain it only by a weakness of the scholarly mind that I have often observed in myself. I call it theory-induced blindness: once you have accepted a theory and used it as a tool in your thinking, it is extraordinarily difficult to notice its flaws. If you come upon an observation that does not seem to fit the model, you assume that there must be a perfectly good explanation that you are somehow missing. You give the theory the benefit of the doubt, trusting the community of experts who have accepted it."

Understanding cognitive biases requires recognizing that rationality necessitates the use of what is known in mathematics as a "formal system" to arrive at correct logical conclusions based on a set of underlying axiomatic assumptions or hypotheses about reality. A "formal system" is used to prove theorems in mathematics, as formally defined by Kurt Gödel in his 1931 paper that proved the first incompleteness theorem. A "formal system" refers to a set of logical statements—theorems—derived from a set of underlying axioms using formal rules of inference. In any formal system, statements such as 2 + 2 = 4 in arithmetic are guaranteed to be true as long as the axioms hold, both in theory and in reality. All mathematics operates as a tautology, where theorems such as Fermat's Last Theorem are not independent logical claims but are already embedded in the axioms, waiting to be logically deduced.

What guarantees the accuracy of proofs in mathematics is their complete independent verifiability. For instance, mathematically literate individuals have independently proven the Pythagorean Theorem, demonstrating that such a proof cannot be false. Because of its independent verifiability, we can be confident that the Pythagorean Theorem is true in reality if the underlying axioms, such as the Euclidean assumption that the shortest distance between two points is a straight line, hold true. However, if this condition does not hold in reality, then the Pythagorean Theorem no longer applies.

For example, in reality, the shortest distance between two points is not a straight line. If it were, the GPS on your cell phone would not function accurately, as it relies on Riemannian geometry, which aligns with Einstein's description of curved space-time, to determine your position. In Riemannian geometry, as in reality, the shortest distance between two points is not a straight line, which is why the Pythagorean theorem does not hold true in this shared objective reality. This deviation is due to time dilation effects, among other factors, as evidenced by the fact that clocks on GPS satellites must run at a different rate than clocks on Earth to account for these relativistic effects.

This illustrates that truth in any formal system is invariably dually defined: a claim can be true in theory but false in reality, and vice versa. For example, in algebra, the claim that 2 + 2 = 5 is universally false, both in theory and in reality, yet the claim that 2 + 2 = 4 holds universally true in algebra theory. However, it is logically deduced from Peano's axioms of arithmetic, including Peano's fifth axiom—the induction principle—which posits that there are infinitely many natural numbers, or countable objects. Thus, in reality, 2 apples + 2 apples = 4 apples, and 2 moons of Jupiter + 2 moons of Jupiter = 4 moons of Jupiter. However, 2 moons of Mars + 2 moons of Mars = undefined (or maybe 2?) since Mars in reality only has 2 moons, which violates Peano's fifth axiom. Therefore, "2 + 2 = 4" does not always hold true in reality.

Theory-induced blindness is fundamentally not caused by the theory itself but by a false implicit assumption embedded in an axiom—an initial hypothesis—accepted as true. This flawed theory is then logically deduced from the false axiom. While the blindness appears to stem from prolonged use of the flawed theory, its true origin lies in the false axiom underpinning the logically derived claims. We subconsciously confuse axioms, which are accepted without evidence because they are deemed "self-evidently" true and can therefore always turn out to be false in reality, with empirical evidence or facts, which are independently verifiable and cannot turn out to be false.

Kahneman further elaborates on this point in his discussion of Bernoulli's flawed theory:

> "The longevity of the theory is all the more remarkable because it is seriously flawed. The errors of a theory are rarely found in what it asserts explicitly; they hide in what it ignores or tacitly assumes."

This quote highlights Kahneman's perspective, emphasizing that the root cause of theory-induced blindness lies in the implicit assumptions underlying a theory's axioms, leading to a flawed understanding of human action. This blindness results from failing to recognize that every long-standing scientific theory is logically derived from a set of axioms. Unless there are errors in deductive logic, such a theory cannot contradict reality unless one of the axioms is false. Logical deductions, like mathematical theorem proofs, are independently verifiable for correctness. Therefore, a theory can only be false in reality if one of its axioms is false. Until the false axiom—

such as Daniel Bernoulli's erroneous assumption about risk—is corrected, the flawed, blindness-inducing theory will not accurately describe reality. This is similar to the situation in the famous Russian song "Murka," where the fact that "too many gang members are being arrested" proves beyond a doubt that there is a traitor. Until the traitor, named "Murka," is eliminated, the compromised gang cannot operate efficiently. Just as a gang cannot operate optimally with a traitor, until a false axiom is eliminated from a flawed theory, such a theory will never work efficiently in reality because it is based on a false assumption.

