CHOKING THE RECOVERY:
Why New Growth Companies Aren't Going Public
And Unrecognized Risks Of Future Market Disruptions

Harold Bradley and Robert E. Litan

Ewing Marion
KAUFFMAN
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Harold Bradley and Robert E. Litan[1]

Executive Summary

A strong, sustained recovery will require the formation and growth of new scale companies. These companies, in turn, often require access to equity capital as they grow. Traditionally, this has best been accomplished by the floating of shares in an initial public offering (IPO).

IPOs have been down substantially over the past decade. Many factors have been alleged to have contributed to this trend, among them, the higher regulatory cost of going and remaining public under the Sarbanes–Oxley Act (SOX) of 2002.

But a far more important, and heretofore unrecognized, deterrent to growth company IPOs is the proliferation of new indexed securities—derivatives essentially. Initially, these products took the form of mutual funds; now they are increasingly represented as "exchange traded funds" or ETFs.

We show here that ETFs are radically changing the markets, to the point where they, and not the trading of the underlying securities, are effectively setting the prices of stocks of smaller capitalization companies, or the potential new growth companies of the future. In the process, ETFs that once were an important low-cost way for investors to assemble diversified stock holdings are now undermining the traditional price discovery role of exchanges and, in turn, discouraging new companies from wanting to be listed on U.S. exchanges.

That is not all. The proliferation of ETFs also poses unquantifiable but very real systemic risks of the kind that were manifested very briefly during the "Flash Crash" of May 6, 2010. Absent the ETF-related reforms we outline below in this summary, and in more detail in the text, we believe that other flash crashes or small capitalization

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[1] The authors are Chief Investment Officer and Vice President for Research and Policy, respectively, at the Ewing Marion Kauffman Foundation. Bradley has more than twenty-eight years of trading and portfolio management experience. He has written widely on financial issues, especially those relating to the U.S. equities markets, and is a retained speaker by the CFA Institute. Bradley was appointed by SEC Chairman Arthur Levitt to the Federal Advisory Committee on Market Data. He has testified before Congress on market structure issues, and was a member of the NASDAQ Quality of Markets Committee and the Investment Company Institute Market Structure committee. He was a member of the board for Archipelago Holdings, LLC, and now serves on the NYSE Pension Managers Advisory Committee. Litan, too, has written widely on financial policy issues, both at the Kauffman Foundation and the Brookings Institution. Litan is a longtime member of the Shadow Financial Regulatory Committee. He has consulted for government agencies and private sector institutions on financial matters, was a member of the Congressional Commission on the Causes of the Savings and Loan Crisis, and most recently served on the Pew Task Force on Financial Reform. We thank numerous readers of earlier drafts, but the views here (and any and all errors) are our own and do not necessarily represent those of the Kauffman Foundation, its trustees, officers and associates.

company “melt ups,” potentially much more severe than the one on May 6, are a virtual certainty.

In setting forth our thesis, we rebut the currently popular critique of so-called “high frequency trading,” or HFT: namely, that it contributed to the flash crash and continues to pose threats to market stability. Likewise, we demonstrate that the charges against algorithmic trading are without foundation.

We reach the following specific conclusions and offer the following principal recommendations:

First, although the Securities Exchange Commission (SEC) has correctly identified some problems that require remedies (such as the growing importance of “dark pools,” explained further below), in other respects, the Commission appears to have fundamentally misdiagnosed the key implications of many of the recent developments in equities markets. This has led the Commission to focus on solutions that either are irrelevant or may be counterproductive.

Among the most significant of the SEC’s critiques are its attacks on HFT. Although high frequency trading has dramatically increased in importance, in fact, it is not to blame for the real problems in U.S. equity markets. Regulatory attempts to level the playing field between HFTs and other traders are misguided and likely would raise costs for retail investors while benefiting old investment bank trading desks and large institutions that once received favorable treatment over lower-commission-paying competitors. Equally misplaced is the suggestion of industry insiders like Paul Tudor Jones that the Commission should encourage the use of rigid trading ranges to constrict price movements to a maximum daily range. As we show below, such limits can be gamed easily by professional investors (like Jones) in global financial markets, and actually worsen, rather than dampen, volatility.

Second, the SEC, the Fed and other members of the new Financial Stability Oversight Council, other policy makers, investors, and the media should pay far more attention to the proliferation of ETFs, and derivatives of ETFs, which we argue are introducing potential systemic risk into the markets while discouraging investor interest in new public company equity offerings. The systemic risks are twofold. One is that the ease of short selling ETFs makes them ideal potential triggers for marketwide free falls of the kind experienced on May 6 during the Flash Crash. The other, less well-recognized danger is that ETFs could be caught in a “short squeeze” should investors for any reason decide they want to cover their short positions. For reasons we outline below, ETF sponsors could then be exposed to the risk that the cash they have collected will be insufficient to cover the cost of purchasing the rising cost of the securities that comprise their indexes. The failure of one or more ETFs in such a circumstance could easily trigger a run on other similarly situated ETFs, in turn leading to a marketwide panic. Claims by such market participants as The Susquehanna Financial Group that ETFs pose no systemic risks simply are not credible, and we show why.

Fortunately, there are remedies to the concerns we raise, and they all reside within the regulatory authority of the SEC:

- The Commission should require far more transparency about the liquidity of the underlying securities or instruments represented by an ETF. It may be a good idea for the Commission to ban ETFs whose holdings are not easily traded. One simple way of doing this is to preclude small capitalization companies from inclusion in any ETF.

- The Commission should compel ETF sponsors to explicitly describe ETF creation and destruction processes in product registration and disclosure documents, including hard rules that govern creation processes based on short interest as a percent of shares outstanding, with hard caps (say 5 percent) on short interest. Additionally, the Commission should require weekly disclosure by sponsors in a transparent, plain English way, such as on the company's website, that summarizes compliance with the sponsor's stated objectives.

- The Commission should immediately subject ETFs to the post–Flash Crash liquidity "time-outs."

- The Commission should require ETFs to obtain opt-in consent from smaller cap companies (or from the exchanges where they are listed) whose stocks are relatively thinly traded.

- The Commission should require securities holders to specifically "opt in" to securities lending agreements rather than the current "opt out" agreement in most account documents. As part of the opt in, the broker should disclose quarterly what the retail investor earns in "interest" for lending stocks in his or her portfolio, and the broker's share of those earnings.

- The Commission should consider, for both stocks and ETFs, prohibiting plain market orders and instead require all market and algorithmic orders to have a minimum price of sale (so-called "marketable limit orders"). This would also help mitigate the kind of free fall in prices we saw during the flash crash, which could be repeated even with liquidity "time-outs" in place.

- The Commission also needs some help from the Federal Reserve System, which is responsible for overseeing the nation's largest banking organizations. Given their central role in capital markets, custodial banks should be required to report each week their fails-to-receive and fails-to-deliver of equity and ETF securities in an analogous fashion to the requirements imposed by the Fed on U.S. primary dealers for debt securities.

Third, two specific rule changes by the SEC would address the problem of "free riding" on the public markets by dark pools—a legitimate problem that the SEC has correctly identified. First, the Commission should require all off-exchange trading venues (dark pools and internalized trades completed by broker-dealers) to first satisfy all publicly displayed orders at the price they intend to trade. Put differently, the Commission should prohibit off-exchange venues from processing trades at the same prices

revealed in the public markets unless the public orders are filled first. In addition, the Commission should adopt one of the rules It has proposed; namely, the “trade at” rule that would require off-exchange venues to improve by one cent the best-quoted price. Together, these two rules changes would restore value to limit orders now undermined by proprietary routing and internalization techniques.

Fourth, the SEC should abandon efforts to artificially promote “competition” among exchanges or their functional equivalents (alternative trading systems) through such fundamentally *anticompetitive* means as compelling all exchanges to report transactions to a single entity (the Consolidated Tape Association) and setting the prices at which such tape information can be sold. In addition, the Commission should set some minimum data transparency requirements for all approved exchanges, including the prompt dissemination of last sale price and volume data; depth of book within 20 percent of market prices; and rules ensuring access to these data. More broadly, the SEC can and should promote more competition in trading, which would further narrow spreads and trading costs by allowing so-called naked access to “long-only” institutional investors who are subject to provisions of the 1940 Investment Company Act. Such firms, which use no borrowed money, are subject to periodic securities holdings disclosure, and are regularly audited by the Commission, may be more dependable counter-parties than heavily leveraged broker intermediaries.

Finally, the SEC and the U.S. Congress have an opportunity to reinvigorate the public market for equities of new companies and thereby encourage promising companies to expand internally rather than sell out to larger, generally less entrepreneurial companies. The SEC cannot encourage new companies to list in the public markets without the help of Congress. We recommend that Congress exempt small companies with a market capitalization of $100 million or less from onerous compliance regulations under the 1933 Securities and Exchange Act so that we can begin to create a true small-cap marketplace, much as existed in the earliest days of the NASDAQ market. Furthermore, shareholders of small capitalization companies of $1 billion in market cap or should be free to choose whether they wish to comply with provisions of the Sarbanes-Oxley Act.

We urge the public, regulators, elected officials, and executive branch policy makers to give attention to the subjects we outline here. In the process, we hope to shed some light on some very complicated but important topics that have a direct bearing not only on our capital markets and their performance, but also on the willingness of the new growth companies to go public and thus help power the sustained growth that our economy so sorely needs.

I.
Introduction: New Scale Companies, U.S. Capital Markets and Outline of the Essay

The weak condition of the U.S. economy and the likelihood, at best, of painfully slow growth for the indefinite future is now widely recognized. It is the reason for much of the angst so evident throughout the country.

Proposed economic solutions abound, but there seems little consensus so far about what precisely should be done to assure a stronger, sustained recovery. The one thing we know from past experience, however, is that new company formation and growth is critical to both output and job growth. An abundance of studies now confirm that new companies—those less than five years old and perhaps as young as only one year—were responsible for virtually all net job creation between the late 1970s and the beginning of the Great Recession.[2]

Growing new companies is essential for the economy, for not only do new companies create jobs, but also they have a history of bringing hugely beneficial (or breakthrough) technologies, products and services to the market. The automobile, the airplane, computers (big and small) and the software they run on, and air conditioning—to name just a few of the technologies that make our modern life what it is and have powered the U.S. economy (and other economies) over the past century—were all introduced and commercialized by entrepreneurs.[3]

These and other new technologies (think iPhone, iPad, and Android) not only generate advances in Americans' living standards, but also help generate optimism about the future, which is required for risk taking by both entrepreneurs and their potential customers.[4] For a long time, at least until the Great Recession, this optimism was a driving force behind the remarkable growth of the American economy.

But optimism today, in the wake of the shattering events of the financial market meltdown in the fall of 2008 and the collapse of residential real estate prices since 2006, is in short supply. Apart from the Apple stores, there appear to be few places where consumers are eager to spend money. The U.S. economy clearly needs a lot more

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[2] See for example Dane Stangler and Robert E. Litan, "Where Will the Jobs Come From?" Kauffman Foundation, November 2009, http://www.kauffman.org/uploadedFiles/where_will_the_jobs_come_from.pdf; John Haltiwanger, Ron Jarmin, and Javier Miranda, "Jobs Created from Business Startups in the United States," Kauffman Foundation, January 2009, http://www.kauffman.org/uploadedFiles/BDS_Jobs_Created_011209b.pdf; and Tim Kane, "The Importance of Startups in Job Creation and Job Destruction," Kauffman Foundation, July 2010, http://www.kauffman.org/uploadedFiles/firm_formation_importance_of_startups.pdf.

