Can Numbers Ensure Honesty? Unrealistic Expectations and the U.S. Accounting Scandal

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Recent economic events in Asia, South America, and the U.S. have made it clear that over the last twenty years a new axis of power has emerged, which is now making itself felt all over the world. This axis runs through large multinational corporations, many of which avoid national taxes by incorporating in tax havens like Hong Kong [1]. It runs through investment banks, through nongovernmental organizations like the International Monetary Fund, through state and corporate pension funds, and through the wallets of ordinary investors. This axis of financial power contributes to economic catastrophes like the 1998 meltdown in Japan and Argentina's default in 2001, and it leaves its traces in the daily gyrations of stock indexes like the Dow Jones Industrials and London's Financial Times Stock Exchange 100 Index (the FTSE). Intrinsically, this axis of power is neither good nor evil. In some countries, like China, it has helped raise the nation's overall standard of living, and in others, like the U.S., it has allowed some people to retire early or with more money than they ever dreamed possible. But it has also widened the gap worldwide between rich and poor. It has led countries all over the globe to abandon their welfare societies in favor of a U.S.-style shareholder culture, where basic services, like health care, are individual responsibilities [2]. And, as we saw in the spring and summer of 2002, it has permitted—even encouraged—corporate crime on a scale that takes one's breath away, not to mention the life savings of thousands of individual workers as well [3].

This new axis of financial power has many dimensions, many causes, and many effects. In this essay I will be able to discuss only a small part of what one analyst has called "financialization" [4] and I call the culture of finance. Specifically, I will discuss some of the ways that the culture of finance uses numbers and mathematics to reorganize the relationship between value and temporality. By translating concepts that were once time-dependent, like risk, into numbers and mathematical equations, financialization is generating a new form of value which produces huge profits for those who know how to play by its rules while inflicting huge losses on others, who often do not.

The starting point for my discussion is an obvious historical observation: the emergent culture of finance differs from an economy of production in that finance generates profit primarily through investment, through moving and trading currencies, and through placing complex wagers that future prices will rise or fall. This is in stark contrast to an economy of production, which generates profits by turning labor power into products that are priced and exchanged in the market. Finance obviously played a crucial role in the economy of production, which dominated the overall wealth of the U.S. until 1995 and which still dominates the gross domestic products of most nations. By the same token, production—both agricultural production and manufacturing—is necessary for the emergent culture of finance, because even investors have to eat, wear clothes, and buy things. Nevertheless, what we have seen in the U.S. since 1995 is a change

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in the ratio between the wealth generated by production and the wealth created by finance: in 1995 the sector composed of finance, insurance, and real estate overtook the manufacturing sector in America's gross domestic product. By the year 2000 this sector led manufacturing in profits. Not incidentally, in the same year this sector also became one of the biggest donors to federal elections in the U.S., and its representatives spent enormous sums of money lobbying Congress in Washington [5].

Some of the instruments I am about to describe are vehicles for trading on stock, options, or futures markets; they are investment vehicles or products. Others are instruments for recording profits and losses; they are bookkeeping or accounting vehicles. I describe these two kinds of instruments together because in this emergent culture of finance, representations, like the figures an accountant enters in a company's books or the numbers a trader enters in a computer, no longer necessarily reflect or point to actual transfers of cash or commodities. Instead, representations and exchanges are increasingly conflated: sometimes such representations cause exchanges to occur, sometimes the representation replaces the exchange, and sometimes a representation actually constitutes what counts as the "exchange" itself. This conflation of representation and exchange has all kinds of material effects, as we will see in a moment, for when representation can influence or take the place of exchanges, the values at stake become notional too: they can grow exponentially or collapse at the stroke of a key.