Quoting Daniel Kahneman from the book again: "If you come upon an observation that does not seem to fit the model, you assume that there must be a perfectly good explanation that you are somehow missing." It is precisely this false assumption—that "there must be a perfectly good explanation that you are somehow missing"—that causes the blindness. There is no such perfectly good explanation, barring the only possible real explanation: one of your axioms is false, and until you figure out which one, using a theory that is a priori known to be flawed is a singularly bad idea that can lead to disaster.

Formally, theory-induced blindness is a cognitive bias whereby people irrationally continue to use flawed theories, falsely believing that there is a phantom "good missing explanation" as to why their theory is false in reality. No such "good missing explanation" exists, barring a flaw in one of the axioms. By not fixing a flawed axiom, one allows laziness to prevail. In this sense, theory-induced blindness is simply intellectual laziness, with the brain subconsciously shirking the "slow, expensive, System 2 work" it knows it will have to do to correct the flawed axiom and re-derive the correct theory. The brain is lying, telling us: "Don't worry about the false hypothesis; there is a perfectly good explanation for it," though no such perfectly good explanation exists in reality. Theory-induced blindness is simply intellectual laziness.

Therefore, for the purposes of this discussion, and in general, we propose renaming this cognitive bias as assumption-induced blindness (AIB). While the blindness is induced by using a false theory, it is caused by relying on a false assumption-dependent axiom from which the flawed, blindness-inducing theory is correctly logically deduced. We confuse the guaranteed certainty of the error-free nature of logical deduction with the error-prone nature of axioms—hypotheses that are accepted as being "self-evidently true" to whoever is using them and that could always turn out to be false in reality—and often do. For example, the axiom of separation in ZF set theory, which posits as an axiom that any set consisting of two elements can be split up into two different subsets, each containing one of the elements, does not hold true in reality when set elements are entangled photons. Here, the word "entangled" in reality means inseparable; thus, Bell's Inequality, which holds true in ZF set theory, does not hold true in reality, as evidenced by the 2022 Nobel Prize in theoretical physics, awarded for its empirical falsification.

Findings and Discussion

Pascal's Wager

Pascal's Wager implies that there are only two possible real-world outcomes: either God exists, or God does not exist. The fact that only these two hypotheses are considered is precisely the blindness-inducing false assumption: that in reality, there are only two possible outcomes. This falsely restricted dual hypothesis approach is why the wager has never been taken seriously. In reality, we must consider the variable N—the number of gods—which is not limited to 0 or 1 but could be any natural number, including infinity, according to Peano's fifth axiom, the principle of induction. This perspective is consistent not only with the polytheistic views found in Greek mythology and the Bhagavad Gita but also with a multitude of other religions.

This means that belief in Yahweh must also include disbelief in all other "false" gods, such as Baal from the "Golden Calf" episode in the Torah. We note in passing that disbelieving is very hard work—a concept discussed in depth in Kahneman's book. The first commandment states, "You shall have no other gods before me," with "other gods" clearly referring to the existence of other gods. However, according to the Bible, the only path to "heaven" is through a covenant with Yahweh, also called Allah, the only "true" God.

Having addressed this false assumption, let us consider Roger Penrose's hypotheses regarding universal consciousness and quantum effects. This concept resonates with Hermeticism, which posits that God is the "All" in whose mind we exist, akin to the quantum field in modern physics, where everything is entangled, resulting in "spooky action at a distance."

"Spooky action at a distance" is a term Einstein used to describe quantum entanglement, a phenomenon he found perplexing because it seemed to imply that God was playing dice with the universe—a notion Einstein famously rejected. However, what made Einstein world-famous was his equation E=mc2. This equation, as we are about to show, can be understood within the framework of Pareto efficiency in mathematical economics. Pareto efficiency describes a state in which resources are optimally allocated, maximizing labor productivity and total welfare under "perfect trade" conditions. These conditions parallel the "fair trade" scenario that would result if everyone strictly adhered to the Ten Commandments, as suggested in the Torah. According to the First Welfare Theorem in the Arrow-Debreu framework of mathematical economics, a Pareto-efficient equilibrium in which both welfare and productivity are maximized is guaranteed in a perfect market.