[3] William J. Baumol, Robert E. Litan and Carl Schramm, *Good Capitalism, Bad Capitalism, and Economic Growth and Prosperity* (New Haven, CT: Yale University Press, 2007); William J. Baumol, *The Microtheory of Innovative Entrepreneurship* (Princeton, NJ: Princeton University Press, 2010).

[4] The importance of entrepreneurial risk taking by *consumers* is too often ignored, but for new products and services to sell, consumers must be willing to take chances with their hard-earned money to buy them. This important point is a central theme in Amar Bhide, *The Venturesome Consumer* (Princeton, NJ: Princeton University Press, 2008).

Apples—new or young companies making "must have" products or services—in a wide range of industries if the U.S. economy is ever to return to sustained health. This is not an argument for a return to more leverage or running down personal savings rates back close to zero, which clearly got us in trouble. Exciting new products and services can raise consumption growth here to a moderately higher, but sustainable, rate while generating similar excitement abroad and, thus, even faster export growth (without currency depreciation). Both sources of demand, in turn, would enhance business confidence and raise the growth of investment (e.g. monies spent for facilities, equipment, and commercial buildings). The net result would be a more balanced, but sustainable, rate of overall economy-wide growth that would steadily but surely cut into America's unacceptably high unemployment rate.

New and young companies, however, cannot grow and contribute to economy-wide growth unless these firms have *access to capital*—not just bank loans but also equity capital. Historically, our deep and liquid capital markets—our stock exchanges —have played a crucial part in providing equity financing.

Until recently, exchanges provided a gateway for eager investors, from the smallest retail traders to the largest mutual funds, to match their capital to the business dreams and objectives of entrepreneurs. That money expands markets, funds new jobs, and quickly allows companies to reach scale as important contributors to the economy. The efficient matching of investors to growing companies effectively lowers the cost of capital for all businesses.

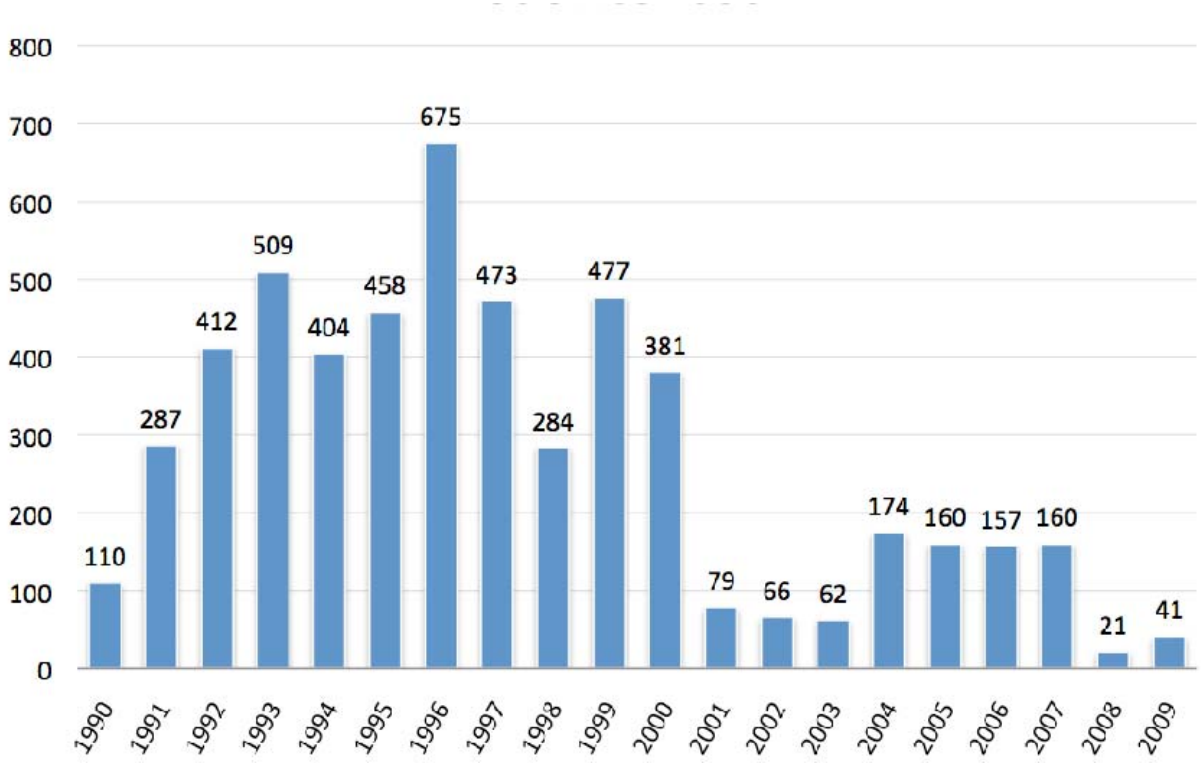
The money raised by private companies from Initial Public Offerings (IPOs) typically enables founders and early investors to "liquefy" their early risky investments while financing the firms' subsequent investments in the facilities and research and development that they need, along with additional workers, to take their breakthrough ideas to scale. Equally if not more important, IPOs give young, growing firms a vital alternative to selling some or all of their company to a larger enterprise, which can dampen or even destroy the entrepreneurial culture that drove the firms' initial success. Imagine, for example, if Microsoft or Apple had sold out in their early years to the "old" IBM or one of its then-current competitors. It is highly unlikely, at least in our view, that the buying firms would have been anywhere nearly as successful as the two independent companies turned out to be, or that the products subsequently produced by each company would have been as wildly popular as they are now.

We sorely need a vibrant IPO market to nurture the growth of our most successful young, inventive companies, which are critical to powering the entire economy. Yet for the last fifteen years—even before the Internet bust—the IPO market has been in the doldrums. As shown in chart 1, the annual number of IPOs during this decade has never approached that of the late 1990s, or even more important, the record pace of the mid-1990s before the Internet bubble really began to form. Moreover, IPOs in U.S. markets through the first three quarters of 2010, though higher than the total for all of 2009, are still well below even the depressed levels of just a few years ago.[5] Duncan

[5] Lynn Cowan, "IPOs Gain Pace as Bankers See Cause for Optimism," *The Wall Street Journal*, October 1, 2010, C7.

Niederauer, president of NYSE Euronext, recently has lamented not only the drop in IPOs in U.S. markets, but the fact that U.S. markets have been overtaken in IPOs by securities markets in Shanghai, Shenzhen, and Hong Kong.[6]

Chart 1. IPOs Since 1990



Source: Jay R. Ritter. 2010. "Some Factoids about the 2009 IPO Market." http://bear.warrington.ufl.edu/ritter/IPOs2009Factoids.pdf.

As we demonstrate in greater detail below, we believe there is an important but so far unrecognized connection between the creation of new indexed securities and the drop in IPOs. This subject deserves much broader public and regulatory understanding and scrutiny.

Historically, investors have invested in individual securities and in broad-based mutual funds, whose professional portfolio managers study the fundamentals of individual companies before allocating capital. Today, more and more financial advisors are turning to index portfolios, often in a package called an exchange traded fund (ETF), to access equity, bond, and commodity markets at very low costs. Missteps by both businesses and regulators who mislead the public or create perceptions of a rigged game can spread systemic distrust that significantly raises the cost of capital for all market participants. That is why the activities of professionally managed funds are governed by the laws and associated regulatory rules found in the 1940 Investment

[6] Duncan Niederauer, "The IPO and the American Dream," *The Wall Street Journal*, September 24, 2010.

Company Act. The interactions between investors allocating capital to individual securities and their brokers are governed by the laws and associated regulatory rules found in the 1933 and 1934 Securities Exchange Acts. In today's trading world, there is no bright line that differentiates these responsibilities, which once were defined by the limitations of the physical world, that have yielded in a grudging way to electronic markets that provide investors easy access to very complex market instruments that may use borrowed money (leverage); depend on counterparty risk (exchange traded notes and exchange traded commodities); and where the trading characteristics are often, but inaccurately, portrayed as highly liquid (when underlying assets may, in fact, be extremely difficult to trade). *The proliferation of new securities packages, enabled by efficient electronic trading today, has been enabled by regulators and encouraged by sponsors dispirited at the unwillingness of new private companies to choose a public listing in the U.S. equities markets.*

Moreover, exchange executives, investors, and companies worry that a host of financial engineering practices are hollowing out the efficient matching of capital to the best companies and undermining the signals that a fairly discovered market price sends to executives about the business decisions they make. In addition, as we will also document, the regulatory requirements of the Sarbanes-Oxley Act of 2002 have disproportionately and adversely affected smaller companies, adding still more hurdles to private companies seeking to list publicly.

In January 2010, the SEC issued a "Concept Release on Market Structure" seeking public comment on a series of issues growing out of major changes in the *structure* of securities markets over the last several decades—specifically, the fragmentation of securities trading into many different venues and the enormous growth of "electronic trading" (the matching of orders by computers rather than by people).[7] SEC Chair Mary Schapiro followed the Concept Release with a major address in New York on September 7 on the challenges she believes these changes now entail for securities markets.[8] Her concerns and those of the Commission more broadly center on whether the changes in equity trading and market structure, which on the one hand have led to dramatically lower trading costs and much faster execution of orders, at the same time also threaten the stability of the markets. The latter concern was highlighted by the so-called "Flash Crash" on May 6 (ironically just two weeks after the comment period on the Concept Release had closed) when stock prices plunged deeply (by more than 60 percent for more than 300 securities, some to prices as low as a penny per share) late in the afternoon, only to rebound almost entirely 90 seconds later.

The failure of the markets on May 6, and the prospect that it could recur, has shaken the confidence of many in the soundness of our equity markets. If this perception is not soon corrected, then we face several unwelcome prospects:

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[7] Securities and Exchange Commission, *Concept Release on Market Structure*, January 14, 2010 (hereafter referred to as "Concept Release"), http://sec.gov/rules/concept/2010/34-61358.pdf.

[8] Mary L. Schapiro, "Strengthening Our Equity Market Structure," (presentation, Economic Club of New York, NY, September 7, 2010), www.sec.gov/nws/speech/2010/spch0907mls.htm.

- That investors will be discouraged from placing their funds in equities in general (directly or through intermediaries, such as mutual funds or exchange-traded funds, or ETFs, though with the qualifications soon to be elaborated), which could diminish overall saving and risk taking by investors;

- That U.S. equities markets will become less attractive for new companies to raise capital, and thereby hamper the growth of potentially the most promising new companies, which in turn can slow the growth of economy-wide GDP; and

- That our financial markets and, in turn, our entire economy can be exposed to significant financial disruptions in the future that, at a minimum, slow growth and, at worst, could trigger or exacerbate future recessions.

Fortunately, there are fixes to the markets that should largely address these concerns, but they are not generally the solutions now being considered by the SEC or actively debated within the investment community and among other policy makers.

We have written this essay for several reasons. First, we want to explain to a wide audience the trends in U.S. capital markets that have brought huge benefits to investors, but at the same time given rise to the kinds of concerns voiced in the SEC's Concept Release. Second, we assess those concerns, concluding that certain of them are misplaced while others are more grounded. Third, and perhaps most important, we identify other trends in the markets not thus far widely recognized or acknowledged by regulators or market participants that we believe are hurting investors, discouraging new public offerings by U.S. growth companies, and threatening to cause future flash crashes or other undesirable market disruptions. We offer suggestions for appropriate reforms, most of which could be implemented by the Commission without new statutory authority, throughout the essay and summarize them at the end.

