Chance favors the prepared mind.
Louis Pasteur

ONE

From Religion to Risk Management: What to Do When Facing Uncertainty?

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Which shows how societies dealt with uncertainty and risk when their population was small and immobile, and when it grew; why traditions and customs can be wisdom, but often become wrong when circumstances change.

Thomas Jefferson called the lottery a "wonderful thing: It lays taxation only on the willing." In one sense, Jefferson's statement is erroneous. After all, taxing tobacco and pornography implies that the tax is imposed only on those willing to smoke or to watch. Yet these actions do not necessarily turn indulging in either act into a wonderful thing.

Jefferson's statement may be linked to Britain's tax on tea, which, when imposed on the unwilling American settlers, resulted in the tea being thrown into Boston's harbor – certainly a way to avoid paying taxes. One can only speculate on the future of colonies if Britain, instead of imposing tax on tea, had decided to raise revenues by selling lotteries on the North American continent.

In another sense, though, Jefferson was right: governments would be better off taxing and regulating an activity that many people want to pursue, even if it is not perhaps perceived as particularly virtuous, rather than outlawing it. Yet where are the Jeffersons when one needs them?

On October 13, 2006, the president of the United States signed a bill – the Unlawful Internet Gambling Enforcement Act (UIGEA) passed by Congress – to make it illegal for financial institutions to transfer payments to online gambling companies, whose services millions of American citizens were buying. A close examination of the sequence of events suggests that politicians did not learn much from past experience with prohibitions, did not know the subject they were voting on, or were manipulated by a wide range of interests – protecting the states' tax base among them. These interests had a strong stake in weakening the online gambling companies, inventing accusations against gambling and disguising such views behind "moral" arguments. True, the roots of some of these arguments can be traced to antiquity. But a closer look reveals that, though one can understand why political and religious leaders as well as private interests condemned gambling then, those reasons have gone with the wind by now. Or they should have, because there is no evidence to back them.

For centuries, opposition to gambling has been linked to deeply held beliefs that allowing probability, risk, and chance to play visible, significant roles in society, and letting industries develop around them, would have serious detrimental consequences. These beliefs all have roots in times, thousands of years ago, when they made sense. When populations are small and immobile, the law of large numbers does not operate – by definition. Not surprisingly, only in 1837 did Siméon-Denis Poisson, a French statistician, coin the phrase "law of large numbers." And the mathematical study of risk began only in 1654, with Pierre de Fermat and Blaise Pascal. There cannot be much specialization, there cannot be many markets, and there cannot be many visible prices when a population is small, sparsely distributed, and mainly immobile.

The insurance people had against fire, illness, floods, or other misfortunes in such circumstances were family, tribe, religion, and all enforcing implicit insurance based on such ties. Religion sustained the perception that decisions in the face of what we would today call incalculable risks are under control, and rulers of the tribes and the priesthood managed them properly. This proper management was done by priests with exclusive rights to throw dice, bones, or other devices and who taught, at the same time, that a higher authority controlled the outcome of the throw. It may seem to us like gambling – but it wasn't. The dice, the bones, and the Urim and Thummim were tools used in rationalizing decisions, much as sophisticated geometry was in the hands of astrologers later, or, more recently, as trivial algebra and erroneous statistics have been in the hands of Keynesians and macroeconomists.

As the population and its mobility grew, traditional institutions and beliefs have weakened, there has been more specialization, more activities have been priced, and new institutions and beliefs have spread to deal with risks and to mitigate the effects of leaps into the unknown, legitimizing other ways of making decisions. But ancient artifacts stayed, words stayed – though they lost their original meaning. What happened, though, is that ancient beliefs, institutions, and rituals, whose origins became lost in the mist of time, became associated with notions of eternal virtue and eternal codes of moral behavior rather than with particular times and places. After all, in many societies around the world charging interest is still taboo, as a result of misunderstood and misinterpreted biblical texts written thousands of years ago.[1]

Still, recall that whereas the last five "dont's" of the Ten Commandments (don't kill, don't steal, don't bear false witness, don't covet, and don't commit adultery) are sound advice for the ages, "don't gamble" is not on the list. As it turns out, with excellent reasons.