Efficiency Requires Unfettered and Symmetrically Informed Exchange

It is an evidence-based claim, independently verifiable for accuracy, and therefore one that cannot turn out to be false, that any parasitic infestation, such as locusts or vermin like rats eating grain stored in a warehouse, directly reduces efficiency. In reality, the consumption of real-world goods and resources by "economic parasites" often results from involuntary exchanges, such as robbery, theft, extortion, and kidnapping. All such obviously criminal activities are universally punishable by imprisonment due to the fact that "unearned wealth extraction" by "economic parasites" inevitably reduces economic efficiency. For example, due to lawlessness, the per capita GDP in Haiti is five times lower than that in the neighboring Dominican Republic. This real-world inefficiency, as measured by a fivefold difference in real-world per capita GDP, results from the direct violation of the unfettered trade assumption, a condition necessary for achieving Pareto efficiency.

According to the first welfare theorem of mathematical economics, any violations of two key conditions of unfettered (meaning fully voluntary) and symmetrically informed exchange inevitably result in real-world inefficiencies. George Akerlof pointed this out in "The Market for Lemons" in 1970, where he showed that the presence of asymmetric information in real-world trade inevitably results in market inefficiencies. This is exemplified by the unearned wealth extraction by a fraudulent used car dealer sticking a less-informed (or asymmetrically informed) buyer with a broken-down car, known as a "lemon." This means that in order to achieve any kind of real-world efficiency, trade must be fully voluntary and symmetrically informed.

Of course, a clear violation of real-world market efficiency is the existence of arbitrage in the foreign exchange, or Forex, market. This type of arbitrage allows one to earn wealth simply by trading currencies – which today occurs simply by pressing buttons on a computer and doing nothing else – without participating in the production of goods and services consumed with this wealth. It is the very definition of unearned wealth extraction through the use of asymmetric information about currency prices at different banks.

No-Arbitrage Constraint on E: The Transpose of Its Own Hadamard Inverse

Our discussion begins with an analysis of the Forex market. In the real-world FX market, approximately $n=30$ of the most actively traded currencies are exchanged, and their exchange rates can be mathematically represented as an exchange rate matrix, denoted as E. In this matrix, the value in row i and column j represents the exchange rate from currency i to currency j. This matrix serves as a model for understanding how exchange rates between not only currencies but also all goods and services that can be bought or sold in an arm's length commercial transaction in an economy are structured to prevent arbitrage—the very definition of a market failure.

Arbitrage, by its very nature, is not possible if a uniform price is maintained for an asset in different markets. Specifically, in the foreign exchange market, if the exchange rate of currency A to B is set, then it must be the reciprocal of the exchange rate of B to A. For example, if $1 buys £0.50, then £1 should buy $2. This reciprocal relationship is crucial to eliminating arbitrage opportunities arising from exchange rate discrepancies. Let the matrix E represent a set of exchange rates, such as those observed between the 30 or so currencies in the FX market, where n, the number of rows and columns, would be 30. The no-arbitrage condition dictates that E must be equal to its own transpose once the Hadamard inverse is applied. Mathematically, the exchange rate matrix is constrained as follows: [E=e_(i,j)]=[1/e_(j,i) =E_T]. This condition, where the matrix becomes the reciprocal of its own transpose under the $E=ET$ "no-arb" constraint, is very similar to the property of a matrix being involutory, where an involutory matrix is its own inverse, *A=A-1*.

Let us formally refer to such matrices as 'evolutory', rather than involutory. An evolutory matrix *E*, is equal to its own reciprocal transpose, *ET* constrained such that *ei,j=1÷ej,i*. The reason for the distinction is that while *A·A-1=I* (the identity matrix), *E·ET*=E2=*n·E*=(*ET·ET*)*T. We note in passing that E·ET*, *and ET·E, do not multiply to form* n·*E, but result in two other matrices.*

As we can see, the evolutory matrix, when multiplied by its-own reciprocal transpose, results not in the identity matrix but rather a scalar multiple of *E* scaled by its row count, *n* effectively becoming *E2*. The reason for this is that the constrained matrix *E=ET* has a single eigenvalue, which is also its trace, and is invariably equal to *n*, due to the fact that the exchange rate of a currency with itself is, by definition, always 1.

