Information, Market Behavior, and Valuation

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Abstract: Responding to the recent financial crisis, this paper examines the role of information flow and transparency in the maintenance of orderly markets. Information plays a role in markets at two different levels: securities trading activity and fundamental values. Efficiency in securities markets is seen to depend on the availability and free flow of information. Even given good trading information, however, sparse or inaccurate information on underlying values can contribute to the formation of asset bubbles. This leads to an informal model of a securitized asset value as a superposition of pure trading asset and pure underlying asset. The relative importance of these components depends on the state of information in the market.

Information on underlying values comes largely from financial accounting. We identify certain defects in going-concern accounting information not addressed—and perhaps aggravated—by fair value and mark-to-market prescriptions. Valuation of liabilities is, and has always been, particularly problematic. Neither are going concern asset values that are the same as marking to market.

We adduce work by Wang and recent efforts of Madan and coworkers as possible conceptual tools for dealing with asset and liability valuation, concluding with an outline of a practical approach.

Keywords: Information, Financial crisis, Securities markets, Financial reform, Fair value accounting, Valuation.

"The dogmas of the quiet past are inadequate to the stormy present…We must disenthrall ourselves...."

—Abraham Lincoln

1. INTRODUCTION

One remarkable aspect of the recent financial crisis is the nature of the financial instruments and associated markets that brought it about. Debt securities collateralized by subprime residential mortgages (CDOs, etc.) and the credit default swaps (CDS), bought to hedge against default of these instruments, brought the nation and the world to the brink of a second Great Depression, which was staved off, for now, only by the most draconian of fiscal measures. These instruments had several common characteristics: (1) complexity, (2) over-the- counter (OTC) trading, and (3) heavy dependence on the integrity of agents, which, taken together, add up to extreme opacity.

These OTC markets have essentially no reporting requirements. Details of the transaction are known only to the direct parties. Brooksley Born, former head of the Commodity Futures Trading Commission (CFTC), coined the term "dark markets" to characterize them. The CDS market is very similar to a commodity futures market, where both benefits and obligations are transferred freely in an active secondary market and where speculative interest can outweigh insurable interest by a large multiple. In the CDS market, all this took place without benefit of an exchange, nor even a clearing

facility until March 2009, and regulation by the SEC or CFTC was proscribed by The Commodity Futures Modernization Act of 2000 (CFMA). The debates prevalent at this period are made clear by an exchange between Allen Greenspan and Brooksley Born in which Greenspan expressed the hope that Born would take little action against fraud while running the CFTC since he believed that the market itself would detect and punish fraudulent behavior. Born did not subscribe to Greenspan's view. This exchange exposes a fundamental split in the philosophies undergirding public policy. Does a "free market" mean a free-for-all, or does it mean a forum where persons can engage in commerce without spending large amounts of time, effort, and money to ensure that they are not being cheated? Many would say, that the former does not deserve to be called a "market" and that the term should be reserved for arenas of commerce governed by the rules of fairness and probity, which we tend to take for granted but which quickly disappear unless they are enforced by established authority. In cold terms of market efficiency, one need only cite the frictional costs of vigilance and due diligence imposed by a free-for-all approach to commerce. Can a market where every bank note has to be tested in a laboratory be called "free"? One doubts that Mr. Greenspan really supports such an approach and must rather suppose that he has a faith in the rationality of market participants that is beyond the capacity of most of us.

Mortgage-based securities have been on the investment menu for decades without causing material disruption. The new ingredients in the current crisis are the extremely low interest rates that prevailed during the last decade and the flood of investment capital resulting from tax cuts for the affluent and from the collapse of the tech boom of the late nineties. This latter produced a temporary disaffection with equities, and real estate came into fashion as a source of investment yield. This, combined with long-standing government policy in support of home ownership, implemented in part through Fannie Mae and Freddie Mac, fueled an unprecedented housing boom as well as a push on the part of mortgage lenders to market to borrowers of inferior credit quality in order to expand the market. Like most other mortgages, these subprime loans were pooled and tranched into mortgage backed securities (MBS), then repackaged into CDOs, resliced into tranches of varying putative quality, and blessed by credit rating agencies on the basis of certain assumptions as to their provenance, which turned out to be false. The resulting financial train wreck, starting in the shadow banking system and described in detail by Gorton (e.g., 2009a) brought about a systemic crisis from which the global economy is only beginning to recover. I shall draw freely on Gorton's masterful account of the role and dynamics of information in securities trading, a subject which he learned in part from bitter experience at AIG (Lewis, 2009).

What lessons can we learn from this debacle? In the following, I will make the case that markets depend on information for orderly functioning. Information is their nourishment and lifeblood. The OTC markets that precipitated the crisis were blind monstrosities, riddled with opacities and obstacles to free trading. To call them free markets is beyond disingenuous, much like maintaining that freedom is enhanced by the absence of law and order; and those who did so should have known better. We shall see that all securities have a dual nature as derivatives on the underlying values and can trade in two distinct modes simultaneously depending on the quality of information regarding the underlying values. This information comes predominantly from financial reports, and its quality in turn depends on the validity of the governing accounting principles and their application. We shall find that the fair value and mark-to-market prescriptions imposed by the accounting standards bodies, relying as they do on spot prices, lead to valuations premised on prompt liquidation of the enterprise, and are by no means assured to be appropriate for valuing a going concern. The adjustments required to get to a going-concern-basis lead to discussion of the insolvency put, with its implications for valuation of liabilities, and of the more subtle issue of the option to defer redemption of an asset.