Origins of Lasting Prejudice

The origin of the word "lot" is the Teutonic root *hleut*, the pebble that priests or judges cast to decide disputes and divisions of property.[2] This is also the source of the Italian word *lotteria*, and the French *loterie*, which eventually came to mean "a game of chance." To this day, however, in both Dutch and English, the word "lot" has broader meanings: it refers not only to lottery tickets but also to human destiny. These two current uses of the same word are not accidental. Devices used today in games of chance were originally used exclusively during religious rituals when authorities made important decisions.

Proverbs 16:33 expresses most clearly the idea that the divine will is reflected in the fall of lots: "The lot is cast into the lap, but the whole disposing thereof is of the Lord." This legitimizes their use, and eliminates the link to chance. Perusal of the Bible reveals that the priesthood regularly cast lots to discover God's will on issues such as the election of a king (1 Sam. 10:20–1), the scapegoat for the atonement ritual (Lev. 16:8–10), and the identification of parties guilty of sacrilege (Josh. 7:10–26). Lots – Urim and Thummim[3] – were also used when the high priesthood had to select important dates or Saul to be the King of Israel (1 Sam. 10), for example. The drawing of lots in this case only confirmed the intuition of Samuel, who had already anointed Saul (even if we may be left wondering what would have happened if the draw suggested another option).

Lots were used to choose members of important groups: the inhabitants of Jerusalem after the exile to Babylon (Neh. 11:1), and the soldiers in the first attack against the rebel tribe of Benjamin (Judg. 20:9–11).[4] The drawing of lots in such ceremonies was called *goral* – which means both "little ball" and "fate." Casting lots was used to divide land and other forms of wealth or duties. In Numbers 26:52–6, for example, one finds: "The Lord said to Moses . . . the land shall be divided by lots; according to the name of the tribes of their father they shall inherit. Their inheritance shall be divided according to lot" (a custom also found in Mesopotamia). Eleazar, Ithamar, and their sons, the heirs of Aaron the high priest, divided the priestly duties by lots (1 Chron. 24).[5]

Note that the drawing of lots for such purposes was called *payis* – which means "to pacify." With good reason: the lot falls independent of he said–she said, and was perceived as either solving or preventing mighty quarrels. Actually, the situation involved more he said–he said, taking into account both the frequent reference to the use of lots in allocating the priests' duties and to the Talmud's frequent reference to the quarrelsome temperaments of the priests.[6] There were a number of ideas underlying such use of lots, ideas that reappear in the work of mathematicians and statisticians during the sixteenth century. One idea was that the use of lots in disputes was the proper way to allocate duties and reward among contenders because the outcome did not depend on whether a person had higher or lower status.

Practices similar to those mentioned in the Bible were found among "primitive tribes," where bones, sticks, arrows, and lots were shuffled and thrown – exclusively by the tribal seer, who then disclosed the message for the future, a message revealed by the supernatural spirit who controlled the throw. Native American Indians, for example, believed that their gods were the originators of their gambling games with colored stones and that the gods determined the outcome.[7]

Pre-Islamic Arabia practiced the casting of lots to determine guilt. In the case of Yunus (Jonah), the Quran refers to the biblical use of lots (*sahama*) to discern the blame for the wrath of heaven. In the midst of a storm, his fellow sailors threw Jonah, on whom the lot fell, into the sea.[8] Apparently, lot casting was used in legal proceedings too, in cases such as manumission, divorce, and the allocation of inheritance.

Greek mythology describes similar practices. The gods cast lots to divide the universe among them. Zeus got the sky; Poseidon, the seas; and Hades, the loser, the underworld.[9] In the *Iliad*, Hector puts lots in a helmet and casts them to decide who will strike the first blow in the duel between Paris and Menelaus.[10] The root of the Greek word *dike*, meaning "justice," is another word that meant "to cast" or "to throw," a relationship also found in Hebrew (*thorah*, *yoreh*).[11] On Greek coins, the figure of Dike, the goddess of justice, sometimes blends with the figure of Nemesis (vengeance) and with that of Tyche, the goddess of fortune.[12] And, as among the ancient Hebrews and in latter-day Islam, in ancient Greece lots were drawn to divide an inheritance and to select some magistrates,[13] a custom Rome also practiced.[14] In the Mahabharata, the world itself is conceived as a game of dice that Shiva plays with his queen, and the main action of the book concerns King Yudhistira's game of dice with Kauravas, and an entire chapter describes the creation of the "dicing-hall-sabha."[15] Still, all these have absolutely nothing to do with risk or gambling, but with ways of making decisions when facing what today we call uncertainty.