By imposing the *E=ET* condition, the matrix E simplifies, having only a single eigenvalue, *n*, and reducing to a vector-like structure. This simplification occurs because each row or column of *E* can define the entire matrix, dramatically reducing the dimensionality of the information required to quote exchange rates. For example, the entire matrix *E* is equal to the outer product of its first column and its first row, which also happens to be the reciprocal of the first column, producing the full matrix. Consequently, each row or column of *E* is proportional to the others, meaning that all rows or columns are scalar multiples of one another. This characteristic renders *E* a rank-1 matrix, indicating that all of its information can be captured by a single vector.

What is interesting here is that in theory, an unbounded matrix raised to the fourth power should have four roots, but in reality, because of the *E=E*T constraint, the matrix *E* has only two such fourth roots, *E* and *E*T because *E*4=*E·E·E·E*=(*E*T·*E*T·*E*T·*E*T)T. We believe it is worthwhile to highlight what might be an obvious connection. In the context of Einstein's equation *E=mc2*, if *E* is a bounded *E= ET* matrix, then *E4*=n2·*E*=m·*c2*. Here, mass is simply the fourth root of energy.

However, while *E* theoretically has four roots, in reality, only two roots exist due to the *E=ET* evolutory constraint imposed on *E* via quantum entanglement. Thus, under this evolutory constraint on *E*, mass is equivalent to energy but exists as a strictly constrained subset of all possible energy states, restricted by the *E=ET* condition imposed on *E*.

While this remains purely conjectural, it intriguingly aligns not only with the principle of supersymmetry in theoretical physics but also, surprisingly, with the ancient Hermetic axiom 'as above, so below.' This concept also echoes the geometry of the Egyptian pyramids and is reminiscent of the notion that '42' is the 'answer' to the ultimate question of life, the universe, and everything, as humorously proposed in The Hitchhiker's Guide to the Galaxy. Although this reference is not directly related to quantum physics, it touches on probability.

At this point, we must caution that our expertise in theoretical physics is limited to interactions with physicist colleagues during our tenure managing the stat-arb book at RBC on Wall Street. Therefore, please treat our comments about physics with considerable skepticism, particularly the ideas about quantum set theory outlined below, which are purely speculative. This may assist a physicist who is not on Wall Street, unlike those making real money at hedge funds such as Renaissance, founded by the late Jim Simons.

In a matrix that simplifies to a vector-like structure, the entirety of the matrix can be described by any of its rows or columns. Here's what happens in such a scenario:

1. Instead of needing to know all elements of a matrix (which in a full matrix would be $n \times m$ values), you only need to know the elements of a single vector (either n or m values, depending on whether it's a row or a column vector). This drastically reduces the dimensionality of the information required.

2. This vector represents a form of data compression, where instead of storing or processing multiple independent pieces of information, one vector informs the entire structure. This simplification could improve the efficiency of computations and analyses involving E.

3. Extending this idea to a theoretical framework, especially in contexts like quantum mechanics, can lead to intriguing possibilities:

4. In quantum mechanics, states can be superposed and entangled. A matrix that simplifies to a vector-like structure might analogously suggest a system where states are not independently variable but are intrinsically linked—a form of quantum entanglement at a mathematical level.

A new set theory that models such matrices could consider sets where elements are fundamentally interconnected. Traditional set theory deals with distinct, separate elements, but this new theory could focus on sets where elements are vector-like projections of one another.

Such a theory could be useful in fields like quantum computing or quantum information, where understanding entangled states in a compressed, simplified form could lead to more efficient algorithms and a better understanding of quantum systems.

By utilizing a matrix that reduces to a vector-like structure as a basic element, we could potentially model a system where traditional notions of independence between elements are replaced by a more interconnected, entangled state representation. This could open new avenues in both theoretical and applied physics, especially in handling complex systems where interdependencies are crucial.