This conflation of representation and exchange has several historical origins. It has occurred partly because new markets, like futures markets, have been taking advantage of old accounting rules. When, for example, derivatives trades are recorded by rules intended to track the exchange of goods and services, the accounts do not have to list the most leveraged and hence most financially loaded parts of the transactions. The conflation of representation and exchange has also become possible because the primary form of representation used in financial markets, quantification, is an inherently abstracting process: in order to depict an exchange in numbers, one must abstract some features that are considered essential (because they are amenable to quantification) and marginalize all others (because they are not quantifiable). Mathematics, of course, by operationalizing quantification takes the level of abstraction to a new level. At this level, equations, typically run by software programs, become more important than the exchanges that might otherwise be performed in time and space. In the new culture of finance where quantification rules, the numbers one writes and the computations a computer performs upon them generate the only value that matters, even if this value is notional or so large that it could never be conveyed in actual currency.

All of the investment and accounting instruments I am about to describe are currently legal in the U.S. (although as I write, Congress has just passed legislation regulating some of them [6]). I will describe these instruments in an order of ascending complexity, and as I do I will also fill in some of the history by which they developed. In the available space I can describe only five of the countless financial instruments currently in use: day trading, stock options, mark to marketing accounting, adjustment to bad debt reserve, and derivatives. As I discuss these five instruments I will also describe five additional features unique to the culture of finance: earnings reports, growth forecasting, off-balance sheet partnerships, deregulation, and pricing risk (the Black-Scholes equations).

Day Trading

The simplest of these financial instruments is the practice of day trading, in which an individual investor creates an imaginary, purely notional future in order to get rich now [7]. In this practice the day trader purchases shares in some company through an online brokerage firm; the trader then provokes other investors to buy the stock by promoting it, usually anonymously, in another Internet venue (a chat room). As other investors buy, the price of the share rises, and the original investor—the day trader—sells the purchased shares just as, or just before, the price begins to collapse. This practice of bidding up stocks to sell them is as old as the securities market itself, but it acquired new velocity and popularity in the tech boom of the 1990s. In that decade more individuals had access to the Internet, fees for individual trades were reduced, and, most importantly, the U.S. government required companies to release earnings information directly to the public instead of just to industry insiders. The imaginary future from which the day trader profits consists of the company's future earnings. The trader promises these profits in the chat room "tips", but the company will never deliver them, because as soon as the day trader takes the profits thus far earned, share prices collapse and in extreme cases the company does too. In such transactions the big losers are the investors who get in late or who buy stock for the long run, even if the "long run" proves to be a few hours instead of a few minutes.

Stock Options

In day trading we see the rudimentary dynamics of the culture of finance, for in this practice the representation of future profits actually generates those profits—at least for a moment and for the

trader quick enough to take the money and run. On the corporate scene, the same dynamic can also work, but the scale is larger and the mechanisms more complex. The simplest of these corporate mechanisms are stock options, which many U.S. companies have used since the 1980s to give employees incentives or to supplement wages. Think of a stock option as an objectification that simultaneously signifies the value the company assigns to good work and rewards the employee for such work. Since good work these days often entails some amorphous quality like "creativity" or "the ability to inspire confidence" instead of a measurable achievement like meeting a sales quota, the value of the objectification (hence the value of the reward) now floats upon a sea of representations and market factors that yield a number (or dollar amount) only when the clock is stopped, when the options are sold. Here is how this works. A typical stock option gives its holder the right to buy a share of the company's stock in the future at a fixed price, the strike price; this price is generally set at or just below the market price at the time the option is issued. If the company's share price rises, the holder can exercise the option; purchase stock at the strike price, which is now below market price; and immediately sell the shares for a profit. In this transaction the "value" of the employee's work floats upon the share price; it is calibrated to the amount the share price rises while the employee holds the option, and the dollar amount of this value is set when—and only when—he sells the shares and takes his profit.

Companies claim that they issue stock options to employees at all levels, from the corporate executive officer (the CEO) to janitors, but recent studies show that the vast majority go to top executives [8]. The CEO and other executives have the power to influence the price of shares—and thus the measure of their own value. In this sense, stock options resemble day trading: the value that both the day trader and the executive can extract depends upon the price to which they can push the cost of a share and the timing with which they realize their gains. The company executive and the day trader both use representations of future profits to push the share price higher. Whereas the day trader uses the informal, ephemeral, and wholly unregulated venue of the Internet chat room to post these predictions, the company executive urges share prices higher through a combination of well-placed hints to financial insiders and the publication of "forward-looking" statements in the company's quarterly reports [9]. While investors may eventually feel cheated by predictions that turn out to be unwarranted, corporate executives are not liable for defrauding the public through such statements; in 1995 Congress passed the Private Securities Reform Act, which exempted corporate executives from liability for "forward-looking" statements that turn out to be misleading [10]. By law, then, no representation of the future can be too far off the mark, even when it helps create the value it claims to describe—momentarily and, as with the day trader again, for those who know when to cash in and get their money out.