Even in the sixteenth century, borough officers in England were still occasionally chosen by lot. In 1583 the Chapter of Wells Cathedral apportioned patronage in this manner. In 1653 a London congregation proposed that a new Parliament should be selected from nominees chosen by each religious congregation "by lot after solemn prayer."

Who among condemned men should die was also a decision made by casting lots, the lucky ticket saying "Life Given by God." A court decision in 1665 allowed juries to cast lots to resolve their differences as an alternative to retrial when the juries could not reach a decision. Although by the eighteenth century it had become a serious offense for juries to reach their decision in this way, John Wesley still used lots to determine the Lord's will, arguing that they could be used in exceptional cases when long prayer and debate did not help bring about a decision. He said, however, that the matter was not settled by "chance," for "the whole disposal thereof is of the Lord."[16]

Volatile Beliefs

From time to time, and more as the eighteenth century approached, observers started disputing the view that supernatural powers controlled the throw of the dice. They interpreted the prohibition on people's use of the dice as a way to sustain perceptions that the priesthood knew something that ordinary people did not. "Our priests are not what simple folks suppose; their learning is but our credulity," wrote Voltaire. In fact, one finds such reactions in earlier times too. Each time that a belief and institutions associated with it weakened, people's betting instinct and a stronger belief in chance surfaced. These interludes lasted until some observers invented new beliefs, condemning betting and belief in chance, and succeeded to enforce them.

In ancient Greece, the worship of fortune and of fate started when the belief in the Olympian religion collapsed.[17] Pliny (23–79 CE) made these observations:

> Throughout the whole world, at every place and hour, by every voice, Fortune alone is invoked and her name is spoken; she is the one dependent, the one cuplrit, the one thought in men's minds, the one object of praise, the one cause. She is worshipped with insults, counted as fickle and often as blind, wandering, inconsistent, elusive, changeful, and friend of the unworthy . . . We are so much at the mercy of chance that Chance is our God.[18]

Later, as Rome was weakening (with its population in rapid decline), some writers noted – inaccurately, confusing cause and effect – that "it was the poisonous notion of chance [that] was weakening the fibre of the Roman."[19] They contrasted the widespread belief in luck and worship of the goddess Fortuna with the fact that the word "fortune" cannot be found in the New Testament – which was emerging as a new source of authority for managing human affairs. As Perkins (1958) summarizes the debate:

> It would appear that the life envisaged by the New Testament writers had no place for gambling or for the acknowledgement of luck. As the years passed, the Christians were influenced to some extent by the prevailing Roman customs, for we find Tertullian writing in the second century: "If you say you are a Christian when you are a dice player, you say what you are not, for you are a partner with the world." (p. 8)

The early church fathers and councils clearly condemned gambling among all Christians. Canon law forbade games of chance; two of the oldest church laws threatened excommunication of both clergy and laity found gambling.[20]

During medieval times (which came about after a rapid and significant drop in the Roman empire's population), the distinction between magic and religion, and between providence and chance, was blurred. In spite of condemnations of gambling, the medieval church did not deny that people were able to manipulate God's grace for earthly purposes. Aquinas, Boethius, and Dante all had stressed that the notion of divine providence did not exclude the operation of chance and luck. It was during the sixteenth and seventeenth centuries when the power of the church was declining further and new beliefs established themselves that the attacks on chance became once again a central theme in public debates.[21]

From Religion to Risk, from Lots to Betting

When people do not know how to solve some problems, when they do not know how to calculate risks – which is often the case today – yet they must decide on a course of action, they have to "manage" that risk. But how do we manage when facing such uncertainty, when there are no probability distributions to guide us but we must still claim legitimacy for the decision and have the authority to act?

Throughout history, people invented a maze of institutions to answer this question and ways to bestow legitimacy on such decisions, although there was nothing we would call scientific to underlie them. Institutions and traditions created perceptions as if there were no uncertainty or the uncertainty were mitigated, and those in decision-making positions knew what they were talking about and doing, backed, occasionally by what contemporaries claimed was scientific. Does anyone know today the magnitude of error in the models that some hedge funds might be using?