In order to make this case we shall review and comment on the foundational work on the efficient market hypothesis. We shall then examine the tension between fundamental estimates of the value of a firm and the value placed on it by the equities markets and the role of information quality in deciding the behavior of equities. We also review briefly the work on bond spreads and the relative roles of credit risk and liquidity risk. The question of restoring credit discounts in liability valuation leads in turn to the question of currencies and the meaning of risk-free valuation in an age of sovereign default. Finally, in the quest to resolve these puzzles, we shall examine recent work of Shaun Wang and of Dilip Madan and collaborators on the question of valuation in incomplete markets and estimate its virtues as a way forward toward achieving transparency in financial markets. We conclude with remarks on the role of financial regulation in applying these findings.

2. THE DUAL NATURE OF SECURITIES

Securities markets, like all others, are driven by the need of participants to equilibrate supply and demand. Demand is equal to the supply of investment capital—funds in excess of those needed for consumption by the owners. Supply is governed by the investment opportunities available. These opportunities, mostly the debt and equity of commercial companies, tend to be most productive and lucrative when funds available for consumption are widely distributed in the population (the "mass

market"). However, every participant in the economy has a limited appetite for consumption; any excess swells the supply of investment capital. Hence any imbalance in the distribution of wealth can depress the economic value of investments while at the same time stimulating demand for them, creating asset inflation. We have seen this phenomenon manifested in the technology boom of the 90s and in the real estate boom of the past decade, an era characterized by an abundance of investment capital and a relative dearth of investment opportunities.

Much has been said about derivatives and the dangers attendant thereto, but it is well to remember that every security or other financial instrument, in one sense or another, is a derivative. A policy of insurance is a derivative on losses from a specified event. A share of stock is a perpetual call on the net worth of a corporation and derives part of its value from the fact that, in case of liquidation, it expires worthless rather than becoming a liability. But such a share trades in the secondary market at a value which bears only an indirect, and sometimes very tenuous, relationship to the underlying value. The secondary market benefits the rest of the economy by providing an exit strategy for primary investors and price discovery for potential equity issues. Nominally the value of a share of stock should be given by the value of the future dividend stream adjusted for taxes and discounted at the default-free rate increased by the failure rate of the corporation and other vicissitudes. However, some of these quantities are hard to estimate and come with large uncertainties. But the shareholder has the option to hold and wait for the benefits of ownership to materialize or to sell to a willing buyer with a higher opinion of the share's value. The buyer may, in turn, buy in anticipation of holding or of selling to the next buyer. (By the same token, a deed of title to a house means one thing to someone who wants a place to live and quite another to someone who wants to sell to the next buyer who meets his terms, and may take on highly unstable values in a speculative environment.)

The point is that equity prices are governed by two competing dynamics: first, the underlying, "physical" value of the enterprise, which is determined by the conduct of the company itself and the markets in which it operates, can be estimated only with considerable uncertainty, and generates new information on a time scale roughly equivalent to the accounting cycle; second, market pressures and trading noise, which are usually driven by demand, particularly if a certain asset type is in vogue, and follow something like a random walk, on a time scale of minutes, with the peculiarity of reading tail events as signal and amplifying them. This disjunction between market price and underlying value means that equities can, and often do trade with only oblique reference to the underlying value of the enterprise. During the technology boom of the late 1990s, such proven value investors as

Warren Buffett stood by bemused as companies with no business plan or clear way to make money traded at astronomical prices because they had dot-com after their names.

Because of this duality and uncertainty, equity issues receive a great deal of attention from analysts and the investing public. Transaction prices are recorded and reported assiduously. In Professor Gorton's terminology, they are "information-sensitive" (Gorton, 2009b, p.4). A contrast is provided by high-grade corporate bonds, which are essentially loans with periodic interest payments (coupons). They can be valued with fair accuracy if one only knows prevailing market interest rates and the issuer's credit rating, provided by one or several of the recognized rating agencies. That is, they are derivatives on the lender's credit—its ability to fulfill its obligations. High-grade corporates, on Gorton's scale, are relatively "information-insensitive," default being perceived as a remote possibility, and trade, in the absence of adverse news, much like U. S. Treasury issues or currency, the most insensitive of asset classes. If a material credit downgrade occurs, and default becomes a clear and present possibility, the issue becomes more information-sensitive and trades at prices that reflect the price of the issuer's equity. At the high end of the scale, the most information-sensitive instruments are private contracts, such as policies of insurance, which are underwritten individually, apply to specific interests, and seldom trade, if ever.

In this connection, the MBS that caused the mischief are particularly interesting. The main purpose of pooling mortgages (and other assets) and slicing the pools into tranches is to produce securities of superior credit quality, AAA or near it, suitable for use as collateral in repurchase agreements and other banking (or "shadow" banking) transactions. Payouts to the junior tranches (of inferior credit quality) are governed by elaborate rules based on even more elaborate risk models, but are generally restricted to avoid paying out too early and shorting the senior trances. Nonetheless, if the assumptions governing the risk models turn out to be inadequate, the senior tranches may stand to lose out with more than the advertised probability.

Once the blessing of an AAA rating was conferred, little attention was paid by anyone as to the provenance of these securities or the assets that underlay them. In point of fact ABS were routinely passed through another level of pooling and slicing and dicing to produce collateralized debt obligations (CDOs) with putative properties better suited to the investor's needs, called such despite the fact that no one knew where to find the collateral. The prevailing assumption was that asset (house) prices would continue going up and that such knowledge would never be needed. To make matters worse, some CDOs were paired with liquidity puts to shorten maturity to one year, thus

meeting regulatory requirements for assets of money market funds. (You thought yours were safe.) (Gorton, 2008)

Thus the designer assets produced by structured finance spread throughout the financial system with almost no provision for tracking their whereabouts. For reliably tame, information-insensitive instruments, this dearth of information would be inconsequential. However subprime MBS had certain structural features which were very likely to lead to trouble if house prices ever stopped rising. This is because most of the underlying mortgages were adjustable rate (ARM), requiring the availability of financing when the mortgages reset (upward). When housing prices began to fall, collateral fell below the loan values; that financing dried up, leading to defaults. We shall discuss this in greater detail in later sections.