II.
The Revolution in US Securities Trading: A Short History, Benefits and New Challenges

Once upon a time—as recently as the early 1970s—stock market trading in the United States was relatively simple, at least by comparison with today's markets. The New York Stock Exchange dominated trading activity, with the most listings and the oldest, most established public companies. NYSE listed stocks also traded at a number of much smaller regional exchanges. The American Stock Exchange also was a small exchange where newer companies were listed and traded. And the NASDAQ, born in 1971, was not really an exchange like the others, but instead an organized network of dealers who traded the stocks of new, mostly technology oriented companies among one another, either for the dealers' own account or on behalf of customers. NASDAQ grew in size and influence as some of its early "star" listed companies—Intel, Dell, Microsoft, and Cisco—grew in importance.

Stocks were bought and sold on these exchanges in different and, in retrospect, seemingly ancient ways. On the NYSE, American, and regional exchanges, floor

brokers would cluster around the specialists who were members of the exchange and shout out their orders to buy or sell. Orders reached the floor “crowd” by telephone and floor “runners.” Memberships were sold at high prices to ration the finite physical space on each trading floor – call these the first “co-location” arrangements. The specialists made the matches, and if there were none or imbalances to sell or buy, the specialists theoretically would step in as “market makers” to complete the trades. In return for this obligation, the specialists, by being on the floor, were given an informational advantage, and so could profit by trading with the knowledge of how orders were moving at any given time.

In contrast, NASDAQ was not really a physical trading venue, although it does have headquarters that house the computers that stitch its network together. Instead, the NASDAQ network itself is the venue. Until the Internet essentially replaced telephonic communications, trading “on the NASDAQ” took place by telephone through “conversations” (in reality snippets of trading jargon, often profane) that the network’s dealers had with each other about the prices and volumes of the stocks they wanted to purchase or sell. NASDAQ did maintain a computer bulletin board that contained the price and volume data from the transactions conducted on its network. Today, the NASDAQ network essentially piggybacks on the king of the networks, the Internet, so that NASDAQ trades (like those on other “exchanges”) are initiated and executed by computers.

Until the SEC changed the rules in 1975, the costs of trading stocks—namely, commissions—mostly were fixed by the members of the NYSE with the approval of the SEC. Readers old enough to remember will recall that the commissions were calculated as a percentage (typically 1 percent) of the total value of the transaction (price times volume), and so could be hefty for large trades. Institutional customers with clout and trading volume had sufficient bargaining power to be able to negotiate lower commissions, which the SEC permitted in 1971 for trades valued over $500,000. But true competition among brokers didn’t really break out until the SEC abandoned fixed commissions entirely in 1975. Not only did this long-overdue step induce the established brokers to compete vigorously with one another, but it permitted the entry of new “discount brokers” who pushed commission rates down. Discount brokers like Schwab, eTrade, Ameritrade, Scott, and others would not exist had the system of fixed commission rates not been dismantled.

Even larger changes, however, in both technology and the SEC’s rules governing trading itself, have fundamentally altered the number and structure of equities markets and way stocks are traded on them. Perhaps most significant in this regard is what happened in the aftermath of the investigation of quote fixing on the NASDAQ by the Justice Department and the SEC in the mid-1990s. This investigation was triggered by a study by two Vanderbilt economists, William Christie and Paul Schultz, which discovered the highly anomalous fact that the bid-ask spread (the difference between the best offer to sell and the best offer to buy) on the 100 most heavily traded NASDAQ stocks was always a quarter of a dollar, and not quoted in fractional one-eighths, as was

the case for other less popular stocks.[9] Christie and Schultz inferred that the only way to explain the anomaly was that the dealers in these stocks were implicitly colluding. As remarkable as this allegation seemed at the time, both government agencies that followed up the investigation essentially found support for it, and eventually NASDAQ settled and agreed to halt the practice.

Most important for our purpose here, however, is what the SEC did to try to prevent future quote or price collusion. It eventually adopted in 1997 two new order handling rules aimed at making the stock markets much more transparent, so that collusion of the kind discovered by Christie and Schultz and confirmed by the government agencies would be much more difficult to pull off and ideally could not be repeated. Specifically, the Commission's Limit Order Display Rule required dealers (technically "specialists" and market makers) to post for public view all limit orders; namely, those orders to buy at no higher than a specific price or to sell at no lower than a minimum price, when those orders are better than the quote provided by the dealer.[10] (Limit orders contrast with market orders, which request only that the trade be executed at the current market price, whatever it may be). In the same year, the SEC also adopted the Quote Rule requiring that dealers (also technically specialists and market makers) provide to the public their most competitive quotes. In combination, the two order handling rules opened up the stock quote "kimono" to the public and for the first time enabled investors to see the "order book"— the prices at which investors were willing to trade specific share quantities.

The SEC's new rules eliminated the one-time dominance of Instinet in the NASDAQ marketplace from the late 1980s through the mid-1990s. Institutions and broker dealers used this "private market" to post orders (real quantities at real prices instead of the NASDAQ "nominal" order book, which was 1,000 shares displayed for all market makers, all the time). While the public saw only the official NASDAQ quotes, large institutional traders and market makers relied on Instinet's private electronic "book" to trade at better prices without having to change the markets' official prices. SelectNet (a utility created for market makers' use only) then joined the fray, followed by Island, and so invited much criticism because the market had devolved into two tiers: one to take advantage of uninformed retail investors through regulatory loopholes, and the other to benefit market makers and order "internalizers," which will be more fully discussed below.

The order handling rules essentially said that all orders in the electronic markets must be incorporated in the public quotes—although for many years these rules applied only to NASDAQ. In 2005, the SEC adopted a series of rules collectively known as Regulation NMS to finally attack the market dominance at the NYSE. This change ushered in the rapid birth of a number of new players in the markets: Archipelago (and

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[9] See W.G. Christie and P.H. Schultz, "Why Do NASDAQ Market Makers Avoid Odd-Eighth Quotes?" *Journal of Finance* (December 1994): 1813–1840.

[10] Professional traders routinely shredded wider "public market quotes" by trading in fractional increments as small as 1/256 of a cent (0.4 cents) to gain price priority before the Order Handling Rules in 1997.

its tag line “everything out in the open”) and Bloomberg’s B-trade were the first post-1997 order display firms that provided complete order transparency, and were immediately incorporated into the public’s National Best Bid and Offer (NBBO) system.

The order handling rules also had an unintended, but important, impact on providers of exchange services. With limit orders publicly displayed, a new form of trading platform—the electronic communication network (ECN) —could electronically, at a fraction of the prices charged by the traditional exchanges, match the buy and sell orders that “crossed” at the same price. The SEC legitimized these ECNs in 1998, shortly after issuing its Order Handling Rules, by adopting Regulation ATS, which enabled ECNs to register either as traditional exchanges or as alternative trading systems (ATS). The early ECNs that quickly became prominent included Instinet, Island, Archipelago, and Brut.

For a time, the ECNs posed a significant competitive threat to the major exchanges, but only for a time. Gradually, all but a few of them (such as Direct Edge today) were bought by exchanges: NASDAQ acquired Brut and part of Instinet, which was merged into Island before being bought, while the NYSE purchased Archipelago (and the LIFFE electronic futures business in London and Euronext). But the mergers did not stop computers from taking over trade execution. In each case, the competition from the ECNs, and later the absorption of the ECNs, drove both NYSE and NASDAQ to execute the vast proportion of their trades electronically. The shift toward electronics was especially painful and disruptive for the NYSE, which historically completed trades manually through its floor member-specialists. Eventually, the NYSE abandoned its membership structure and went public in 2006.[11]

The electronics revolution in exchange trading had another important implication. Once the computer systems were in place, the marginal costs of completing additional trades essentially fell to zero, which meant that it made sense economically to put those systems to use executing more and more trades or to launch more and more trading products. And that is exactly what happened: The combination of dramatically lower commissions and exchange trading costs impelled a huge increase in trading volumes. It was not until 1982 that 100 million shares traded in a single day on the NYSE. In 1997, members there traded 1 billion shares for the first time. In 2001, as the U.S. adopted decimal trading and electronic networks because they were vastly cheaper and more efficient, 2 billion shares traded. Today, it is routine for nearly 6 billion shares of NYSE-listed stocks to trade in multiple venues. As the SEC’s January Concept Release notes, average trading volume tripled in just four recent years—from 2005 to 2009.[12]

Likewise, trade execution times also have fallen dramatically. In the good old days of the 1960s and 1970s, it could take a minute or more for the typical retail trade to be completed**.** By comparison, the Concept Release notes that, between 2005 and 2009,

[11] Some other interesting history in this regard may be noteworthy. The NYSE bought Archipelago, which already was an approved, for-profit stock exchange traded on the Pacific Coast Exchange. Under terms of the merger, the Archipelago shares became a vehicle for the stealth offering of new shares under the Arca registration.

[12] Concept Release, p. 6.

average execution time for small orders of NYSE-listed stocks fell by more than a *factor of 10*, from 10.1 *seconds* to just *0.7 seconds.*[13]

More importantly, the costs for large institutions to trade very large orders in the market have been reduced by more than half during recent years—and that money goes directly into the pockets of pensioners and investors.

Economies of scale also have driven the major U.S. exchanges to use their technology platforms to extend their reach to other markets, especially since "money never sleeps": stocks can trade around the clock in different exchanges as the world turns. NYSE and Euronext, one of Europe's largest exchanges, linked up in 2006. NASDAQ bought the Stockholm Exchange in 2007.

III.
The SEC's Market Structure Schizophrenia

It is tempting to conclude that, in the limit, the virtues of technology and liquidity imply that trading should evolve to a monopoly. After all, as trading volume expands at any location, the more desirable it becomes for other traders to do business there. Trading becomes a virtuous circle, with a single exchange seemingly the end point. Such notions are derived from a time when phones converged at a specific physical location on the trading floor. Today the world is connected by a network. All traders with a computer gain equal and instant access to the nation's equities markets. The natural monopoly notion breaks down in a virtual world where physical places for trading are far less relevant than they once were.

Moreover, a single exchange, or its functional equivalent, a "central limit order book" (CLOB) containing the quotes from all exchanges, would lack incentives—like monopolies in other industries—to innovate. Facing no competitive threat, why should a single trading venue ever change? Specifically, why should such an entity, or a collective of entities, introduce the new technologies that have driven costs and execution speeds down like a stone? The events of September 11, 2001, also provide a national security reason as to why a CLOB is a bad idea. But, as we suggest later, software aggregators can effectively put together a virtual central order book without entailing the national security risk of having a single physical exchange.

In any event, at least since the Securities Exchange Act of 1934, U.S. policy makers have wanted the best of both monopoly and highly competitive markets: a system of competing exchanges that are linked through communications and data processing technologies. Specifically, Section 11A of that Act directs the SEC to establish (and maintain) a "national market system" (NMS) that promotes competition among exchanges, while also minimizing the "potentially adverse effects of fragmentation on efficiency, price efficiency, best execution of investor orders, and order interaction."[14]

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[13] Ibid.

[14] Senate Banking Committee, Subcommittee on Securities, *Hearing on Competition and Transparency in the Financial Marketplace of the Future*, testimony prepared by Harold Bradley, April 26, 2000, http://banking.senate.gov/00_04hrg/042600/bradley.htm.

How the Commission is to carry out this seemingly impossible balancing act is not made clear. But the theory seems to be, in any event, that through a combination of the right rules harnessing the best technology, brokers can be made to seek out the best prices for their customers on whatever exchanges they happen to be (in fact, this is precisely what Regulation NMS, discussed shortly in more detail, attempts to achieve).