We know that when populations were small, isolated, most risks could not even be assessed. This does not imply that people did not design prudent strategies or that they acted blindly – even if with the passage of time we consider decisions they made imprudent, capricious, and blind.[22] We consider the outcome of casting lots, throwing dice, a matter of chance. But if a society believes that spiritual power controls the outcome, that the priesthood has the exclusive right to throw these devices and the priesthood is held in esteem, then decisions based on such throws can be, and have been, perceived as legitimate ways of making decisions. No smallest element of chance would have been perceived when leaders and priests made decisions based on throwing lots – just as the word of rating agencies, Moody's and Standard and Poor's, until recently had been taken at face value. The reality has always been that societies face uncertainty. The question they have to solve is the following: how do we legitimize decisions to act?

If relying on lots sounds "primitive," consider how later generations, including ours, have been making decisions in the face of uncertainty (i.e., situations when we do not know the probability distribution). In ancient Greece people flocked to oracles to resolve their doubts and to seek guidance in private and public affairs. No decision on engaging in war, on signing a treaty, or on enacting a law was made without oracular approval. Were decisions based on oracles' forecasts any better than those based on the throw of the dice or of lots?

Later, for centuries, monarchs and governments relied on religion and astrology to make decisions. For more than a century, rulers perceived astrology as an exact science, and books, presenting extremely complex geometrical calculations linking decisions to the position of stars, claimed legitimacy for their forecasts.[23] The mathematical complexity, like sacred languages of religions in earlier times, sustained exclusivity for a while.[24]

In England, from the time of Elizabeth to that of William and Mary, the status of judicial astrology was well established. In the time of Charles I, the most learned and most noble did not hesitate to consult astrologers openly. In every town and village, astrologers – just like priests in earlier times – were busy casting dates for prosperous journeys and for setting up enterprises, whether shops or the marching of the army; rulers kept their own councils of astrological advisers.[25]

Jump a few centuries ahead and consider what happens today: governments consult economists in every municipality, county, state, country, or, on global matters, the International Monetary Fund. Yet what passed for science for a few decades – going by the name "macroeconomics" – has been discarded, or at least is in the process of imploding. Just like astrology, macroeconomics wore the masks of science – models, numbers, complex equations, predictions, claims of forecasting, "professors" of macroeconomics, journals and books published by academic presses, and expanding national and international bureaus gathering statistics created and sustained legitimacy for a while. John Maynard Keynes and his followers were widely celebrated – some were awarded Nobel Prizes. Yet macroeconomics, as astrology or views about controlling the outcome of throwing lots, had no foundation.[26] It seemed solid, but at a closer look it melted into thin air: what the majority believed in was actually false.

Macroeconomics was based on a new language, which Keynes invented and which his mediocre followers (to whom Keynes referred to as "fools"[27]) developed to esoteric depth. Most readers today would be struck by just how ridiculous the content of macroeconomic articles and books affecting policies has been. Keynes and his followers claimed that government bureaucracies, collaborating with central banks and independent of institutions in a country, could create eternal prosperity by solving a few equations with a few unknowns, and that central banks could print money with abandon without risking inflation. The models also assumed that whereas entrepreneurs, businesspeople, and ordinary people suffer random bouts of pessimism and optimism – subject to atavist animal spirits – politicians and government bureaucracies were immune to such primitive emotions. It is true that a minority stood up to these especially silly premises of the Keynesian school (the deceased Milton Friedman being the most prominent), where it did not matter if a country was centralized, dictatorial or not. But reasoning is never enough to defeat false views, in particular when those views rationalize increasing power in the hands of governments and rulers.

It took decades and bad inflationary experience for the Keynesian school of managing risk to be gradually discarded. Being leapfrogged and risking default are the mothers of invention; people fight over paradigms and language.[28] For a few decades, though, academics, heavily subsidized by governments, legitimized views by drawing on the Keynesian jargon. They suggested that it was a science able to guide fiscal and monetary policies to manage incalculable risk, and to shape policy debates. Keynesians saw risks as generated by the aforementioned unpredictable animal spirits – random, irrational, unprovoked, unreliable sentiments. However, Keynesians assumed, as noted previously, that these spirits strike only the hoi polloi, businesspeople in particular, but not – hold your breath – government bureaucracies and central bankers. The latter, Keynesians said, know how to mitigate the commoners' randomly fluctuating emotions. The fact that people's actions could be a *reaction* to politicians' animal spirits – short-term political interests of gaining and enforcing powers – was simply assumed away.