So far we have not mentioned commodity futures contracts. We shall do so in the next section in connection with the exchanges where they trade.

3. THE MARKETS IN QUESTION

The securities described in the previous section trade, if at all, in widely diverse markets.

3.1 Equities markets

Most equities are placed privately, or auctioned, at issue and subsequently trade on exchanges, which are highly structured, information-rich environments with self-imposed rules to ensure orderly trading. This secondary market serves the economic purpose of providing liquidity for primary investors looking for an exit and price discovery for prospective equity issues. In the United States, further regulatory discipline is imposed by the Securities and Exchange Commission (SEC) with restrictions on insider trading, attempts to corner markets, securities fraud, and other practices deemed prejudicial to the fair and orderly functioning of markets. Yet few would question that these are free markets in any practical sense, though they are not "free-for-all." They have a definite structure with mandated information flows, but they are structured to reduce the costs of vigilance and due diligence to manageable levels so that all participants have access to price information and all can buy and sell at the best available price. They also impose trading restrictions, such as maximum intraday price swings. The extremes of freedom, from which chaos and darkness are bred, have been sacrificed in the cause of efficiency.

It is usual for investors in equities to leverage their funds by maintaining margin accounts,

typically furnished by their stockbrokers at the going rate of interest and collateralized by the investors' equity holdings. This arrangement raises the possibility of a panic, which occurs when prices fall over a substantial sector of the market, reducing the value of collateral in the margin accounts and prompting margin calls from the brokers to cover the shortfall. Investors with insufficient funds to answer the call are forced to sell holdings into a falling market, driving prices down further, and initiating a vicious circle. Most stock market panics follow this pattern, including the great sell-off of 1929-1932. We shall see below that the Panic of 2007 was brought about by a similar mechanism, though not initially in the equities markets, but in the shadow banking system.

In *Foundations of Finance*, Eugene Fama (1976, Chapter 5, et seq.) defines an efficient market as one that fully reflects all available information. It seems, then, that the precondition of market efficiency—and the ability to judge whether a market is efficient—is the existence and ready availability of information. This is neither trivial nor obvious. Left to themselves, traders would rather play close to the vest and share knowledge with as few people as possible. Why do they forego the advantages of secrecy and submit to the discipline of the exchange? A likely answer is that the cost in time and money of obtaining information is prohibitive for an investor wishing to diversify her portfolio to attain an acceptable risk position. The business of obtaining information is best left to specialists, arbitrageurs, who profit from ignorance by dispelling it and discipline the market by occasional reference to fundamentals.

Fama analyzed daily and monthly stock returns on the New York Stock Exchange, testing for autocorrelation at various lags. He found no evidence for significant autocorrelation. This suggests that arbitrageurs filter information from trading noise on a time scale of a day or less. It says less about shifts in fundamentals. The equity exchanges adjust very quickly to breaking news. The real issue is how long it takes the news to break. How much information is encoded in accounting statements and other sources in forms that require elaborate processing to become news? To what extent can market efficiency be enhanced by improving the transparency of such information? We will explore this in a later section.

3.2 Fixed income

Treasury bonds are sold initially at public auctions then traded privately through private dealers. State, municipal, and corporate issues are sold at auction or through private placements then traded through dealers. There is very little exchange trading. The markets are over the counter because there are many fewer variables to be considered than in equities trading. The variables at question in

Treasury bond trading (and any trading in sovereign debt) are all public: fiscal policy and the inflation outlook for the relevant currency. For state, municipal, and corporate bonds, there is one additional variable that sums up all the residual risk: the creditworthiness of the borrower. This is investigated and made public by the recognized rating agencies, Standard and Poor's, Moody's, Fitch, and others.

Bond dealers employ specialists as market makers, who know the current market consensus as to the yield spreads above treasury associated with the various bond ratings (as well as, perhaps, some special knowledge as to the quality and currency of the ratings themselves). These market makers provide information to prospective buyers and liquidity for sellers for a fee embedded in the trading commission, as in equity trading. Information always comes at a cost, but so does ignorance.

Fama (1976, Ch. 6) framed the efficiency of bond markets in terms of ability to respond in timely fashion to expectations of inflation. Using data from Salomon Brothers rate sheets (no exchange to preserve data), he found that they did so reasonably well. Of course, the data period did not include the runaway inflation of the late 1970s and 1980s when bond yields fell below the rate of inflation for an extended period, the likely result of demand pressure from investors looking for investment vehicles to ease the effect of inflation. This reinforces our point that demand for the security itself, if strong enough can always swamp the fundamentals and drive up prices regardless.

3.3 Structured finance

As remarked earlier, structured finance products, such as MBS, CDOs, etc., are devised to resemble, as much as possible, treasury or corporate bonds except that there is little if any secondary market. What they do not and cannot provide are short and simple chains of accountability. Apart from demand considerations, if treasuries drop in value, it is because the Treasury and the Federal Reserve have mismanaged the money supply and brought about inflation—or the fear of it. If a corporate issue falls when the currency is stable, it is because the company itself has misbehaved itself in a way that casts doubt on its credit- worthiness; likewise for state and municipal issues. For structured finance products, the chain of accountability reaches back from retail financial intermediaries through the special purpose entities (SPEs) set up by shadow bankers to bundle and market CDOs, through MBS packagers such as Fannie Mae and Freddie Mac and still other shadow bankers, through the primary lenders, mortgage companies, to the mortgage brokers, mostly small operators who operated with minimal oversight and received their origination fees regardless of the quality of the loan.