The Exchange Act never mentions how many exchanges the NMS should contain, but over the years, with a few exceptions, the Commission has acted in ways that err on the side of having too many rather than too few exchanges. Three important steps or initiatives stand out.

Consolidated Trade Reporting

Since the 1970s, the SEC has required all SEC-registered exchanges to report the prices and volumes of their trades and quotes to central data consolidators operated by the Consolidated Tape Association (the Commission's rules allow customers who don't want their limit orders displayed, however, to opt out of having them made public).[15] The CTA, in turn, distributes the results to subscribers who, in turn, publish the results. The CTA was designed both to improve the reporting of transactions data—before then, NYSE ticker tape did not report transactions in NYSE-listed stocks that were executed on regional exchanges or on over-the-counter (non-exchange) markets—and to facilitate competition by the non-dominant exchanges.

CTA is technically a joint venture of its member exchanges, which effectively sets the prices that are charged for the data, subject to SEC review. In reality, however, CTA is a government-sanctioned data cartel or monopoly. Like all monopolies, the CTA earns "rents" or excess profits, despite SEC oversight, which effectively help subsidize the operations of all of the exchange members. (We know this to be the case, having been told that CTA has refused motions by one or more of its board members to lower its tape charges by as much as 20 percent). The CTA thus artificially may prop up some exchanges that could not otherwise exist without tape revenues also being artificially inflated. In addition, by requiring all transaction data to be funneled through a central repository, the CTA system slows down the transmission of these data to market participants. This effectively acts like a tax on investors, who must pay for trading data to access current stock prices before entering orders into the marketplace. These high costs paid ultimately by investors subsidize an incentive structure for exchanges to compete for revenues.

Despite the presence of the CTA, the SEC allows exchanges and ECNs to offer data that are included in the consolidated reports directly to individual customers so long as these data are offered at "fair, reasonable, and non-discriminatory" terms. These specific data "feeds" can include other information that is not included in the consolidated data, including "depth of book" quotations that are inferior to the best price quotes. Because the individual data feeds do not first go through a consolidator, they can reach customers more quickly than the consolidated data. The fact that individual data feeds already are allowed raises the obvious question that we answer below: Why

[15] This language is drawn from a Senate Report in 1975 and is found in the Concept Release, 12.

require data consolidation in the first place, and instead, why not simply allow *all* transaction and quote data to be provided by the exchanges and ECNs directly to data vendors, with the SEC responsible for defining rules of fair access and minimum standards of transparency in public markets?

Regulation ATS

We already have described how the resolution of the NASDAQ quote-fixing investigation helped lead to ECNs, which the SEC rightfully legitimated as alternative trading systems under its Regulation ATS. Clearly, that regulation, driven as it was by a welcome change in the order handling rules and facilitated by huge and continuing improvements in computer processing and communications capabilities, has helped foster healthy competition among exchanges. This competition, in turn, has helped spur the electronic revolution in securities trading. At the same time, each of the major ECNs could not sustain profitability in this new competitive environment, and ultimately merged with one of the two leading exchanges, NYSE or NASDAQ.

Regulation NMS

As noted, in 2005, the SEC adopted a series of rules, collectively known as Regulation NMS, aimed at facilitating the "national market system" and ensuring that investors received the best price, regardless of where their orders were executed. Rule 611, the Order Protection or "Trade Through" Rule, was and remains the most controversial. It requires traders to transact on the trading venue offering the lowest price, rather than on the basis of which venue offers the quickest or most reliable execution.[16]

Rule 611 remains controversial. In one view, the rule protects investors by giving them the best price (though this is not necessarily always the case since the rule only protects the "top of the book," or the first quote; larger trades that go deeper into the book are not protected). A competing view is that because the rule does not reward speed of execution or reliability, it does not promote innovation. In any event, the rule allowed regulatory exemptions for exchanges to route orders around slower exchanges by relying on "self help" when order response times from linked exchanges was slow. The use of self help provisions was thought by some exchanges to be a method to internalize a larger proportion of trades and enjoy maximum profits by not having to route orders to other exchanges. The joint CFTC/SEC report on the May 6 Flash Crash suggests that self help rules may have accelerated the price collapse when the NYSE used liquidity time-outs not respected by other exchanges. In creating ways for exchanges to be virtually linked, the SEC has allowed market maker and self-help exemptions that did not anticipate the high speed trading world of today. That said, regulation NMS most likely has some effect, at the margin, of protecting less efficient exchanges.

[16] Transaction data are reported to the Consolidated Tape System (CTS), while quotes are distributed to the Consolidated Quote System (CQS). Both are operated by the CTA.

The SEC's Penny Increment Rule

Perhaps the most contested of the SEC's recent rules is the one it adopted in 2001 requiring exchanges to permit quotes in penny increments, rather than in the fractions that previously were used. The narrower quotes clearly have led to narrower spreads, which have benefited investors. Nonetheless, some critics continue to argue that with narrower spreads, dealers don't have sufficient incentives to act as market makers, thus contributing to the market's instability. As we argue below, we believe this critique is baseless because it was and always will be unrealistic to expect any market makers to stand in front of the speeding train known as the market and step in when an avalanche of sell orders, in particular, are swamping the exchanges. Indeed, there is not a shred of empirical evidence that market makers have ever sacrificed themselves as described in market mythology—by choosing to accept losses in volatile downward markets as a cost of enjoying protected profits and advantages during normal market environments.[17]

To summarize: Exchange trading is subject to two sources of economies of scale., the virtuous cycle of liquidity, which drives more trading volume to exchanges with the most offers; and the capital intensity of electronic trading venues, which drive the costs of executing the marginal trade to zero. Congress has directed the SEC, however, to prevent monopolization of exchange trading in the interest of promoting innovation. Through a series of rules, the Commission in fact has made exchange trading less concentrated over time.

The net result is that not only does the NYSE no longer dominate the trading of stocks, but trading also is spread out among many venues. This is evident from chart 2 below, which shows the latest market shares in the trading of listed stocks on U.S. securities exchanges. The shares are distributed among the registered exchanges, ECNs, so-called "dark pools" (to be discussed shortly), and internally matched trades completed by broker-dealers themselves. It is clear that no single entity or even combination of entities (such as the consolidation of shares of the traditional and newer electronic exchanges of the NYSE and NASDAQ, respectively) comes close to dominating the trading of U.S. equities.

[17] The road show prior to the public offering of LaBranche and Associates (LAB) in 1999 revealed a metric called the principal realization rate. It was effectively a profit measure for market making activities; the consistency of the PRR through good and bad markets was presented as an important reason to own a specialist company and the data indicated somewhat higher margins during the most high-volatility trading periods.

Chart 2. Estimated Percentage of Share Volume in Stocks Listed on U.S. Securities Exchanges, September 2009 vs. September 2010

	9/09	9/10
Registered Exchanges	63.7%	69.9%
NASDAQ	19.3	18.4
NYSE	14.7	14.3
NYSE Arca	13.0	14.6
BATS	9.3	9.8
NASDAQ OMX BX	3.3	2.8
EDGA	0	4.4
EDGX	0	3.6
Other exchanges	4.1	2.1
Direct Edge/ECNs	11.8	0
Dark Pools	8.5	12.1
Internal trades through broker-dealers	16.0	18.0

Sources: NYSE Euronext, Rosenblatt Securities "Let There Be Light" (Rosenblatt's Monthly Dark Liquidity Tracker)

IV.
Growing Criticisms of the Electronic Trading Revolution

Despite the increased competition among exchanges—an outcome that the SEC itself has promoted over the years—the Commission, and specifically its chair, Mary Schapiro, appears now to be having some second thoughts, or at least some concerns about the implications of multiple electronic trading venues. The issuance of the Concept Release in January 2010 was the first indication that the Commission was not fully comfortable with recent market developments. Schapiro followed up in her speech of September 7, 2010, before the Economic Club of New York, by detailing her more specific concerns (although she did not explicitly label them as such, it is clear from her language that these developments do worry her and possibly other members of the Commission):

- As indicated in chart 2, nearly 30 percent of the trading volume in NYSE-listed stocks is executed either internally within roughly 200 broker-dealers or in as many as thirty "dark pools." The latter are alternative trading platforms that, unlike ECNs, do not provide their best-priced orders to the CTA and are thus used primarily by large institutional holders wanting to keep their trades quiet so as not to disturb prices. Some institutional trades are handled internally by

broker-dealers for the same reason (although many internal trades are for smaller orders that broker-dealers complete, either because they have the stock in their inventory or a sufficient customer base to have matching orders). Traders and their customers who use internal markets or dark pools to execute their trades thus effectively "free ride" on the quotes and transactions data from the other venues whose quotes and prices *are* made public.

- Dark pools are holding areas where large traders hope to meet up with a similar-sized order on the other side. Brokers provide algorithms to institutional traders that have proprietary methodologies for routing orders to venues that maximize the brokers' revenues by enhancing rebates and perhaps other revenue sources. Conversations with several buy-side traders suggest to us that many buy-side traders using these venues do not know exactly where or for how long their orders are moving through dark pools before execution and/or posting to the NBBO among ECNs. Brokers should be required to publish for customers exact routing destinations, as several traders explained that brokers told them such routing instructions are proprietary to the business model. Some mutual fund and hedge fund traders use these approaches to pay research and operating costs through the 28(e) soft dollar exemption in the 1975 amendment to the Securities Exchange Act.[18]

- Electronic markets do not have formal specialists or market makers, such as the member-specialists of the old NYSE who had affirmative obligations to step in and provide liquidity and make markets in stocks when the order book was thin or unbalanced. Instead, proprietary trading firms (principally hedge funds) have become the dominant liquidity providers without having to register as market makers (and would have few obligations even if they did). The demise of the specialist has been blamed for the May 6 Flash Crash, when prices for more than 300 stocks plunged suddenly and deeply because the markets were temporarily flooded with market orders to sell, which were executed at ridiculously low prices (as noted, some at roughly a penny per share). Although the Commission introduced stock-specific liquidity time-outs (introducing a trading pause if prices move by more than 10 percent in a five-minute period) relatively quickly after this event, the same rules were not immediately applied to ETFs—a troubling oversight on the part of the Commission, especially since ETFs were among the principal instruments whose value suddenly plunged on May 6.

- The proprietary traders who have stepped in to provide liquidity are called high frequency traders (HFTs) who use computer programs capable of

[18] A soft dollar arrangement directs the commission generated by a transaction towards a third party or in-house party for services, such as research, that benefit the client but are not directed by the client. In contrast to "hard dollars," which are cash payments tied to particular transactions and are reported; under the Section 28(e) exemption of the 1934 Securities Act, soft dollars may be incorporated in brokerage fees and paid expenses, but do not have to be broken out in required reports.

> submitting thousands of quotes per second (although the SEC and others have noted that there is still no widely accepted definition of what an HFT actually is). HFTs use different trading strategies to eke out tiny profits on huge volumes of trades, some completing more than a million per day. Collectively, HFTs (loosely defined) now reportedly account, on some days, for more than 50 percent of equity market volume, up from less than 10 percent just several years ago. Schapiro also cites data indicating that HFTs submit ninety orders that are quickly canceled for every one order that is actually executed.

Schapiro points to several concerns that "some investors and others" have about these various developments (implying that she shares these concerns). First, the rising importance of trading venues where quotes and transactions are not publicly displayed may be impairing the important price discovery function of equity markets, which is an important public good. Prices are important signals for companies and investors, as high or rising stock prices reward success, while low or falling prices punish failure. If the markets are not generating adequate price signals in a timely fashion, this important feature of the equities markets is being compromised. The Commission's Concept Release explicitly raises the question about the high technology investment required by some market participants to effectively compete with high frequency traders and whether it is "fair."