Company executives' rosy predictions function as a form of insider knowledge, which can influence share prices both directly, when current investors decide to buy more shares, and indirectly through the reports issued by financial analysts. The direct influence is easy to understand: a current shareholder reads an executive's forward-looking statement, decides that the executive has insider information that points to higher earnings, and buys more shares. The indirect influence takes a little more explaining, for it travels through the intermediary of at least two levels of financial analysts. Financial analysts are supposedly objective sources of market information who advise individual and corporate investors about what to buy. The information that financial analysts provide purports to be objective in two senses: it is supposedly disinterested, in the sense of being provided by someone not employed by the company whose prospects are being evaluated, and it is theoretically based on mathematical models that convert past performance and countless other factors into predictors about future profits.

Even though they are theoretically independent, however, these financial analysts actually depend upon a variety of sources, including company executives, to provide the information they represent as privileged. And even though they do use mathematical models computed electronically, all analysts also rely on other skills which are not objective in any sense, including market experience, intuition, and a general "feel" for market conditions. The financial analysts who work for large investment companies, moreover, rarely compose, run, or understand the computer programs that assist their "feel" for the market. Instead, these analysts rely both on the "quants" (the mathematicians) who write the programs and on another, more specialized, set of financial analysts. These specialized analysts belong to a new sector of finance called growth forecasting. There are currently two U.S. organizations that generate growth forecasts for every publicly traded company every quarter of the year: ThomsonFinancial/First Call and WhisperNumber.Com. To see what these growth forecasters do and why they are so important, we need to take a short detour through the history of financial reporting.

Beginning in the mid 1980s, in the midst of the hostile takeovers provoked by deregulation (which I will discuss in a moment), two financial analysts, Robert A. G. Monks and Nell Minow, suggested that

"New from accounting, sir. Two and two is four again."

corporations ought to be run for the benefit of their shareholders and that companies and CEOs ought to be evaluated by quarterly earnings reports [11]. Earnings reports and share prices are not the only way to evaluate a company's performance, of course. One could also look at the cash generated by its ongoing operations or even at a composite of factors, including productivity in relation to expenditure, and so on. But the earnings report has two particular virtues for the purposes of evaluation: first, the earnings report can be summarized in a single figure, which makes it seem simple to evaluate profitability; earnings can be recorded as gains or losses per share. Second, the earnings report can actually help enhance the company's future, because a good earnings report ensures access to affordable sources of capital, which are critical to ongoing operations and growth. When the U.S. stock market began to rise in the mid-1990s, more ordinary citizens began to invest in individual stocks, media coverage of investment mushroomed, and analysts struggled to package their information (and their services) in ways that would seem usable to all investors. The earnings number served this purpose well, for its brevity and simplicity spoke to the ordinary investor and its aura of privileged information appealed to everyone not in the know. The earnings figure even had a benchmark that enabled investors to evaluate the numbers that appeared in companies' earnings reports. This benchmark was set in the mid-1990s, when Jack Welch, the CEO of General Electric, declared that a successful company should be able to sustain an annual growth rate of 15 percent. Few investors realized that almost no companies actually met this figure, even in the 1990s. According to a report conducted by Credit Suisse First Boston, a major investment bank, average corporate growth during that decade was little better than 7 percent, and only one in eight large corporations managed to achieve continuous, year-upon-year growth of any size [11, p. 70]. Nevertheless, the benchmark had the predictable effect on CEOs' representations of their companies' future growth (their "forward-looking" statements) as well as on investors: most large companies continued to predict that their earnings would grow by 15 percent a year, and most investors continued to look for that figure.