The point of all this has been made persuasively already by Professor Gorton (2008): We have learned already that information comes at a cost. In the case of structured finance products, the cost of information is prohibitive. If something like the subprime defaults happens to cast doubt on the AAA (or whatever) credit rating, bestowed in the first place by a rating agency with questionable incentives, there is neither time nor money to sort out the composition of a structured product and to decide whether it is vulnerable to default and needs to be written down. There is no corporate treasurer to get on the telephone and demand the truth. If anyone knows the truth, he or she cannot be found. The only alternative is to panic. In a panic, doubt spreads rapidly because no one knows which structured products are tainted and which are clean. This is what happened, and ignorance has seldom come at a higher price. We shall see how this became a systemic event when we discuss the sale and repurchase (Repo) market.

3.4 Sale and repurchase (Repo)

Just as commercial banks finance their lending through demand deposits, shadow banks do so through short-term collateralized loans, known as "repos," because the borrower agrees to repurchase the collateral at a specified time, usually the next day. Securities received as collateral can be reused by the lender as collateral in other transactions, a practice known as rehypothecation. This has the effect of a dramatic increase in the money supply, as long as everyone believes in it, and of lengthening the chain of accountability if the positions need to be unwound. There is some ambiguity as to whether the repo transaction should be accounted for as a sale or a loan, which Lehman Brothers, in its death throes, used to move inconvenient items off of and onto its balance sheet at crucial times, e.g. quarter ends, in order to mask its true condition (Valukas 2010). But, in its normal usage, the repo market is entirely legitimate. It is, however, the darkest of dark markets. The shadow banking system has minimal regulatory oversight and no requirement to report detail on such borrowings; hence next to nothing is known about the size of the repo market. Professor Gorton (2008) estimates it as $10 trillion to $12 trillion at the height of the housing boom, though, in the absence of any clearing facility, this may include some double counting. We follow his very thorough exposition, touching on those of his points that illustrate our own.

Lenders in the repo market, as a rule, accept only very high-quality collateral. The speed and volume of transactions leave no time for research, so that only securities at the level of treasuries or AAA corporates are acceptable. The smooth functioning of the market is premised on the assumption that the credit ratings applicable to the offered collateral are accurate and reliable—in

Gorton's terms, on the assumption that securities used as collateral remain information-insensitive. This is Plan A; in the case of structured finance products, there is no Plan B for the reasons cited above.

As a system taking uninsured demand deposits is susceptible to panics, "runs on the bank," so is the shadow banking system if, for any reason, the offered collateral begins to lose credibility. When this happens, repo lenders begin to apply "haircuts," reducing the credited value of the collateral by some percentage. The application of a haircut is tantamount to a withdrawal from the shadow bank, reducing the amount of funds obtainable for a given amount of collateral. According to Gorton, the first signs of trouble in the repo market appeared in the ABX index, compiled from a thin sample of subprime MBS issues, which began trading in January 2006. Before this index began trading, there was no direct, publicly observable way for traders to put money on their estimates of the health of the subprime market. The ABX tracking subprime exposure began a steep decline in early 2007 (Gorton and Metrick, 2009). Since the structured finance securities used as collateral were packaged in such a way that it was difficult to tell how much they contained of the suspect subprime exposure, suspicion quickly spread to the entire class of structured finance products.

The haircuts applied to this class of collateral by the repo market are documented by Gorton and Metrick (2009). As of August 2007, the average haircut on structured debt was 0%. In succeeding months it rose at an accelerating pace, topping out near 47% at the end of 2008, by which time the repo market had shut down, strangled by a scarcity of collateral. Assets designed to be information-insensitive, in Gorton's terms, very swiftly became information-sensitive, urgently in need of scrutiny that was thwarted by that very design. This crippled the shadow banking system just as a run on demand deposits would cripple a conventional bank, were it not insured by the federal government.

As an immediate consequence the commercial paper market dried up, leaving a wide spectrum of businesses without short-term financing. In parallel developments, the defaults and foreclosures on subprime mortgages gutted the housing market and forced prices down even further. Widespread and severe unemployment led consumers to buy less stuff rather than taking on even more debt. Reduced public revenue and distress among other bond issuers led to cascading defaults and claims against credit default swaps (CDS), many of which had been written in the expectation of zero losses. Wall Street investment banks failed or came near it. Companies like AIG and Citicorp were saved only by massive infusions of federal cash. In the economy at large, the effective money supply was reduced drastically; and a deflationary spiral became a real and imminent danger, to be avoided,

in the absence of private funds, only at great public expense. As we have shown, the role of ignorance (lack of information) and its handmaiden, complexity (lack of transparency), in this debacle cannot be underestimated.

The ramifications of this opacity have continued to the autumn of 2010 in the form of a new crisis in the processing of mortgage foreclosures, which have proceeded in many cases with improper evidence, falsified affidavits, and inability to demonstrate ownership of the property being foreclosed. This has cast doubt on the provenance of all foreclosed properties and threatens to shut down the market in such properties, just as the subprime defaults shut down trading in a wide range of derivative securities. The crisis is far from over.

3.5 Futures Markets and Future Markets

Though the commodities markets played little or no role on the financial crisis, it is useful to describe their workings as an alternative to some of the opaque and disorganized operations of the OTC markets.

3.5.1 Conventional Exchanges

Organized futures exchanges have been in existence in one form or another for centuries. Modern examples emerged when transportation of agricultural products over long distances became possible by railroad. Contemporary exchanges handle trading in a wide range of agricultural, financial, and other products (though, in the U.S., not credit default swaps, by act of Congress, as noted above). All these products have the common feature that they are interchangeable, unbranded, and delivered in bulk.

The instruments traded on an exchange are derivatives: futures contracts that bind one party (short) to deliver and the counterparty (long) to take delivery of a stated quantity of goods of a given type and quality on an agreed future date at an agreed location. Contracts are standardized by quantity, date, and location to limit the number of distinct instruments being traded. Both long and short positions are traded freely up to just before the delivery date, subject to intraday price swing limits and position limits. At the end of each trading day, each trader is required to post margin to cover any imbalance in the account, a measure that eliminates counterparty risk. Trading is by open outcry—or its electronic equivalent—and all prices are known to all participants at all times.