We note in passing, as illustrated here in this video from MTI online lectures, the axiom of separation from ZF set theory is used to derive Bell's Inequality. At approximately the 1 hour and 15 minute mark, the lecturer uses the axiom of separation, for example, to split up the set $N(U,\neg B)$ into $N(U,\neg B,\neg M)$ and $N(U,\neg B,M)$ In this particular case, when set elements are pairs of entangled particles, the axiom of separation does not work, simply because such a set cannot be split up into two separate subsets. That is what "entangled" means in reality – "inseparable." However, if we replace set elements with vectors that are all entangled on account of being constrained by $E=ET$, we may—with hard work that no one in their right mind would do for free—develop a better set theory that will more accurately model quantum entanglement, akin to the way Riemannian geometry was derived from a set of axioms that more accurately reflect the reality of how curved space-time actually operates.

The Role of Linear Algebra in Market Efficiency

As mathematical economists, we find that the linear algebra formulation captures the essential idea that in an arbitrage-free market, the reciprocal relationships between exchange rates of different currencies, as well as all goods and services, must be consistent. An arbitrage-free exchange rate matrix E, such that ET=E (since it is equal to its reciprocal transpose), imposes constraints on exchange rates, eliminating opportunities for arbitrage by simply transposing and reciprocating the exchange rate matrix.

In this framework, prices represent the exchange rates of all goods and services relative to a single specific row or column in the full exchange rate matrix E, chosen as the unit of account. This framework supports the theories of Arrow and Debreu and is even, surprisingly, consistent with the ideas of Marx. Indeed, the key role of money is to regulate markets by preventing arbitrage, by acting as a single unit of account in which the prices of all other goods and services available for sale are expressed, precluding the existence of multiple prices for the same asset, which inherently facilitates arbitrage.

This is vividly illustrated by the real-world practice of quoting all currencies in the foreign exchange (FX) market against a single standard currency, currently the U.S. dollar, which plays a pivotal role in reducing the scope for arbitrage, thereby nudging the market toward an ideal no-arbitrage condition. By standardizing currency pairs relative to the dollar, there is greater predictability and consistency in exchange rates. This systemic approach effectively minimizes the discrepancies and gaps that arbitrageurs typically exploit, leading to a more stable and equitable trading environment.

While the application of linear algebra might often seem excessive in financial contexts, its use in this scenario is particularly warranted. Viewing the prices of goods and services through an exchange rate matrix effectively underscores money's role strictly as a unit of account. In the real-world FX market, where all currencies are traded in pairs, cross rates for pairs such as EUR/GBP or EUR/JPY are determined using the U.S. dollar solely as a unit of account. This approach not only emphasizes the functional use of money exclusively as a unit of account but also highlights the practical utility of quoting all prices relative to a single standard asset. Adopting this methodological choice significantly enhances market efficiency by increasing information symmetry among participants and reducing arbitrage opportunities, thereby establishing consistent prices for each asset across all markets.

Diminishing Productivity Through Arbitrage

Arbitrage diminishes productivity because it allows a non-producing arbitrageur, X, to consume goods and services produced by others without contributing to their production. X earns money by facilitating a trade between A and B that should have occurred directly between them in a more efficient market with symmetric information. The fact that both parties placed open orders to buy and sell, which did not cross due to X's speed, highlights this inefficiency. We posit that losing half the bid-ask spread is not worth having your trade executed 2 milliseconds earlier for 99.999% of the public.

Consider two scenarios: one with and one without the presence of arbitrageur X, who acts as an unwanted intermediary preventing A and B from trading directly. In the absence of X, all trades occur at the mid-quote. However, if X is present, some trades occur at the bid and others at the offer. In other words, the difference between E and ET becomes greater in the presence of X, as this bid-ask bounce volatility represents the "alpha" that X earns.

This highlights that the root cause of market inefficiency, defined by arbitrage in terms of prices, is the existence of multiple prices for the same asset. This is exemplified by the ability to buy at the offer and sell at the bid, instead of consistently trading at the mid-quote. Within the framework of the exchange rate matrix E, this inefficiency can be quantified as the difference between E (ask or bid) and ET (mid-quote), multiplied by the trading volume. In this scenario, the calculation equals the profits earned by the arbitrageur (half the bid-ask spread), down to the penny.