Second, both the Concept Release and Schapiro's speech reflect unease about the potential unfairness of recent changes in market structure; specifically, the savings in a few milliseconds in trade execution that HFTs are able to realize by co-locating their trading operations next to one of the trading venues. Unlike the days when specialists conducted trades manually and thus had privileged access to market information, but also affirmative obligations to provide liquidity in times of market stress or forego trading that exacerbated volatility (for example, by removing bids as prices declined), today, there are no specialists. The new world of trading apparently prompted Schapiro to wonder in her speech whether those with privileged access to the markets today (by implication, HFTs) "undermine the fair and level playing field essential to investor protection, capital formation, and vibrant capital markets generally."

Third, Schapiro raised certain concerns about the impact of HFTs on market volatility, especially on the downside, and offers several possible solutions. For example, to at least partially fill the void left by the demise of specialists, she asks whether it might be constructive to require today's liquidity providers—principally HFTs—to at least avoid destabilizing trading strategies by withdrawing from the market at critical times. (Schapiro raises this possibility but doesn't explain how it might be implemented.) She also asks whether the SEC should do something to limit HFTs from submitting and then cancelling so many orders (even though such "pinging" is their way of discovering what prices the market will bear at any given time). Finally, Schapiro infers from the fact that, during the Flash Crash, trading volume in dark pools plummeted, that in times of stress traders still rely on and use public markets, and thus wonders whether this situation is

sustainable.[19] In particular, while she acknowledges that dark pools provide important short-term advantages to institutional investors who value secrecy, she also questions whether "non-transparent trading …. undermine(s) all investors in the long run by compromising the essential price discovery function of the public markets."

The Concept Release does not attempt to validate any of these "concerns" apparently voiced by some investors. For example, nowhere is high frequency trading defined, although we know that the practice covers hundreds of institutional and broker dealer trading approaches. In our view, trading algorithms and high frequency trading serve a tempting, convenient, and easy target for politicians and market participants who have failed to adapt to the modern technology age. We shortly discuss the allegations about HFTs in more detail. We next discuss, however, the criticisms of algorithmic trading.

V.
Algorithmic Trading and the Facts

There is much misunderstanding about algorithmic trading. The very name conjures up notions of trading robots out of control. Who could be for that?

The reality is more complicated. The common algorithms used by institutions to trade stocks were developed in the early part of the decade by leading broker dealer firms who relied on the computer routing techniques to drive the firm's trading profits. When the algorithms became widely adopted and proprietary advantages weakened, Wall Street peddled these same algorithms to institutional trading clients. In conversations with knowledgeable market participants, we have learned that many leading high frequency firms are led by, or rely on, the same quantitative investment leaders who formerly developed algorithms for the leading banks. One leader of such a firm suggested that it's a wry irony that institutions would rely on computer code written by experts who know how the algorithms are designed to work and how plodding, predictable institutional traders placing very large orders might best be exploited.

This does not necessarily make the programs bad, though. Before we explain why, it may be helpful for readers to peruse the boxed sidebar on the following page, which identifies and explains the most popular trading algorithms.

[19] The Commission fails to analyze trading behaviors and the technology available to buy-side traders who can instantly cancel orders from all venues in a few milliseconds if volatility, news, or fear creates tumult in the stock market. The prudent risk management by HFT firms, broker-dealers, and institutional traders who canceled buy and sell orders against a backdrop of fear and uncertainty created yet more instability. According to the Flash Crash report, this was especially true in ETF products where virtually no resting orders could be found more than thirty basis points away from last sale prices.

Popular Trading Algorithms

Volume Weighted Average Price (VWAP): One of the oldest techniques, pioneered on the floor of the NYSE by the crowds around the specialist post, is used to minimize market impact and deliver an execution price in line with a VWAP benchmark for individual securities. At the base level, a broker will continue to buy a security as it rises in price, but will never pay more than the day's VWAP at the time of trading. The VWAP calculation during and at the end of each trading day incorporates the volume of shares traded at each discrete price, and then averages a price that reflects at what price the most volume traded in the market during the day. The algorithm essentially is Volume (V) times Price (P), summed for each price level and then divided by the total number of shares traded that day. On May 6, such an algorithm would have likely reduced selling pressure as prices fell on lower volumes. This algorithm would sell more shares at lower prices if other market participants did so as well. This order reflects a "wisdom of crowds" methodology and is not usually constrained in price.

Percentage of Volume, "Follow" algorithms: Formerly known on the NYSE trading floor as a "participate" order, this trading technique describes situations wherein a specialist matches any orders that traded within a specified percentage of the overall trade request until the order is filled. This type of order has been used for decades, although surprisingly it was castigated by the U.S. Commodities and Futures Trading Commission (CFTC) and SEC investigators of the Flash Crash, who criticized the use of a 10 percent volume match order as a catalyst for that event. Ironically, that order of $4 billion was executed in a little more than twenty minutes. If overall volumes were lighter, that same order might have taken hours or even days. The complete execution of that order means that *at least $40 billion* traded side by side with the much (inappropriately) criticized order. Many institutional traders now "program" orders at the beginning of the day to "go along," assuming that markets are efficient in pricing and trading prices will normally be fair and efficient. This kind of order, if used by large numbers of other market participants (or even by a few institutional traders placing very large orders) on a volatile, news-driven trading day, can involve the market in significant negative feedback effects—a crash, if you will. Orders of this sort should always have finite price limits. The Flash Crash report says that "some firms reported that their algorithmic trading systems attempted to execute against declining prices all the way down to stub quotes—either because trading was consistent with the parameters for that system, or because the system did not necessarily recognize that it was hitting stub quotes…"[20] But this quote should not be read out of context. Algorithms themselves are not the problem, and the lack of a human specialist is not a problem; rather, inattention and lazy behaviors at some institutional trading desks are where accountability resides. There should be firm finite prices on all orders, including trade routing algorithms, entered in the marketplace.

Time Weighted Average Price (TWAP): This algorithm also is designed to minimize market impact by evenly distributing an order over time in mostly liquid stocks. TWAP orders are broken up into many small and frequent orders. This institutional order type tries to minimize the ability for predatory trading interests to identify and game large orders by dividing a large order into small increments and feeding them into the market throughout the day. The quantify and time of an order is sometimes varied; while more "stealthy" than other institutional order types, there is higher risk that a trader using such strategies might achieve worse prices for all but the largest orders.

Minimal impact: This algorithm is used by institutions trying to avoid any detection by adversaries in the market. It typically routes trades mostly or entirely to dark pools.

Market on Close (MOC): The idea behind this algorithm has been used for decades on the floor of the NYSE. The advent of futures and index trading, now augmented by hundreds of ETF indexes, uses the anticipated future market close as a benchmark and calculates optimal starting times to minimize overall trading costs (notably, timing risk and market impact). Many brokers will guarantee a MOC price to large institutional clients and then use algorithms to try and better the close, pocketing the difference as trading profits.

[20] CFTC and SEC, *Findings Regarding the Market Events of May 6, 2010*, September 30, 2010, 64, , http://www.sec.gov/news/studies/2010/marketevents-report.pdf. (Hereafter referred to as "Flash Crash Report.")

In sum, the box on the previous page demonstrates that *most of the algorithms in use today more efficiently mimic (through the use of advanced information technology) the very same approaches used by a host of brokerage intermediaries in the NASDAQ stock market and by specialists at the NYSE in the 1980s and 1990s.*

The algorithms described in the box nonetheless leave a regular "footprint" in the markets that can be easily exploited by smart technologies and high frequency traders. The concentration of enormous assets with fewer and fewer mutual fund and institutional account managers (and ETFs) means that today's orders are many times the order size as when the money management industry was much more highly fragmented. The larger an order, the more difficult it is to trade without significantly impacting a security's price. That's why so many institutions try and hide in the "shadows" of so-called dark pools. The transparency of today's markets and the rigid, maladaptive approaches of many institutional traders make them easy targets for smart, technology based traders. There are thus no economies of scale in large institutional asset pools. It is an inescapable fact that large order sizes move the price of securities.

This economic outcome cannot be repealed by blaming high frequency traders for taking advantage of clumsy and conflicted participants in the marketplace. In fact, buy-side clients can generally access, for a fee, the same trading infrastructures as those used by the street's most profitable high frequency traders. The greatest beneficiaries of regressive regulation of these new competitive technology trading firms would be the old investment bank trading desks and large institutions who once received favorable treatment over lower-commission paying competitors; the big banks have for years favored big-commission paying clients with large "loss" ratios, losing money on those orders to attract the orders of less economically important clients. Fast-moving, electronic markets have busted those cross-subsidy arrangements. The biggest losers of repressive regulation would be retail stock investors who now benefit from instant access to small order-size quotes on virtually all securities.

VI.
Some Not-So-Conventional Wisdom About The Electronics Revolution and HFTs

The major changes that have revolutionized securities trading in recent decades, and are well described in the Concept Release and by Chair Schapiro, cannot be contested. It is a fact that equities trading including the largest orders by institutional investors (such as pension funds, insurance companies and mutual funds) is now almost entirely electronic, carried out on multiple venues at far faster speeds and dramatically lower costs than when trading was executed on exchange floors through open outcry or over the telephone.

It should also be a given that whatever "reforms" the Commission may adopt to address certain problems in the current equities market structure should not compromise the enormous benefits to investors of the electronics revolution.

The Commission's post–Flash Crash decision to implement stock-specific liquidity "time-outs" in addition to the existing marketwide circuit breakers that have been in

place (with some modification) since the 1987 stock market crash pass this test. Shortly, we will suggest at least several other trading reforms that also would mitigate the risk of another flash crash or similar event, but the stock-specific circuit breakers are an important first step.

Other implications of the electronic trading revolution drawn by Chair Schapiro and by the Commission in the Concept Release are more questionable, in our view. In this section, we offer an alternative narrative of these implications, which we believe fits closer to reality. Just as in medicine, it is important for financial policy makers to have the right diagnosis before offering and implementing prescriptions. Otherwise, the "cures" either may not work or be worse than the disease.

Is the Loss of Specialists A Bad Thing?

The asserted benefits of the former specialist system were largely a myth or, at the very least, largely overstated. The case for giving specialists privileged access to trading information—they had control over the "trading book" in their assigned stocks, after all—rested entirely on the advantages of their supposed obligation to step in to provide liquidity when markets themselves didn't provide it. Yet in perhaps the best test yet of this thesis—the stock market crash of 1987—specialists were essentially missing in action. They didn't step up and buy when the massive selling took place. During its 1999 road show, the specialist unit LaBranche reported that its business had been profitable every quarter for twenty-two years; that would include the market's record single-day drop in 1987, the major bear markets in 1980 and 1982, and other periods of market "distress."[21] In 1987, NASDAQ market makers didn't even answer the phone when panicky traders were calling them to place orders. And, frankly, who could blame them? What rational person would want to step in front of a speeding freight train? It was foolish ever to have expected them to do this. But if this is true, and we firmly believe it is, then the pining today over the loss of specialists should be taken with a grain of salt.

Are HFTs Really To Blame?