There are two types of trader in the market: (1) those who own the underlying physicals or want to own them, and (2) those who wish to profit by speculation. The first type are managing risk by

hedging, locking in a price that they consider attractive. This can only be achieved if the market is efficient, that is if contract prices converge smoothly to the settlement values. This convergence is called price discovery. Some speculators trade actively and liquidate their positions in good time and are welcomed on the exchange for the liquidity they provide. A more recent arrival, the Long-Only Commodity Fund, as the name suggests, takes a large long position and holds it to expiration, rolling it over all at once. Though opinion is divided, many maintain that these operations impede price discovery, one of the most important informational functions of these markets, keeping prices high until just before settlement (CFTC Roundtable, 2008). They also have the potential that investor demand can drive up prices for the actual commodities. In any case vehicles like this are ill-suited to an exchange with frequent expirations and cause disruption of the market.

3.5.2 Innovation: Liquid Insurance Contracts

Commodity futures exchanges are among the most transparent of existing markets. A modification of this pattern is under development, proposed and patented by Oakley Van Slyke, FCAS (2007). This scheme was originally devised to trade insurance liabilities (Liquid Insurance Contracts). It has since been generalized to other instruments, but we confine our narrative to LICs for the sake of specificity.

Insurance companies that opt for this mode of operation will retain origination and underwriting functions, bundling policies of similar coverage, maturity, territorial, and underwriting quality characteristics into LICs for transfer to the LIC Exchange. Claims administration bodies, which may, but need not, coincide with the originating companies, will present claims against the bundled policies for payment by the Exchange.

Traders on the Exchange, called LIC Underwriters, or Transparent Traders, operate as corporations under the rules of the Exchange, with liabilities and assets fully disclosed on transparent balance sheets. Each is required to obtain, and maintain, a surety contract from a Surety approved by the exchange, who can maintain almost continuous audit of the Trader's condition. If the surety is withdrawn and cannot be restored, the Trader must dissolve and put its holdings to the Exchange for disposal. Provision and monitoring of surety makes position and price swing limits and margin calls unnecessary.

Traders bid on shares of LICs at prices based on past experience with LICs of similar characteristics. These shares can be traded freely based on information and opinion current among the traders. All trades are reported to the Exchange and to the Sureties so that there will be no

guessing as to obliged parties when claim payments come due and no uncertainty as to the composition of the traders' holdings. Traders can also adjust their risk characteristics by buying and selling assets and issuing equity.

Apart from obtaining participation of traders and companies, success of such a scheme depends on three major factors:

1. Recognition of the LIC transaction as a true liability transfer by regulators and accounting authorities so that companies are relieved of long term financial obligations. With such recognition, admittedly a major hurdle, policies bundled as LICs will not be carried as liabilities on the originators' books but will be reported as liabilities of the LIC Underwriters, and, indirectly, of the Exchange and its Sureties.
2. Recognition by primary markets of the superior security provided by the LIC Exchange and their willingness to pay for it.
3. Development of information systems capable of handling the large information flow reliably and efficiently.

This scheme exemplifies extreme trading transparency and promises to demonstrate its advantages if it can be realized. As the above description suggests, the scheme would be workable for liabilities or assets that lend themselves to standardization or both at once, as in a commodity or swap exchange.

4. ACCOUNTING AND FINANCIAL MARKETS

Corporate financial statements have traditionally been only a subset, albeit an important one, of the information considered in deciding how much to pay for a share of stock or a bond. Equity value investors look at the balance sheet and add their own fact-based estimate of the franchise value of the firm to decide whether current prices are attractive. Other investors look at the history of stock price movements for clues as to the future movement of prices. As we have argued, whether accounting fundamentals or noise trajectories dominate the trading, depends in large part on the quality and credibility of the accounting information. Outside the equities markets, as we have seen, bond prices of firms with inferior credit tend to follow their stock prices.

Prior to the advent of fair value in the late 1990s, the flow of information was essentially one way from the financial accounting system to the financial markets. Financial instruments were put on the

balance sheet at purchase price or cash received and held there or amortized to maturity at a fixed rate. Valuation was not a basic accounting practice. Balance sheet values were rolled up from transaction cash flows by a process called deferral and matching. The values on the books need have little to do with changes in the financial markets, and large adjustments might be required when disposing of assets or acquiring resources to fulfill liabilities. (Exceptions were made for some major items, such as casualty insurance loss reserves, which typically have changed to reflect the latest information.)

4.1 Information flow under fair value

With fair value, information flow has changed radically, effectively turning the discipline of accountancy on its head. Valuations are to be kept up-to-date, reflecting the current state of the markets; and internal value flows are driven by changes in valuation. Where markets exist, assets are to be marked to their current market value. Liabilities are to be marked to the price at which they could be extinguished by repurchase, that is, at the value the creditor places on them as assets. Where no markets exist, values are to emulate market prices as closely as possible. A moment's thought tells us that assets, valued for immediate redemption, less liabilities, valued at the repurchase price, is precisely the market value of a firm in liquidation. Reflecting further, one can see that a credit downgrade will cause the market value of a firm's liabilities to decrease, creating a windfall and a surge in earnings. This is not a mere curiosity, but has already happened. In first quarter 2008, Radian Group's credit was downgraded, leading to a $410,000,000 windfall on revaluation of its liabilities. Radian apologized in its published financials, explaining that it only followed established accounting guidance. In first quarter 2009, Citigroup took a downgrade that led to a $2.5 billion (!) windfall. Rather than apologize, Citigroup bragged about its earnings and started laying plans for bonuses and TARP paybacks. Other major firms experiencing this sort of oddity include Bank of America, Lehman Brothers (now defunct), and Morgan Stanley. Few laymen have as pretty a taste for paradox as do seasoned professionals, and most would agree that this is mere nonsense. One often hears the argument that everyone knows that such results are bogus and discards them—and replaces them with what? Information vacuums do not persist but are filled with bad information when good information is not available. The problem must be fixed. IASB has attempted to address the outcry with mixed results, as we shall discuss below.