The benchmark of 15 percent is a rather crude assessment index, for it is a fixed and universal standard. While analysts and investors do refer to this for general evaluations, in order to assess a company's earnings report with any specificity, they need a number generated especially for that company. This is what growth forecasters do: they combine data about companies' past performances with information picked up from corporate and investment insiders to produce an earnings prediction. This earnings prediction is also expressed in a single number: the number of pennies each company's dividend is likely to rise or fall in the quarter. As the end of the business quarter approaches, the ThomsonFinancial/First Call numbers parade across the bottom of televised programs like Bloomberg Marketline, and as soon as a company issues its report, analysts and investors react to the relation between the prediction and the report. Since the growth forecaster's prediction is based partly on insider information, a company executive's "forward-looking" statement can indirectly influence the analyst's report—which means that, in one sense, an investor is comparing one number directly supplied by the CEO, who stands to profit from a rise in stock prices, with another number that the CEO has influenced. Both numbers carry an aura of precision simply because they are numbers, and the latter in particular also carries the aura of objectivity, because the lines of influence that link the company to the growth forecaster are invisible to the investor.

The numbers provided by the growth forecasters have extraordinary power, for when a company meets or exceeds the forecasters' prediction, investors tend to buy and share prices rise. They continue to have this influence even though most economists agree that earnings, even if stated accurately, have no predictive value and that rapidly growing profits are not necessarily even signs of corporate health. This means that the number most investors interpret derives its meaning only in relation to those other numbers that growth forecasters compile, not in relation to the past, present,

or future of the company itself. It also means that, just as corporate executives want the quarterly numbers to be high now, even though they may be hiding debts that will fall due in the future, so investors evaluate these numbers as if they promised future profit, even though they have no predictive value at all. Thus the current fixation on earnings reports, which is one basis of the value of corporate executives' stock options, routinely puts the future under erasure by assessing its value now. When I say that the future is under erasure, I mean to imply that the fixation on earnings reports can keep the future from occurring, even as it continues to hold out the promise that it will. I think that the laid-off employees of Enron, especially those who lost their retirement funds when the company collapsed, would agree that the future promised by the glowing earnings reports will now never occur or vanish from their imaginations as something that once might have happened.

Mark to Marketing Accounting

Company executives can influence the relationship between the number that appears in the quarterly earnings report and the number the growth analysts provide by devices that are more formal than just a few well-placed hints. Because a company's earnings report is always based on a certain amount of interpretation and guesswork, no matter how well informed, a company's financial officers can actively adjust the number they report to make it coincide with the growth analyst's prediction. This is called "backing-in" to an earnings figure [12]. One way that financial officers back-in to the all-important earnings figure is by mark to marketing accounting [13]. This practice, which allows a company to record profits before they are realized, is often adopted when a company creates off-balance-sheet partnerships [14]. Such partnerships can be used in various ways: to raise money for the parent company through the sale of bonds or to purchase a stake in the parent company's future gains on some investment. These partnerships also decrease the parent company's visible risk by moving part of its holdings and much of its debt onto the balance sheets of companies that look like they are separate, so that this risk can be assumed by outside investors or written off as bad debt.

To understand the origins of this kind of structured financing, it is useful to detour again, this time through the history of deregulation in the U.S. Because the effects of deregulation have been particularly visible in the energy sector, I will use the deregulation of energy as my example [15]. Deregulation first began to affect the petroleum industry in the early 1980s, when congressmen from the oil-producing states pressured the board that oversees the accounting industry (the Financial Accounting Standards Board, or FASB) not to impose tough standards for financial reporting in that industry. In particular, congressmen lobbied for relief from a provision, still in place in 1978, that required utilities to enter into long-term power deals at fixed prices in order to guarantee customers a constant source of power and to prohibit price gouging. These fixed prices were typically high, because they were set just below the cost of building a new power plant. During the 1980s these restrictions were lifted, and it became possible to trade energy on the open market as if it were a commodity like any other. This is what companies like Enron did: they transformed energy supplies into "products" that could be bought and sold. Because deregulation created a discrepancy between the high prices that utility companies had contracted to pay and the lower prices set by the market, companies trading energy stood to make millions. They did so by purchasing energy on the open market for a low price, then selling it immediately for another price which was higher than the current market price but lower than the existing contract price. Such deals were lucrative because energy contracts were futures contracts: energy is a product that the buyer needs over time, not all at once. Thus companies like Enron guaranteed buyers, like the state of California, future prices for energy which were set above the price that Enron paid but below the price California might have to pay if it had to honor existing contracts, which were set at the relatively high price required for building plants to generate energy.