Not every trade in reality is facilitated by an arbitrageur. However, we can approximate ET by the Volume Weighted Average Price (VWAP) for the period we are examining, subtracting it from the price of each executed trade, using the fill price as E (ask or bid). What we are doing here is "collapsing the wave function"—averaging out all the different E matrices over time, thereby producing an estimate of the value of ET. When we measure Pareto efficiency this way, it becomes clear that the more volatile the prices, the greater the difference between E and ET, and the less Pareto efficient the market.

Beyond arbitrage, other types of unearned wealth extraction occur in the economy, as exemplified by agency costs and economic rents in public choice theory. However, the role of profits in this context is often overlooked. While Karl Marx's theory correctly states that corporate profits measure Pareto efficiency, it also has a flaw: it equates corporate profits with "economic rents"—an idea that is both theoretically and factually inaccurate.

For Marx's theory to be true, the employer must have asymmetric information about the labor being provided to cheat the worker and extract economic rents. This would apply to extracting value from any counterparty in free trade, such as selling labor for wages in a free market economy. However, this is impossible. In reality, any such "surplus"—i.e., "unearned or fraudulent" extraction of value—can only flow in the other direction, from employer to employee, as illustrated by agency costs. This is because the employee is always better informed than the employer about the labor they produce.

Setting aside the bug that equates corporate profits with rent-seeking, we see that corporate profits measure the relative Pareto efficiency of an economy, given existing production constraints. In this sense, higher economic profits – net of all opportunity costs, including the opportunity cost of capital – indicate a less Pareto-efficient economy. While the bid-ask bounce for most commodities is relatively low, this is not the case for labor. The difference between the price at which you sell your labor to your employer and the price at which your employer effectively re-sells your labor to the end user (consumer) is measured by the economic profits the employer earns, adjusted for all opportunity costs. Here, E−ET for labor measures the bid-ask spread on wages and is always rank-order correlated with "excess" corporate profits.

Moreover, if you think about it for a moment, it becomes clear without any math: price volatility is bad. Why do we still use the imperial system of units in the U.S., even though the metric system is easier to use, given that we use a base 10 system for math and the scales are better aligned than in the imperial system? The reason is obvious: once we get used to a system of imperial units as a unit of account, it becomes uniquely difficult to switch to metric.

Imagine how inconvenient and difficult it would be to measure exchange rates with a ruler whose length is constantly changing, as the spendable money supply, like M2, keeps fluctuating. Imagine switching from metric to imperial and back to metric, as the units in which prices are quoted and measured—both absolute and relative—keep changing. Additionally, some prices, like wages, tend to be stickier than others, such as gasoline prices, further destabilizing relative prices during inflationary or deflationary periods.

It's important to point out that money, as a unit of account, measures not only absolute prices but also relative prices. When the money supply becomes prone to inflation and unpredictable, it becomes a poor unit of account. No wonder price volatility is bad for market efficiency. This is why all central banks fear deflation worse than death and vigorously fight inflation at the same time, aiming to keep prices stable. We are not saying anything new here.

This mathematically illustrates, with absolute precision, exactly why price volatility, as measured by inflation and deflation, is detrimental to the economy—an obvious fact now mathematically proven, rather than merely a hypothesis. This is also why Bitcoin is worth over a trillion dollars.

Measuring Pareto Efficiency

Minimizing firm profits in the absence of externalities—such as rent-seeking, barriers to entry facilitating monopolies, and negative externalities like pollution—is counterproductive. In an efficient market, the development of innovative patented technologies inevitably generates excess profits that benefit society, assuming no theft. The key is to eliminate other inefficiencies, such as rent-seeking, agency costs, theft, robbery, extortion, and asymmetric information, as these always facilitate cheating by rational cost minimizers.

How should that surplus be split between consumers and producers? Ideally, a 50-50 split is optimal. If we switch the roles of individuals as consumer-producers, under the principles of information symmetry and rational behavior, and assuming you don't know which side you will end up on—buying or selling—how would you set the price? A 50/50 surplus split, at the mid-quote, is where the derived subjective utility is equal for both parties. Thus, the midpoint is the optimal point, where the economy operates with maximum Pareto efficiency, minimizing unearned wealth procured by non-producing arbitrageurs—or economic parasites—as described by Lenin.