The inconsistencies inherent in the current approach to fair value are apparent in an example cited in Crooch and Upton (2001), which we quote here:

Company A issues a pure-discount (zero-coupon), nonprepayable, 10-year $10,000 note to a lender. Consistent with Company A's AA-rated credit standing, the note is discounted at a 7% annual rate and Company A receives $5,083 in cash. Under today's GAAP, Company A records a liability of $5,083.

On the same day, Company B issues a pure-discount, nonprepayable, 10-year $10,000 note. Consistent with Company B's B-rated credit standing, the note is discounted at a 12% annual rate and Company B receives $3,220 in cash. Under today's GAAP, Company B records a liability of $3,220.

On the same day, the rate appropriate to comparable U.S. Treasury instruments is 5.8%.

These postings are consistent with both traditional GAAP and proposed fair value. We see immediately, and by design, that two companies enjoying the status of going concern, but having somewhat different credit standing, can undertake identical obligations and record materially different liabilities for them. Figure 1 depicts how these obligations, in comparison with a risk-free obligation, amortize to maturity in the absence of any change in the risk-free rate, market credit spreads, and credit standing.

Figure 1. Current GAAP: Good, Bad, Riskless

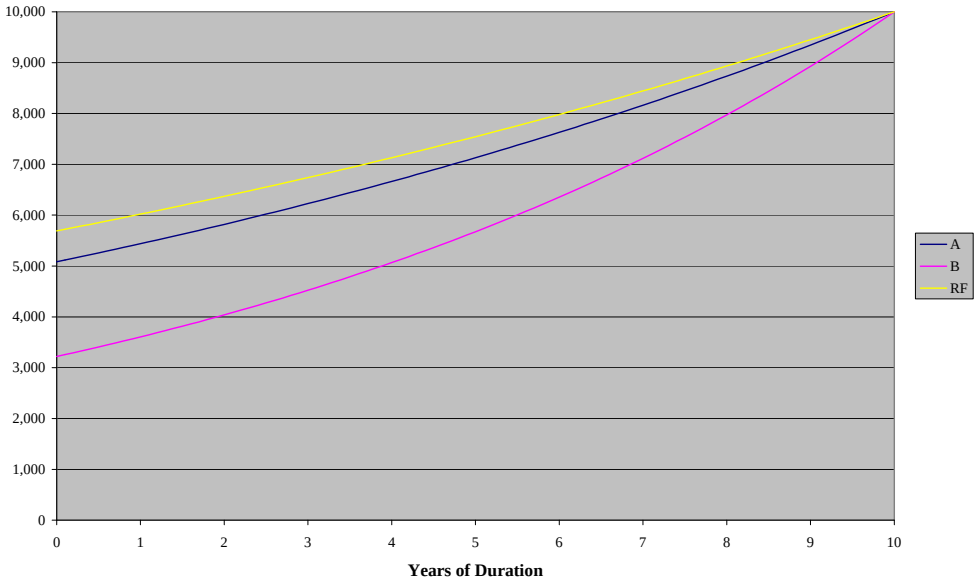
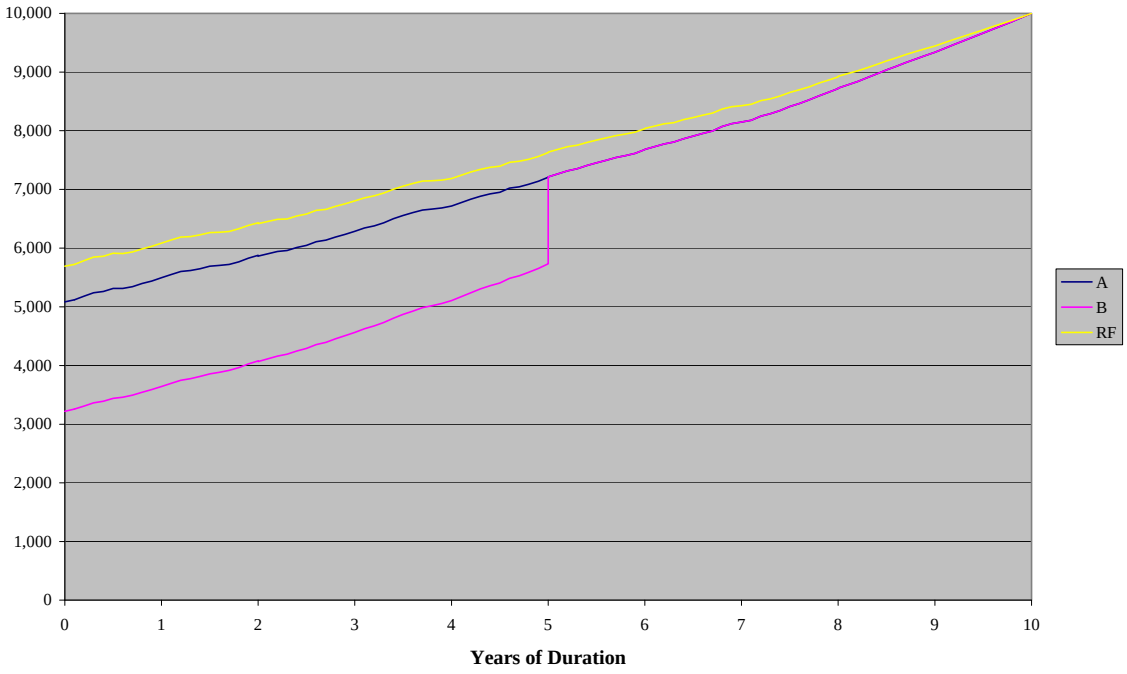


Figure 2 shows the effect, under fair value, other things being equal, of an upgrade in credit of Company B to AA five years into the term of the loans. This causes the value of the liability to *increase*, simultaneously causing a *loss* to appear in income.