If the role of specialists has been grossly overstated, then so too has been the demonization of the HFTs who have taken their place. The fact is that the new HFTs trade enormously higher volumes of stock for a fraction of the "take" (the difference between the bid and the ask price) of yesterday's market makers and specialists. When one of us (Bradley) started as a trader in 1988, the typical market maker netted about four cents in profit for every share traded. In contrast, the typical HFT today reportedly nets *7/100 of a cent or less* for every share traded. In short, the HFTs are willing to work for *98 percent less* than what the average market marker of yesteryear made. These small profits are derived from the provision of quotes for almost all securities, large and small, in the market. The net result is an enormous increase in liquidity for the small orders submitted by retail investors.

[21] Senate Banking Committee, http://banking.senate.gov/00_04hrg/042600/bradley.htm

Of course, we do not defend certain indefensible practices of HFTs, such as submitting "flash quotes," "quote stacking," and "quote stuffing" —which regulators are right to rein in.[22] Yet despite these issues, the fierce competition among and between the HFTs has helped to drive trading costs relentlessly down, which has benefited institutional *and retail* investors alike.

The concerns or fears that HFTs co-locating near trading venues have an unfair advantage relative to long-term investors are equally misplaced. For as long as there have been markets, professional traders "close to the action" always have had an informational advantage over those who trade infrequently. The reality is that today, with trade execution times well under a second, the transmission of price and volume data to the public in no more than several seconds (despite the delays caused by the CTA, discussed above, and later in this paper), the timing advantages of HFTs relative to other traders are far less significant than the advantages enjoyed by professional traders just a few decades ago. Moreover, with the SEC's requirement of public reporting of limit orders in effect for more than a decade, non-professional traders have access to the same or similar information about the trading book once enjoyed only by the professionals. And finally, even with their small advantages, HFTs add so much liquidity to the market that they bring down trading costs for the retail, less-professional investor. Efforts to eliminate any vestiges of unfairness that certain HFTs are said to enjoy could reverse these gains for retail investors.

Some money management executives have accused high frequency trading firms of front-running large, institutional buy and sell orders. Others have protested the apparent sale of data about large orders in dark pools or "reserve" books to competitive trading interests. As a rule, the buy side (large institutional investors) has long treated trading desks as bill paying centers that attempt to meet best execution requirements while using client commissions to pay a fund's research and certain fund operating expenses. This has led to chronic underinvestment in technology, trading resources, and trading professionals. Most firms use trading software provided by third parties, trading algorithms provided by broker dealers on Wall Street, and "outsource" handling of client orders to a host of intermediaries. The predictable way that many of these investors behave and the execution of orders too big for the markets make such firms likely targets for short term traders. Many institutional investors are like ocean freighters; the high frequency firms are motor boats. Without more investment in trading technology and trading professionals, such institutional investors should not expect to compete favorably with firms aggressively investing in both.

Notwithstanding their complaints about HFT, institutional investors now enjoy the lowest trading costs ever, which we would argue HFTs have helped to make possible. The savings have been widely discussed in a variety of Transaction Cost Measurement (TCM) papers and in congressional testimony by American Century Investments.[23] In 1992, the average cost of trading a $20 stock on NASDAQ was about 23c per share,

[22] Flash quoting involves is a brief, flickering quote send from a market venue to the consolidated tape; its economic purpose is to attract contra-side orders to that venue, so that the order can be internally crossed and not be assessed an outbound routing charge.
[23] Senate Banking Committee, http://banking.senate.gov/00_04hrg/042600/bradley.htm

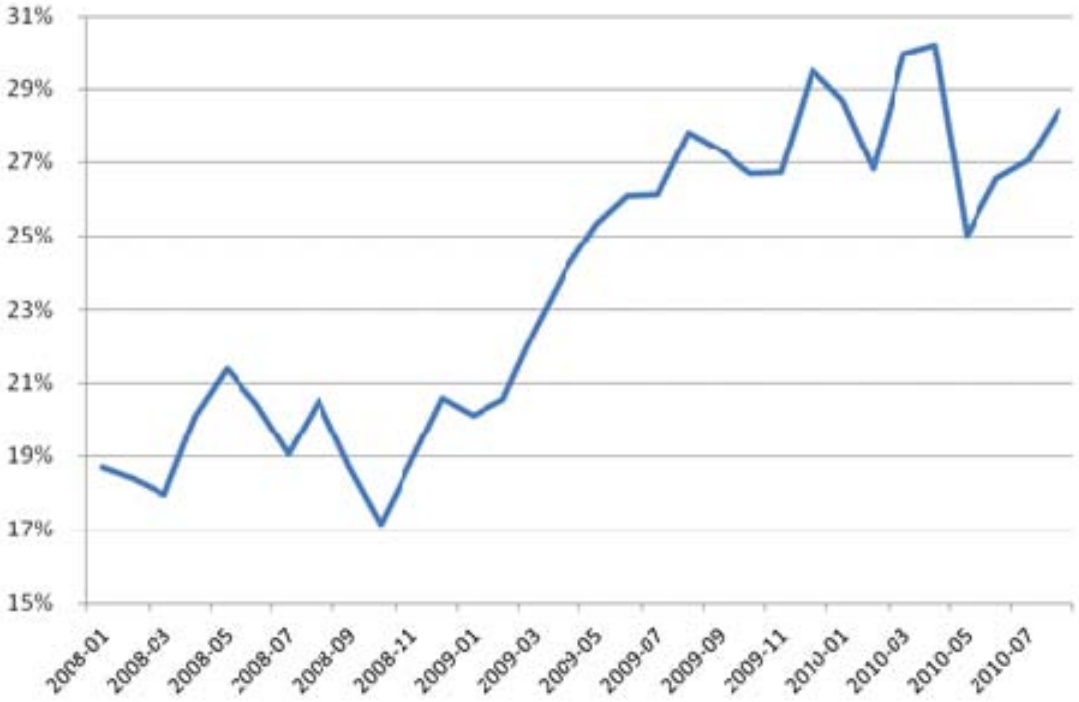
including commissions and market impact; and at the NYSE about 19c cents a share at the specialist post. In the fourth quarter of 2009, ITG analysis of $5.2 trillion in trades shows that the institutional investor paid less than 10c a share. The trading intermediaries' share of profits from institutional traders plummeted 60 percent for NASDAQ equities and 50 percent for NYSE shares as trading became electronically facilitated. Complaints by institutional investors who may be ill-equipped to compete in the markets simply are not supported by available data. In sum, the notion that the HFTs should therefore now be saddled with the kinds of "affirmative obligations" to which specialists theoretically were subject is completely misplaced. So, too, is the suggestion that regulators ought to impose price limits ostensibly to limit any market instability caused by HFTs. As we have just explained, the apparently conventional narratives about both the old specialists and the new HFTs are just flat wrong.

Are Dark Pools a Problem, and If So, What is the Fix?

Their very name— "dark pools" —conjures up images of something sinister that cries out for a ban, or at least some tighter regulation. Yet even in raising questions about these trading venues that do not report transaction information, SEC Chair Schapiro acknowledges that they benefit the customers who use them, by enabling companies to avoid moving the market as much as would be the case if the size of their trades were made public. At the same time, however, as more trades migrate to venues where transaction data are not reported, the public markets lose the ability to accurately price securities, since the customers of dark venues are "free riding" on the publicly set prices in one out of four shares traded (see chart 3). In the limit, the equivalent of public transport for equities—the public, regulated exchanges—won't be profitable to operate if too many "passengers" ride for free.[24]

[24] NASDAQ's chief economist, Frank Hatheway, noted that price discovery is significantly impaired for a given security when about 40 percent of its trading volume is internalized, or traded in a venue that free rides off the public quotes. See Bob Pisani, "Stock Trading Regulations Need Improvement," CNBC.com, September 14, 2010, www.cnbc.com/id/39044302/.

Chart 3. Percentage of Volume Traded by Institutions in Dark Pools, January 2008-August 2010



Source: NASDAQ OMX Stock Market

There are two straightforward answers to this apparent dilemma. First, the SEC should require off-exchange trading venues—such as dark pools and internally completed trades by broker-dealers—to first satisfy all publicly displayed orders at the price they intend to trade. Put differently, the Commission should not permit dark pools and internalizing brokers to trade at the same price as the prices revealed in the public market unless the public orders are filled first. This requirement would serve the broader public interest in public markets by rewarding traders who reveal the size and prices of their orders in public markets and thus directly mitigate the free riding incentives of those who participate in off-exchange trading venues. When market participants operate on razor-thin profit margins as they do today, small changes in the rules of engagement can effectively change participant behavior and obviate investors' perceived needs today to rely on dark pools in order to remain safe from the market's sharks.

Second, the SEC should adopt one of the ideas floated in its Concept Release; namely, the "trade at" rule. Under this rule, off-exchange venues would be required to pay a one cent higher price for orders they internalize. There should be no exceptions to the one-penny improvement rule, especially as the price of a stock says little about the value of the underlying company. The joint Flash Crash report by the CFTC and SEC fully discusses the role played by internalizers in that market disruption.[25] The report suggests that over-the-counter market makers "appear to handle a very large

[25] The report describes internalizers as OTC market makers and block positions, who handle orders of their own other broker-dealers' customers.

percentage of marketable (immediately executable) order flow of individual (retail) investors." The report fails to explain that these market makers explicitly pay brokers to direct market orders to these proprietary venues. We are told that shortly after the Flash Crash, many retail brokers were willing to discuss using only limit orders in the marketplace, but then withdrew from the debate when they realized the negative impact on revenues if payment for market orders from wholesale brokers was eliminated. The profit margins of high frequency trading firms are fractions of a penny; requiring a one-penny price improvement before internalizing of market orders is allowed would again alter market behavior and encourage larger orders to be advertised in the public marketplace. The market requirement that all orders be submitted as limit orders is neither unprecedented nor unproven. The Singapore Stock Exchange allows only limit orders within its highly automated market structure environment. The use of market orders today is a vestige of an "ancien regime" in the U.S. stock markets.

The SEC has long been concerned about internalization of retail market orders and raised such concerns as long ago as the Market 2000 Concept Release, whose findings were published in January 1994. The Commission defined "payment for order flow," the engine behind the internalization of orders, to be a problem.

Internalization has been a standard market practice for a generation -- the specialists at the Midwest and Pacific Stock exchanges "internalized" orders for customers at the same price as NYSE so they could pocket the trading profits. Bernard Madoff was the first one to do this with huge success, paying small regional firms without strong market access for order flow.[26] Once he attracted sufficient numbers of these firms, he could match off orders in the public market and often traded at prices narrower than those available on the NYSE floor. As success spawns imitation, the late 1980s gave birth to dozens of new "wholesale market makers" who paid for order flow and matched orders in their own books, capturing the entire trading spread. This practice, dubbed internalization, was dubious then, and the Commission questioned whether internalization provided a positive economic benefit for retain investors. The prevailing view was that, without internalization, regional exchanges would wither and die. At one point, that was a justifiable regulatory position, but today history makes such practices moot.

The focus of the Commission's plan as reported in the Market 2000 findings was to focus on rule making that would both narrow spreads and increase quote competition. Having been successful in this approach, the Commission now openly considers market makers' pleas to both slow down markets and possibly increase trading spreads, a natural outcome of trading privileges normally bundled with affirmative market making obligations. In 1994, the Commission worried that recommendations aimed at reining in payment for order flow would likely "reduce spreads, but they probably will not eliminate the practice." The Commission then openly considered banning the practice as a

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[26] See Weeden & Co.: The New York Stock Exchange and the Struggle Over a National Securities Market.

plausible regulatory approach.[27] It is ironic, then, that the May 6, 2010, Market Event Findings paper charges that "many internalizers of retail order flow stopped executing as principal for their customers that afternoon, and instead sent orders to the exchanges, putting further pressure on the liquidity that remained on those venues."[28] Furthermore, the Commission said "one large internalizer (as a seller) and one large market maker (as a buyer) were party to over 50 percent of the share volume of broken trades, and for more than half of this volume they were counterparties to each other….internalizers were the sellers for almost half of all broken trade share volume."[29] During normal market conditions, internalizers can afford to pay for market orders only because they are allowed to trade these orders at the same effective price as orders transparently priced on competing exchanges. This cannibalization of market orders relies wholly on displayed limit orders that constitute the National Best Bid and Offer (NBBO) and creates yet another reason for institutions to seek solace in dark pools.