For energy companies this constituted a change from producing energy, which was the old way of doing business, to trading for it, and under existing accounting rules this change enabled the company to book an entire 10–15-year profit immediately instead of waiting for payments to come in. This is the benefit of mark to marketing accounting: it counts anticipated profits as present gains. To raise the capital necessary to purchase the energy it traded and to finance the debt such bonds incurred, Enron formed off-balance-sheet partnerships with fancy names like Raptor and Condor. It created these partnerships by giving them Enron stock in exchange for a promissory note; Enron immediately booked this promissory note as an asset. In addition to raising capital in this way and servicing debt, these partnerships also enabled Enron to keep its debt off its own balance sheet, because bookkeeping rules did not require the partnership to list its debts as belonging to the parent company.

Adjustment to Bad Debt Reserve

Deregulation also allowed company accountants to exercise other kinds of accounting creativity. A second creative maneuver is called adjustment to bad debt reserve [11]. Instead of manipulating the

recording of future profits, as mark to marketing accounting does, adjustment to bad debt reserve uses a stroke of the pen to make up for company shortfalls. Specifically, the provision allows a company accountant to represent part of the reserve fund, which the company sets aside in case some of its creditors default, as profit. Thus, in a quarter in which the company's earnings threaten not to reach the figure growth analysts have projected, company accountants can move part of its reserve into its profit column simply by deciding that fewer creditors are likely to default in this quarter. Like mark to marketing accounting, adjustment to bad debt reserve helps a CEO back-in to his company's projected earnings figure, and since the number of defaulters is always an estimate, the new number, which is also an estimate, is no more intrinsically accurate or flawed than the old one. In the long run, of course, if it becomes obvious that a company has not produced the earnings it recorded, it has to restate or reclassify its numbers, and when it does so, investors typically punish it severely. On June 28, 2002, for example, when Xerox announced that it was reclassifying $6.4 billion in revenue from the 1990s, its share price fell sharply. In the last twenty years the number of such restatements has risen dramatically: in 1981 three companies had to restate their earnings; in 2001 one hundred fifty-eight companies were forced to do so [16].

Derivatives

Thus far the role that mathematics has played in these financial instruments has been as much inspirational as practical: people tend to believe that numbers embody objectivity even when they do not see (or understand) the calculations by which particular numbers are generated. In my final example, mathematical principles are still invisible to the vast majority of investors, but mathematical equations become the prime movers of value. The belief that makes it possible for mathematics to generate value is not simply that numbers are objective but that the market actually obeys mathematical rules. The instruments that embody this belief are futures options or, in their most arcane form, derivatives.

In the simplest terms, derivatives are contracts with fixed expiration dates whose price is determined by the value of some underlying asset, like the price of a currency or a megawatt hour [17]. Instead of representing the ownership of some commodity as shares do, derivatives represent wagers on the direction that prices for some commodity will take: up or down. Derivatives can be used for hedging, for speculation, or for both. An options trader can sell a derivatives contract before the date of expiration or simply allow the option to expire; the trader makes this decision not so much by observing the direction of prices as by assessing the mathematical probability that the price will rise or fall enough to make the wager profitable. Derivatives do not involve the exchange of principal; most of them are traded over the counter (not on any public exchange), and because a trader initially puts down only a small percentage of the contract cost (the good faith deposit or the initial margin), an extraordinary degree of financial leverage is attached to futures and derivatives. Because of their notional quality and because of the secrecy in which they are typically traded, the volume of derivatives is difficult to measure; but taking currency trades, one of their most common forms, as an index, we can begin to glimpse their size. The International Bank of Settlements estimates that in 2001 the total value of derivatives contracts traded approached one hundred trillion dollars, which is approximately the value of the total global manufacturing production for the last millennium. In fact, one reason that derivatives trades have to be electronic instead of involving exchanges of capital is that the sums being circulated exceed the total quantity of the world's physical currencies [18].