The end result is the same, regardless of whether arbitrage takes place in space or time. This becomes evident by "collapsing the wave function," comparing E to its reciprocal transpose E_T, and observing the differences. Whether unearned wealth is extracted via asymmetric information in space or time, the end result is mathematically identical: real-world inefficiency. Therefore, true economic efficiency is measured by three parameters:

1. The difference between E and E_T, multiplied by real GDP.
2. The extent to which unfettered exchange is permitted.

3. The extent to which symmetric information is available.

That's how one could measure market efficiency, beyond simply looking at real GDP growth—as an alternative real-world measure. And finally, to find out how theoretical physicists may be paid for doing research on quantum set theory by using one-true money backed by patents, please visit us at tnt.money. Just type "tnt. money" into your browser, and hit Enter.

Meanwhile, Einstein was wrong. God does play dice with the universe, just loaded dice, loaded in a way such that God always wins in the end, because everything is entangled and therefore Pareto-efficient and balanced in the long run—ensuring that, in time, everyone gets their comeuppance, giving back everything they stole. In this reality, no matter what, E always equals ET! Isn't that what the restated E=mc2 says: E4=ET·c2?

Conclussion

This paper has examined the intersection of Pascal's Wager and theory-induced blindness, revealing how deeply embedded assumptions can obscure critical perspectives. Pascal's argument, while historically dismissed, serves as an illustrative case of how a flawed foundational assumption—in this case, the binary nature of belief in a single deity—can shape and constrain discourse. The broader implications of theory-induced blindness, as conceptualized by Kahneman, demonstrate that cognitive biases are not necessarily the product of irrationality but rather the result of entrenched axioms that are implicitly accepted as self-evident truths.

The analysis further extends into mathematical formalism, demonstrating how truth in theoretical constructs can diverge from empirical reality, as seen in the application of Gödel's incompleteness theorem and the limitations of formal systems. This reinforces the idea that theoretical models, whether in economics, physics, or theology, are only as valid as their underlying assumptions. By addressing these false premises, it becomes possible to refine and evolve theoretical frameworks to better align with observed reality. Ultimately, this study underscores the necessity of a critical approach in evaluating long-standing theories, advocating for intellectual rigor in questioning deeply held assumptions. In doing so, it highlights the importance of maintaining epistemic flexibility, recognizing that our understanding of truth is contingent upon the validity of the axioms upon which our theories rest.

Reference

Adams, D. (1979). The Hitchhiker's Guide to the Galaxy. Pan Books.

Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. The Quarterly Journal of Economics, 84(3), 488–500.

Arrow, K. J. (1951). An extension of the basic theorems of classical welfare economics. In Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability (pp. 507–532). University of California Press.

Arrow, K. J., & Debreu, G. (1954). Existence of an equilibrium for a competitive economy. Econometrica, 22(3), 265–290.

Aspect, A., Clauser, J. F., & Zeilinger, A. (2022). [Awarded for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science]. Nobel Prize in Physics. NobelPrize.org.

Bell, J. S. (1964). On the Einstein Podolsky Rosen paradox. Physics Physique Физика, 1(3), 195–200.

Einstein, A. (1905). Does the inertia of a body depend upon its energy content? Annalen der Physik, 323(13), 639–641.

Einstein, A. (1916). The foundation of the general theory of relativity. Annalen der Physik, 354(7), 769–822.

Einstein, A., Podolsky, B., & Rosen, N. (1935). Can quantum-mechanical description of physical reality be considered complete? Physical Review, 47(10), 777–780.

Euclid. (circa 300 BCE). Elements.

Gödel, Kurt. "Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I." Monatshefte für Mathematik und Physik 38 (1931): 173-198.

Guillemin, V., & Sternberg, S. (1984). Symplectic Techniques in Physics. Cambridge University Press.

Kahneman, D. (2011). Thinking, Fast and Slow. Farrar, Straus and Giroux.

Pascal, B. (1670). Pensées. [Original publication in French].

Peano, G. (1889). Arithmetices principia, nova methodo exposita. [Reprinted in: van Heijenoort, J. (Ed.). (1967). From Frege to

Gödel: A Source Book in Mathematical Logic, 1879-1931 (pp. 83-97). Harvard University Press].

Penrose, R. (1989). The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics. Oxford University Press.

Wiles, A. (1995). Modular elliptic curves and Fermat's Last Theorem. Annals of Mathematics, 141(3), 443–551.

Zermelo, E. (1908). Untersuchungen über die Grundlagen der Mengenlehre I. Mathematische Annalen, 65(2), 261–281.