In sum, internalization is a vestige of SEC efforts over decades to preserve competition among exchanges and to reduce formerly wide trading spreads. Those once-valid regulatory concerns no longer exist, and with the technology and access to different markets today, there is no longer any justification for regulation that facilitates internalization. The Commission should work instead to create consistent and favorable economic rewards for market participants willing to display trading intentions to the market writ large.

VII.
Addressing The Main Danger: The Explosion in ETFs (and ETF Derivatives)

Despite concerns about the speed of trading, both the SEC and CFTC have allowed rapid creation of new trading vehicles – ETFs -- whose very existence depends on high frequency traders and instant arbitrage to underlying securities. In a remaining vestige of the pre-2008 laissez-faire regulatory environment, there appears to be little or no economic justification for the explosion of these derivative trading vehicles. ETFs have proliferated around the globe at an astounding pace, from roughly ninety at the beginning of this decade to about 450 at the end of 2005 and more than 2,300 today, with another 1,000 or so in the regulatory pipeline (see chart 4).[30] As we explain in this section, the explosion of ETFs and ETF derivatives is a development that warrants serious attention by regulators and policy makers.

[27] Securities and Exchange Commission, *Market 2000, An Examination of Current Equity Market Development*, January 14, 1994, 22.
[28] May 6, 2010 Market Event Findings, p. 65.
[29] Ibid, p. 66.
[30] BlackRock, *ETF Landscape*, *Global Handbook Q3 2010*, http://www.mondovisione.com/pdf/etfl_globalhandbook_q310.pdf.

Chart 4. The Explosive Growth of ETFs and ETPs

Year	Number of ETFs	Number of ETPs[31]	Assets Under Management (billions)	ETFs in the Pipeline	ETPs in the Pipeline
1995	4	0	2.3		
2000	92	14	74.3		
2005	461	64	412		
2010	2379	878	1,200	972	878

Source: BlackRock ETF Landscape, End Q3 2010

The first ETFs were set up to escape the confiscatory tax policy applied to individual investors in mutual funds, who must pay taxes on stock-specific gains in a portfolio that might be down significantly in value.[32] To this degree, broad-based ETFs contributed directly to improving the tax outcomes for some smaller investors.

ETFs also have a second advantage for investors. Because they are like index funds, ETFs are relatively inexpensive to manage, at least compared to the fees charged by fund managers of actively traded mutual funds. ETF fees are more closely in line, however, with the typical index mutual fund. Nonetheless, to the extent that ETFs have become more widely available and used as an investment vehicle by investors who otherwise would purchase actively managed mutual funds, ETFs lower overall transactions costs and thus benefit investors, especially longer-term investors.

But there can be too much of a good thing if taken to extremes, and this is now happening with ETFs. From an asset base of about $75 billion a decade ago, ETF assets now approach $1.2 trillion, with trading reaching an astounding $18.2 trillion last year. ETFs have been morphing in new and unexpected ways. Simply put, we will argue here that ETFs and the derivatives built around them have become the proverbial tail that wags the market. The increasing failure of capital markets to discriminate between the best-run companies and the also-rans, combined with million dollar-plus costs to be compliant with Sarbanes-Oxley regulations, has emptied the pipeline of new private companies trying to access the capital markets. The increasing cost of capital thereby reduces near-term growth rates for the very companies creating jobs in the economy.

That is not all. ETFs also are derivatives, because their value is derived from the value of securities that make up the baskets or package of stocks (just as mortgage securities were packages of individual mortgages). As more ETFs are created, the risk grows that, in the event of a future market meltdown triggered by any number of possible causes,

[31] An exchange traded product might take the form of an exchange traded note or exchange traded commodity. These are exchange traded products where the commercial viability of a sponsor who "promises to guarantee" contractual payment matters. In 2008, the U.S. government essentially made investors in UK exchange traded commodities whole by the recapitalization of AIG, which would have failed because of insufficient capital and collateral.

[32] ETFs have been permitted for more than twenty years by the SEC, which has granted private letter "exemptions" from certain parts of the 1940 Investment Advisors Act in order to create these packages.

the rush to unwind the ETFs will aggravate any sell-off. Indeed, some creators of ETFs may not be able to honor their obligations. If those institutions or holders of ETFs are deemed sufficiently important or interdependent with other financial actors, the U.S. government could be forced again to make the agonizing decision whether to come to the rescue, as it did with AIG and a number of other large enterprises during the financial crisis of 2008. We discuss this and possible other systemic risks of ETFs in more detail in this section.

The Mechanics of ETF Creation

To understand why we reach these admittedly controversial conclusions, it is useful to begin with a brief description of how ETFs are created. That is best done by contrasting them with mutual funds, both open- and closed-end.

The holder of an open-end mutual fund receives a fractional interest in a portfolio that is comprised of individual securities holdings and cash. As assets flow into an open-end fund, there is no theoretical limit to its size, but many open-end funds historically have elected to close when asset size outstrips the ability to trade target stocks in the portfolio, especially more thinly traded small-capitalization companies. A buyer of a mutual fund typically pays a price based on the aggregate value of securities at each day's closing price. When a mutual fund portfolio manager sells a specific security from the portfolio at a taxable gain, a pro rata percent of that gain passes through to the mutual fund investor. In some cases, a fund investor might be forced to write a check to the IRS for taxable gains, even if the overall fund's value has declined. Such was the case in years like 2008.

In contrast, closed-end mutual funds are limited in size to the amount that is "subscribed" to the fund when it is listed on the public markets. Historically, these funds have not performed well and tend to trade at large discounts to fair market value. Often, hedge funds and other investors targeted heavily discounted closed-end funds and forced them to convert to open-end funds, which eliminated the trading discount.

ETFs are like closed-end mutual funds, but trade like stocks. Investors in ETFs do not need to wait until the end of each day to find out the net asset value of the fund. The ETF has a constantly updated price throughout the trading day, just like stocks. ETFs also have a tax advantage relative to open-ended mutual funds, since investors in ETFs pay capital gains taxes only when they sell the securities. When an ETF is created, the fund operator (e.g. BlackRock for iShares and State Street for SPDRs) purchases an inventory of equities that are offered to the public as an ETF, which is priced and traded like any stock throughout the trading day on a securities exchange. The size of an ETF is not limited like those of closed-end mutual funds, which also are exchange traded. Instead, ETF sponsors promise to keep values closely aligned in the market by working with Authorized Participants (AP), electronic specialists, to create units by acquiring more stocks consistent with the index fund's individual securities weights to offset new cash flows from investors. These units are typically "institutionally sized" packages of 50,000 shares or more. Conversely, an ETF owner of 50,000 shares can redeem those shares through an AP for cash or, more often, for the underlying equities. Because of this structure, ETFs are said to be unlimited in capacity.

ETFs have become the favored vehicle for short sellers in the marketplace. We believe that the ability to escape normal and customary borrowing costs, the lack of precision around responsibilities for ETF sponsors and APs vis-à-vis creation and destruction of ETF units, and the complicated nature of serial lending (and the inability to regulate and monitor layers of borrowing risk) have created enormous reliance on the continued solvency of countless market intermediaries.

An ETF can be shorted like most any listed stock. A short seller asks his broker to locate shares held in a margin account by an owner of an ETF. The more "unavailable" a stock is for borrowing, the higher the broker loan rate will be charged to the borrower. Once borrowed, the borrower then sells the borrowed stock to a new buyer in the hope that an overvalued stock will move sufficiently lower in price to compensate the short seller for normally high borrowing costs. In this simplified case, two owners think they have a rightful claim on a single ETF share. In common stock trading, the borrowing costs climb rapidly for "hard to borrow" stocks—those that typically have 4 percent to 5 percent of shares sold short. For instance, the common stock Tesla Motor (TSLA) in early October 2010 was reported to be 5 percent net short. The stock is so "hard to borrow" that we are told prospective short sellers were charged a 30 percent annual interest rate to borrow the stock to sell it short.[33] In contrast, in the case of ETF shorts, borrowers look only at the ETFs (which theoretically are created to match demand) and ignore the ability to borrow the underlying shares of stock that are held within the ETF (chart 5). In common stocks, heavily shorted stocks are subject to a "short squeeze" in which a stock's price can rapidly rise to bring out new supply that can be borrowed. While 5 percent short interest is considered very high for common stocks, as of June 30, there were six ETFs with more than 100 percent short interest and at least thirteen ETFs with more than 5 percent.

[33] Interestingly, a retail investor who owns Tesla is required by many brokers to execute an agreement to lend the shares as a condition of a retail brokerage relationship. The broker rents the owner's stock for 30 percent annual percentage interest and yet, in most retail accounts, the lender of the shares earns nothing from the broker for making that stock available to short sellers.

Chart 5. Shares Short and Shares Outstanding of Selected ETFs as of June 30, 2010

ETF	Ticker	Shares Short (in millions)	Shares Outstanding (in millions)	% Short
SPDR S&P Retail ETF	XRT	94.9	16.9	562%
Retail HOLDRs Trust	RTH	7.4	4.7	157%
SPDR KBW Regional Banking ETF	KRE	42.4	31.4	135%
iShares Russell 2000 Index Fund ETF	IWM	230.2	203.3	113%
iShares Dow Jones US Real Estate Index	IYR	57.7	52.5	110%
SPDR S&P Oil & Gas Exploration & Prod. ETF	XOP	16.3	15.1	108%
SPDR S&P 500 ETF Trust	SPY	314.4	712.2	44%
Financial Select Sector SPDR Fund	XLF	140.7	432.9	33%
PowerShares QQQ Trust	QQQQ	120.9	407.3	30%
Technology Select Sector SPDR Fund	XLK	22.1	196.4	11%
SPDR S&P Biotech ETF	XBI	0.9	8.8	10%
iShares MSCI Emerging Markets Index	EEM	65.0	909.5	7%
iShares S&P Global Infrastructure Index	IGF	0.1	13.6	1%

Data are compiled from Factset Research Systems, NYSE, NASDAQ, and shortsqueeze.com. Excerpted with permission of the editors from "Asymmetries in Short Selling of Exchange Traded Funds and the Potential for Systemic Risk," by Andrew A. Bogan, PhD, Brendan Connor, Thomas R. Bogan, CFA, and Elizabeth C. Bogan, PhD. This paper is currently under review by the *Financial Analysts Journal*. It was written and submitted in early August 2010.

Notwithstanding the theoretical ability of ETF sponsors to create more ETF units in response to heightened demand for them, the conditions exist for a major short squeeze in small capitalization securities. We provide evidence later in this essay to support this concern. The likelihood of a major equity market short squeeze, driven by ETF demand, is thus just as much a concern as a liquidity crisis during a market panic sell-off.