Futures trading probably originated in seventeenth-century Japan, but modern futures and derivatives differ from their predecessors in that modern derivatives articulate a set of mathematical equations, computed electronically, that objectify and price risk. The mathematical analysis that made it possible to price risk was first developed in the 1950s as part of Henry Markowitz's innovative approach to investing called portfolio theory. Markowitz argued that one could quantify risk if one conceptualized it as the magnitude of price swings around a mean; the variance in returns on assets can thus be plotted, and one can assemble a portfolio of stocks that will allow large returns while minimizing risk. According to portfolio theory, "high variance, or excessive risk, [is] something to be avoided. The conclusion of portfolio theory, now emblazoned in the mantra to 'diversify,' is that the return on a diversified portfolio will be the average volatility of these holdings" [19, p. 28].

For the next twenty years financial experts refined Markowitz's formula for pricing risk. In 1973 two economists produced a set of equations, the Black-Scholes equations, that provided the first strictly quantitative instrument for calculating the prices of options in which the determining variable is the volatility of the underlying asset. These equations enabled analysts to standardize the pricing of derivatives in exclusively quantitative terms. From this point it was no longer necessary for traders to evaluate individual stocks by predicting the probable rates of profit, estimating public demand for a particular commodity, or subjectively getting a feel for the market. Instead, a futures trader could engage in trades driven purely by mathematical equations and selected by a software program. These

trades can take several forms [20]. In the strategy called spread trading, for example, the trader buys one contract and sells another for the same commodity at the same time. Since one contract will typically make money and the other lose, the trader tries to get the spread, or the difference between the two contracts' prices, to work in his favor. A derivatives trader can also hedge investments with a straddle, which enables the trader to buy a call (buy) and a put (sell) option on the same underlying investment at the same strike price, thus enhancing the probability that the trader will make money whether the price goes up or down. Or a trader can use a strangle, by buying a call and a put on the same underlying investment with different strike prices, each of which is far enough from the market price to make it statistically improbable that the option will be exercised. If someone does exercise an option the trader sold, the trader can then meet the ensuing obligation by exercising another option already purchased.

Unlike all of the other financial instruments I have discussed, futures and derivatives options do not need to use representations about future or current earnings to make other investors believe and buy. As I have already argued, these other instruments have to inspire belief in investors because those investors' purchases drive the price of shares up or down and thus enhance or deflate the value of one's own shares and stock options. Even if futures and derivatives options do not depend upon inspiring belief in earnings figures, however, they do depend upon belief. Futures and derivatives trading depends upon the belief that the stock market behaves in a statistically predictable way, in other words, that mathematical equations accurately describe the market. Never mind that another set of numbers shows that these equations do not seem to work very well: these statistics reveal that between 75 percent and 90 percent of all futures traders lose money in any given year [20, p. 313]. Whatever the money lost or gained, the belief that the market is statistically predictable drives the mathematical refinement, and this belief inspires derivatives trading to escalate in volume every year.

Conclusion

One appeal of applying mathematical equations to equities trading is that the pricing model provided by equations like the Black-Scholes equations enables the financial community to disaggregate the economic and financial components of commerce and to reassemble from these parts new financial products that combine different risk profiles. These products can then be bought and sold in a bewildering variety of forms and in almost unlimited quantity. What often goes unremarked, however, is that these innovations are producing alongside new trading instruments concepts that are also new or that rework familiar concepts that used to drive investment. Take risk, for example. Risk used to be viewed as uncertainty about the future, an irrational factor that one sought to protect against. Now that risk has been objectified, divided, and reassembled so that it can be traded, it becomes mathematically predictable—that is, rational, abstract, and subject to management through devices like the straddle and the strangle [19].