If Company A were to suffer a rating downgrade to B, it would *decrease* the liability by this same

amount and would enjoy a windfall *profit* in the same amount. This would be impossible to justify were it not for the fact that no one has ever voiced any objection to the traditional treatment at first recognition. In some cases, tradition means not having to care about common sense.

Figure 2. FASB Fair Value: B improves after 5 years



The standard-setters firmly maintain that the standards they propose are intended to be appropriate for going concerns; firms at the other end of the solvency spectrum from firms in liquidation (with various states of bankruptcy in between), that are expected to remain in business for the indefinite future. A question we must ask is whether standards we have shown to be suitable for firms in liquidation could also be suitable for going concerns. In my view, the answer is clearly **no**. Going concerns differ on two vital points, following from their definition:

1. A going concern is generally in no hurry to redeem its assets for cash. Any liquidity penalties embedded in asset prices should be restored in the valuations, excepting assets needed for ready cash.
2. A firm holding itself out as a going concern is expected to perform its liabilities as specified in the contract. The repurchase price is irrelevant. The value of a liability should

depend only on the terms of the contract and the cost of fulfilling it as written. Firms holding similar liabilities should record similar values just as if they were sovereign obligations. This implies that the credit discount implicit in the price of a liability held as an asset (actually the combined effect of own credit standing and liquidity) should be added back to the liability value of a going concern.

The liability issue is addressed in Heckman (2004). A useful review of the role of liquidity in asset pricing is given in Amihud et al. (2005).

Enforcing requirement #2 introduces two puzzles used as objections on the other side of the debate. Both have to do with the difference between the full funding amount and the cash proceeds. We can call this amount the "borrowing penalty" since it contains elements of both credit risk and liquidity risk.

1. Booking the full funding amount implies taking a loss at inception equal in amount to the borrowing penalty.
2. At any time after inception, the firm can go into the market and realize a gain by repurchasing its own liability.

It is clear that these are both part of the same puzzle, hinging on the treatment of value flows; and both were solved at one stroke in a paper by Chasteen and Ransom (2007). They propose that:

1. The full funding amount should be booked as the liability at inception. The cash proceeds (asset value) should flow to income; the borrowing penalty should be charged directly against equity.
2. On update, changes in the full funding value should flow to income. Any gains on repurchase due to changes in own credit should flow directly to equity.

Since the borrowing penalty is made up directly from equity, without passing through income, there is no loss at inception; and all calculations of income reflect management actions and not decisions affecting credit standing, which are the domain of the owners. If the company, for whatever reason, should decide to repurchase the liability at a discount in the open market, any gain would flow directly to equity, without passing through income.

We feel strongly that fair value in its present form does little to promote transparency in financial reporting, and that the reforms proposed and described here would go far toward restoring that mission.

Even though fair value, as proposed, is beset by puzzles and anomalies, and does not even produce the information needed to support the decision as to whether or not an enterprise is a going concern, the central idea of introducing market discipline into accounting valuation is a worthwhile one. Another way of viewing these puzzles is to recognize that fair value, intended to describe the financial condition of a going concern, prescribes marking to the wrong markets.

We have seen that a going concern is not constrained to accept the spot price when redeeming its assets for cash. Liquidity crises, like the recent catastrophic one, are the exception rather than the rule; but, when they occur, the value of a firm's option to defer asset sales can be substantial. Amihud et al. (2009), in reviewing data and analytical work on liquidity effects in asset pricing, have found evidence that both the level and the risk of liquidity are priced in the market. Whether such pricing of an episodic effect, perhaps through options and futures markets, is robust and pervasive enough to support mark-to-market accounting is a question that requires investigation. A positive answer would suggest that any identifiable and quantifiable liquidity penalty should be added back to the asset valuations of a going concern.

We also understand that repurchase of a liability in the open market is not something that going concerns do. The Chasteen and Ransom proposal makes clear that such an action amounts to withdrawing capital from support of the enterprise and winding down business. An asset repurchase imposes both liquidity and credit penalties on the counterparty because such a transaction is typically a take-it-or-lose-it proposition. Such penalties do not apply when a company is holding itself out as a going concern undertaking to fulfill its contracts in full and on time. Restoring the liquidity penalty, if any, still leaves the credit penalty—the cost of surety. It is worth noting that reliable surety is precisely what is required for liabilities to trade freely: to close the gap between the value to the creditor and the cost to the debtor—between bid and ask. A rational third party will not assume a liability unless the cost of surety is included in the price. So the critical market to consider when pricing the liabilities of a going concern is the surety market, supposing that it exists. Marking to the spot asset price of the obligation is very questionable, as it leads to such anomalies as gains on credit downgrades and losses on upgrades. In addition, it leaves liabilities underfunded, makes effective capital management more difficult, obscures the costs associated with inferior credit, and disposes management to take risks that they might not if their true capital position were known, e.g. issuing junk bonds instead of equity. There remains the familiar objection that a debt issuer can realize a gain after a credit downgrade by repurchasing its debt in the open market. I suggest that any such gain should be accounted for as a windfall and that, following Chasteen and Ransom (2007), the gain

should flow not through income but direct to equity.

Just as important, marking assets and liabilities to the wrong markets sends false signals back to the capital markets, amplifying volatility and portraying debt financing in a falsely advantageous light. This latter quirk, for instance, places property-casualty companies at a chronic disadvantage in the capital markets vis-à-vis the nonfiduciary companies that rely more heavily on debt financing. Arguably, this persistent inequity has spawned really perverse reinsurance deals that have put some very unlikely people in orange jumpsuits.