Governments had every incentive to subsidize spreading the Keynesian view, because it taught that bureaucrats and politicians were in a better position than businesspeople and the investing public to make decisions – a claim the lot-casting priesthood and astrologers made during earlier times. If rulers then had incentives to subsidize the priesthood and astrologers to gain legitimacy for their decisions, so did governments in our times when they subsidized macroeconomists. One difference between earlier and more recent times is that, in a world of small numbers and lack of specialization, religion and the throw of the dice offered legitimacy, but today many still believe that academic affiliation does. Academia and think tanks are identified – mistakenly – as institutions engaged in detached scientific inquiry. Although, by now, much academic study only wears the masks of science, and its legitimacy has been eroding rapidly – as happened to many facets of religion and astrology in the past.[29]

But what, then, will replace macroeconomics today? What will be the new institutions that legitimize making decisions when one faces incalculable risks? And what happens during the transition? Surprising as it may seem, the sequence of events and the debates surrounding gambling offer insights into answers to these questions, because gambling has been tightly linked with the development of financial markets, as Chapters 4, 5, and 6 will show.

During periods of transition from one way of legitimizing decisions to another, people fight about language, laws, regulations, and the viability of businesses and institutions. They do so because perceptions of risk and uncertainty, and institutions to mitigate them, suddenly change. The old institutions try to protect rituals, language, and power, and the new ones try to show that the older ways of dealing with risk were wrongheaded. Yet, even as the new ways of looking at the world spread, the older views, prejudices, and institutions do not disappear. Occasionally they are still powerful enough to bring about harmful laws and regulations. This is often where debates about gambling, risk-taking, and laws and regulations come into the picture.

The answer to the question of what will replace the older ways of making big decisions in the face of incalculable risks today has been unfolding before our eyes for the past decades, even if the link to risk-taking, gambling, and financial issues has not always been made explicit.

Financial markets, with the necessary political and legal institutions surrounding them, are emerging, giving legitimacy to decisions in the face of incalculable risks, replacing both spheres of decisions that government bureaucrats occupied in the more recent past and rulers' drawing on astrologers', priests', and oracles' decisions before. Societies recognize that risk-taking makes them natural resources, and gamblers are needed to achieve that. This substitution does not happen richer than smoothly; it happens through trial and error, as in every endeavor. As a brief first example, consider how the junk-bond market, whose legitimacy was questioned by associating it with gambling and Ponzi schemes, transformed into the high-yield-bond market within a span of fifteen years, with few questioning today its benefits. As the next chapters show, gambling often acted as a banking institution and was equally misunderstood. Also, both clearinghouses and investment banks have their origins in gambling establishments. In fact, many other institutions that are part of established financial markets today have their origins in gambling and were often misunderstood. Also, closer examination reveals that occasional surges in people's willingness to gamble have been due to governments' and central banks' grave mistakes. These mistakes suddenly raised questions and brought about debates that eventually helped correct misperceptions about risk, pricing, and gambling.

Yet one may now ask, How do we know that theories and institutions legitimizing the use of financial and betting markets to make decisions would turn out to be any different from fads like astrology, macroeconomics, or the throw of the dice? Maybe we are also suffering from professional and linguistic deformations? The answer to the last question is no, and, once again, the analyses and history surrounding all facets of gambling, broader and narrower, show why.

There is a significant difference between the use of information drawn from liquid, democratized financial markets to make big, tough decisions and the ways in which our ancestors, and most countries to this day, still are making decisions. The difference is simple. Decisions based on throwing lots, on astrology, on macroeconomics, have been made exclusively by rulers, relying on either central authority, or on priests, astrologers, or macroeconomists. In contrast, decisions based on information derived from deep financial markets rely on the outcomes of millions of people's opinions – many gamblers and risk-takers among them, who put up money to back their opinions and who come from all spheres of life. Such decisions offer better guidance for actions than do their alternatives. Deep, liquid, financial – speculative – markets turn out to be the best institutions for aggregating information. But to have such markets and achieve this goal, capital must be *dispersed* and there must be institutions in place to hold all parties to a transaction accountable (a path that is not quite smooth today because of