The use of mathematical equations to generate value is also producing a new temporality. This new temporality is end-stopped (like the life of an options contract) and short term (like the duration of an options "future"). It is also abstract, homogeneous, and self-referential. Time is reworked in this way because in order to price a derivative, the mathematical model has to assume that no unprecedented economic events or conditions will intervene or disrupt the pattern graphed by statistical probability. In other words, in order to work, the mathematical model must assume that a limited and stable set of factors will be at work in the market and that these will generate a normal distribution about a mean; to limit factors that might prove disruptive—to set the a priori conditions for the mathematical equation—some analyst has to establish the beginning and end of a given temporal sequence. He does so by mathematically projecting these points backward and forward from the present. Thus the past and the future resemble and refer to the present in the abstract sense that they are mathematical (logical) projections of it.

Like the other trading instruments I have described, then, derivatives and futures options are conflations of representation and exchange, for the representations of time and risk implicit in these trades create a purely notional trading environment whose only existence is electronic. Nevertheless, these electronic trades can have very real effects, as we have seen with the bankruptcies of Enron and WorldCom. When all of the financial instruments I have described are used together, as they typically are in sophisticated financial institutions, they mobilize both of the beliefs I have described: the belief that numbers are objective and true, and the belief that the market conforms to mathematically produced statistical probabilities. Thus executives at companies like Enron manipulated investors' faith in future profits by backing-in to earnings reports whose figures matched the numbers growth analysts supplied: they issued thousands of stock options to entice other executives to help pump up share prices, they used off-balance-sheet partnerships to book future profits as current gains and to keep debt off their books,

and they used derivatives to hedge their positions and to gamble on making enormous profits.

At the time Enron was doing all this, of course, all of these instruments, including derivatives, were perfectly legal [21]. Derivatives were developed, in fact, specifically to take advantage of deregulation, which also permitted creative accounting to flourish. To this day derivatives remain largely unregulated, for they are too large, too virtual, and too complex for industry oversight boards to police. In 1997–8 the FASB did try to rewrite the rules governing the recording of derivatives, but in the long run they failed: in the 1999–2000 session of Congress, lobbyists for the accounting industry persuaded Congress to pass the Commodities Futures Modernization Act, which exempted or excluded over-the-counter derivatives from regulation by the Commodity Futures Trading Commission, the federal agency that monitors the futures exchanges. Currently, only banks and other financial institutions are required by law to reveal their derivatives positions, and Enron, which never registered as a financial institution, was never required to disclose the extent of its derivatives trading [22].

Taken as an ensemble, all of the financial instruments I have described contribute to the axis of power I invoked at the beginning of this essay. This axis is difficult to police, because it is not centered in any nation state or subject to any transnational regulatory body. It is difficult to track because its effects are so dispersed and ramified and because these effects do not always serve a single or identifiable interest. Deploying mathematical equations through the hair-trigger connectivity of the Internet to move international financial markets, this axis is everywhere and nowhere at once. Even if it is difficult to monitor or see, however, this financial axis wields terrific power—and not just in the realm of the economy. As it reworks the relationship between temporality and value, it also redefines labor, agency, and responsibility. In the new culture of finance, value can be created without labor, agency is transferred to an unstable mixture of mathematical equations and beliefs, and responsibility for disasters is pinned on an individual (a "bad apple") or simply dispersed as analysts blame their investors' losses on flawed computer programs or unforeseeable market forces.

Very few people inside or outside the global financial community question whether the foundational assumptions implicit in financialization are true [23]. In the light of exposures of corporate greed in 2002, investors have begun to suspect that numbers do not always embody objectivity, but few have stopped to question the assumptions that make the largely unseen world of derivatives work: the assumptions that the market obeys the logic of statistical probability and that the estimates that mathematical equations silently make do not matter. But what if markets are too complex for mathematical models? What if irrational and completely unprecedented events do occur, and when they do—as we know they do—what if they affect markets in ways that no mathematical model can predict? What if the regularity that all mathematical models assume effaces social and cultural variables that are not subject to mathematical analysis? Or what if the mathematical models traders use to price futures actually influence the future in ways the models cannot predict and the analysts cannot govern? Perhaps these are the only questions that can challenge the financial axis of power, which otherwise threatens to remake everything, including value, over in the image of its own abstractions. Perhaps these are the kinds of questions that mathematicians and humanists, working together, should ask and try to answer.

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