4.2 Open issues

Implementing the Chasteen and Ransom program for liabilities is straightforward when accounting for debt issues, where the amounts and timings are specified by contract and the only risks, apart from inflation, are those of credit and liquidity. None of these risks affect the calculation of the full-funding amount since inflation and other currency risk are embedded in the default-free rates. For other types of liability, such as a policy of insurance, payouts can be wildly uncertain, and one must consider the issue of risk premiums. This is not a problem we shall solve here, but only call attention to it as a very knotty one. In commercial casualty insurance, for instance, liability risk premiums vary widely according to market conditions, routinely taking on negative values near the trough of the underwriting cycle and consuming surplus that would have performed better in treasuries. How to deal with this variability in an accounting context is an open question.

Another open question is the going concern valuation of assets. This involves disentangling the credit penalty from the liquidity penalty and quantifying the latter, which is variable—almost evanescent. Some work (Amihud et al., 2009) has been done on the subject, but more is needed.

A novel scheme for estimating liabilities has been proposed by Dilip Madan and coworkers (2009). Using coherent risk measures (Artzner et al., 1999) and convex probability distortions (e.g. Wang, 2000), they define an index of acceptability applying to a given transaction, characterized by the probability distribution of the cash flows. Applying this formalism to incomplete markets, they identify bid and ask prices for a given financial obligation. In an incomplete market, the actual transaction, if it takes place, does so at an indeterminate value between bid and ask. Madan proposes posting the asking price as the liability and the bid price as the countervailing asset, with the differences held in reserve against deterioration in the position. This is a promising line of research with the potential of providing a complete theory of liability and asset valuation.

The reader will have perceived that these problems are some distance from resolution. We must agree with the standard-setting bodies that the goal of market discipline in accounting valuation is an important one. However, the present haste is likely to be counterproductive, particularly if there is uncertainty as to which markets should provide the discipline.

5. CONCLUSION: IMPLICATIONS FOR REGULATION

I hope that the foregoing has made the case that future changes in financial regulation should focus on information and disclosure. Much of the mischief that brought about the crisis of 2007 could have been avoided had reliable information on structured securities and derivatives been available. Professor Gorton, who put together such a convincing narrative of the collapse of the shadow banking system, was hobbled in his modeling efforts by lack of information on the subprime content of the CDOs on which AIG was writing CDS. If these securities and derivatives were traded on well-structured exchanges like shares of stock, instead of over the counter like bubble gum, provenance would have been documented, counterparties could have been identified, and contrary positions could have been netted out in a clearinghouse. None of these functions were carried out in the frenzy that led to the crisis.

Many of these defects can be remedied without the most meddlesome aspects of regulation. The power of law can be used to establish structures wherein necessary disclosures are a condition of membership and to place outside the law and to declare unenforceable contracts entered into outside the structure. Contracts that cannot be enforced in a court of law will seldom be entered into. Where orderly structures and procedures are in place, people tend to use them just as someone concerned with getting from A to B will follow established routes rather than building new roads. We have described structures that can be used for trading exotic securities and derivatives: existing commodity futures exchanges or the LIC scheme proposed by Van Slyke, for instance.

Even the problem known as "too big to fail," the difficulty of unwinding the affairs of systemically important institutions, has more to do with information and transparency than with mere size. Were it not for the extreme interconnectedness of major financial institutions, size would hardly matter at all. The failure of Lehman Brothers brought about the near collapse of the financial system and a total freeze on credit not because of Lehman's size as such, but because of the myriad of counterparty relationships in which it was involved, threatening a cascade of failures throughout the system. Many financial instruments are traded hand-to-hand, like the family fruitcake, with no

record beyond one step afield of where they have ended up. The complexity and opacity of this contractual web could be reduced enormously by trading on exchanges with their clearinghouse function. If this were to become prevalent, no institution would be "too big to fail." It is not size itself that is prohibitive, but the information cost of tracking down counterparties and winding up affairs—the cost of complexity and opacity.

Other causes have been cited for the recent financial meltdown. One is the human capacity for self deception; another is the prevalence of perverse incentives in the financial industry. These are undoubtedly important factors, but I suggest that they tend to flourish in an atmosphere of doubt, ignorance, and defective information. Good information, readily available and impossible to ignore, will reduce opportunities for self deception and expose the defects of perverse incentive plans. Better information is not so much a sovereign remedy as a condition sine qua non.

Apart from some ill-advised asset holdings and the vagaries of corporate parents, the insurance industry was in large part insulated from the frenzy on Wall Street. It would be wise to keep it that way until adequate reforms are enacted.

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Abbreviations and notations

ABX, subprime MBS index
AIG, American International Group
ARM, adjustable rate mortgage
CDO, collateralized debt obligation
CDS, credit default swap
CFMA, Commodity Futures Modernization Act
CFTC, Commodity Futures Trading Commission
GAAP, generally accepted accounting principles
IASB, International Accounting Standards Board
LIC, liquid insurance contract
MBS, mortgage-backed securities
OTC, over the counter
SEC, Securities and Exchange Commission
TARP, Troubled Assets Relief Program

Biography of the Author

Philip E. Heckman holds a B.S. in Physics and Mathematics from Purdue University and a doctorate in Physics from the University of Chicago. He joined the insurance industry in 1975, working as a casualty actuary and statistical analyst, later in audit support and actuarial consulting. He is an Associate of the Casualty Actuarial Society and a member of the American Academy of Actuaries. He is active on the CAS Committee on Theory of Risk and the *Variance* Editorial Board, and on the CAS Accounting Changes Task Force. He also sits on the AAA Financial Reporting Committee and the Halmstad Prize Committee.

Phil's interest in accounting and related financial matters began with the advent of fair value, from observing the perverse consequences of marking liabilities to market. He has published several pieces and delivered several talks challenging the assumptions and conclusions of the standard-setting bodies, most recently accentuating the contrast between liquidation and going-concern accounting and the modifications needed to put fair value on a going concern basis.