ETFs also create opportunities for high frequency traders in the equities markets to immediately arbitrage away any temporary discounts. In a mutual fund, new cash that is not immediately invested can sharply reduce market returns in an advancing market. This is a key difference between mutual funds and the new era of ETFs. Though marketed as "index funds" in a variety of venues such as Yahoo! Finance, many ETFs do not act like index mutual funds because they often do not fully and immediately invest proceeds in the underlying securities. The rules governing the creation and destruction of ETF units are sufficiently different from both open-end and closed-end mutual funds that the Commission approves ETF filings by giving an exemption from provisions of the Investment Company Act of 1940. We think the systemic risks emanating from this free option on market structure requires immediate regulatory attention, especially given the high failure rates to deliver securities by short sellers.

A review of ETF structures begins with the prospectus. The prospectus for the iShares IWM ETF, based on the Russell 2000 small capitalization stock index, states that it will use "representative sampling" that will have investment characteristics, fundamental characteristics and liquidity measures "similar to those of the underlying index." The prospectus states that the "Fund generally invests at least 90% of its assets in securities of the Underlying index and in depositary receipts representing securities in the Underlying Index. ***The Fund may invest the remainder of its assets in securities not included in the Underlying Index, and in futures contracts, options on futures contracts, options and swaps…"*** The prospectus and statement of additional information describe in general terms the role of the AP and creation and destruction processes but does not specifically define the conditions under which new units must be created, such as extremely large short exposures. The bottom line: one of the more popular ETFs explicitly tells investors not only that it is not using all of its funds to purchase shares in the companies that the ETF purportedly represents, but the fund sponsor may purchase *other* securities and a wide variety of derivatives. We are not confident that many, if not most, purchasers of this particular ETF – which probably is no different from many others – are aware of the considerable discretion they are giving to fund sponsors. But even more important, by investing in derivatives rather than in the underlying *advertised* securities, this investment strategy only further undermines the price discovery function of the markets, the topic to which we turn shortly.

That is not all. Consider the substantial volume of shorts of the IWM ETF. On June 30, this ETF reported that there were 203 million shares outstanding. Yet on that same date, short sellers had a claim on *230 million* shares that were not created or funded with equivalent securities (chart 5). Stated another way, an investor in the IWM ETF might understand the bargain if it was said that the sponsor would use his money to purchase 50 percent of the stocks in the index and the other 50 percent would be loaned to short sellers of the index.[34] We are told that collateral must be posted at 102 percent against all short sales, meaning a market move of +/- 2% would not cause credit concerns given the unknown credit exposures of all those using borrowed stock. In 2008, there were eighteen days when the S&P 500 moved more than 5 percent, however. If the ETF is 100 percent short, this would imply a leverage ratio of about 50:1 and a collateralization ratio that did not even cover the eighteen most volatile days of 2008. The ETF market thus looks to us to be seriously under-collateralized for a major failure. As important, we think that small companies are seriously undervalued given these statistics, which we will explain fully below. We find it shocking to consider the implied leverage inherent in the IWM when the wounds from the liquidity crisis of 2008 are not yet healed. The extremely low cost of bank borrowing in the market seems to be building yet another bubble.

While most ETFs use some form of market capitalization or revenue weighting, there is no magic financial wizardry around the use of so-called cap-weighted indexes other than the quantitative financial engineer's worst nightmare – rebalancing risk. Active portfolios or equally weighted portfolios would require constant trading and tweaking

[34] Of course, about 30 percent of the securities within ETFs may be loaned by the sponsor, who typically does not rebate a percentage of that loan amount to the ETF holder. Hypothecation (lending) agreements don't typically pay the retail (unsophisticated) owner for lending his or her securities.

with cash flows in or out of such funds. The capitalization- weighted index becomes a financial engineer's most expedient way to reduce trading and rebalancing frictions. In a broad market index like the S&P 500, a capitalization-weighted regime not only reduces costs associated with frequent rebalancing of a portfolio but it can be argued that the S&P 500 constituents and weightings represent broadly the economic importance of companies to the general economy. This logic fails to hold as the "broad market" has been increasingly fragmented and fractured by ETF sponsors into highly specific indexes and industries. Capitalization weighting has no economic defense in many of these highly stratified indexes except to provide more trading opportunities for hedge funds and day traders.

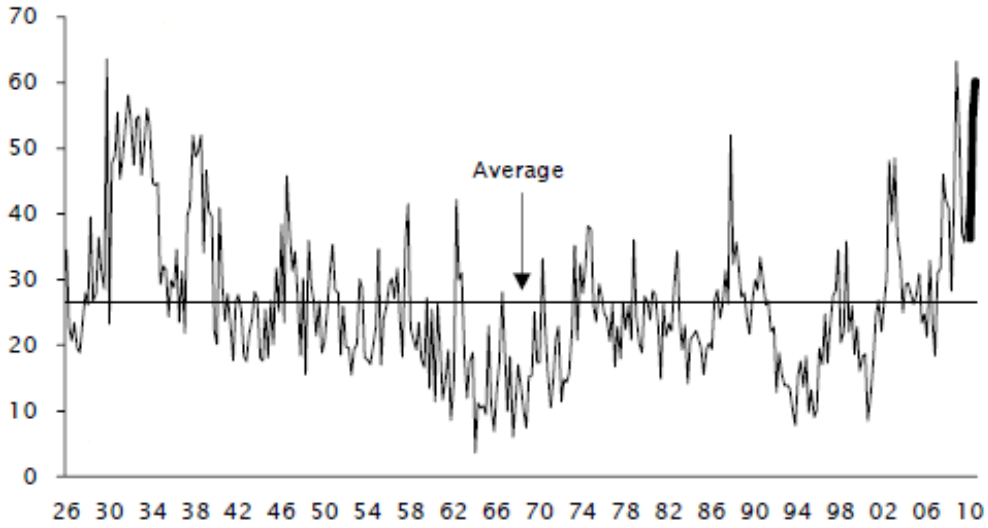
How ETFs Are Undermining the Market's Price Discovery Functions for Small Cap Stocks

Our first and most significant concern with the rapid proliferation of ETFs is their impact on existing small cap stocks and, perhaps even more importantly, on growth companies that may be considering whether to list on an exchange.

Our argument here stems from the high and rising correlations of price movements on stock markets, to which we believe ETFs are contributing. The July 2010 report by Empirical Research Partners, for example, illustrates that the stock prices of large capitalization common stocks now move in the same percentages and in the same direction 60 percent of the time—a level exceeded only twice in eighty-four years (1929 and 2009).[35] The data in charts 6 and 7 on the following page illustrate that correlations have been rising for most of the decade, both in the broad market and within sectors like financials, capital goods, and transportation.

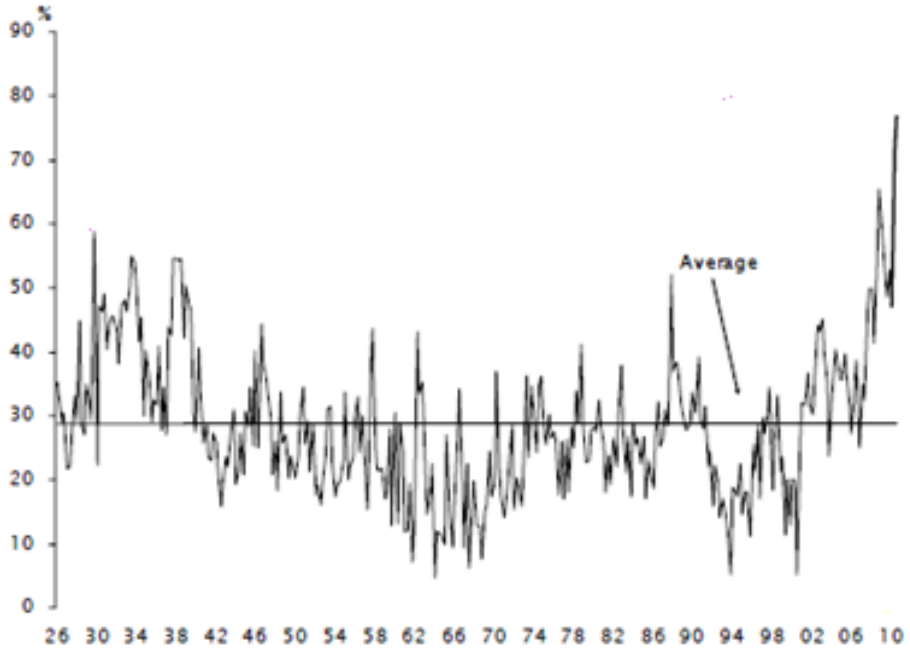
[35] Empirical Research Partners LLC, *Systematic Risk Within Sectors, Consumer Cyclicals: Still Exploiting Retreat, The Housing Cycle: Bouncing Along the Bottom*, research report, July 28, 2010.

Chart 6. Large Capitalization Stocks Average Cap-Weighted Return Correlation Among Stocks*, 1926 Through Late July 2010



Source: National Bureau of Economic Research, Empirical Research Partners Analysis.
*Measure quarterly using daily data.

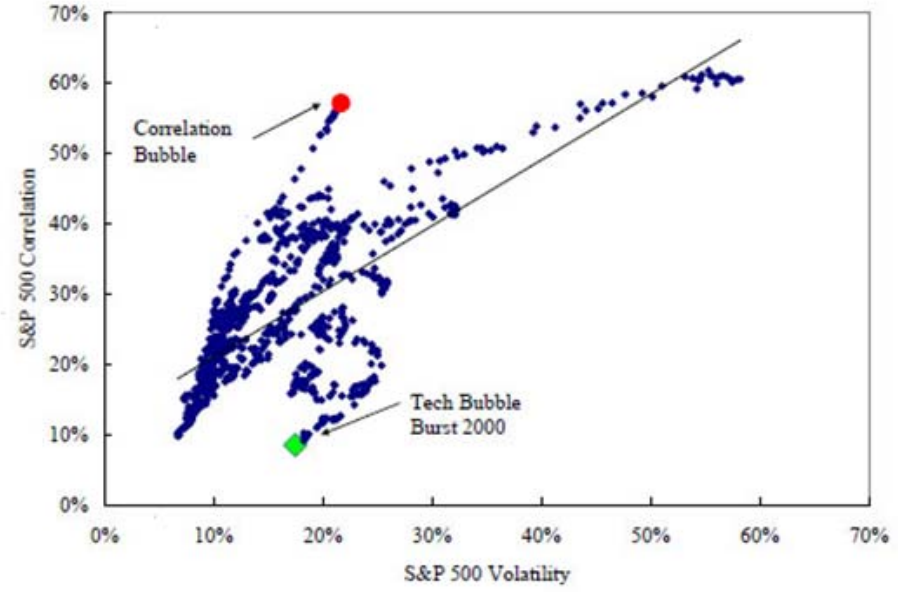
Chart 7. Large Capitalization Capital Equipment Stocks Average Cap-Weighted Return Correlations,* 1926 Through Late July 2010



Source: Empirical Research Partners Analysis.
*Computed quarterly and based on daily data.

When financial assets move in highly correlated ways, that should be a strong signal for regulators to worry that capital markets are not doing their principal job: properly allocating capital between different assets or financial instruments in such a way as to properly discipline risk and reward success. Increasing correlations often are attributed to investor panic about the economy's ability to recover from exogenous shocks—think the World Trade Center attack in 2001 and the bankruptcy of Lehman Brothers and Bear Stearns in 2008. What is different this time about the increased correlation of individual stock prices across capitalization and sector ranges is a *lack of panic* as depicted by the VIX, an index of implied fear (volatility) in the market. J.P. Morgan displays the historically unprecedented correlations found in today's stock trading in chart 8, which they term a "correlation bubble."

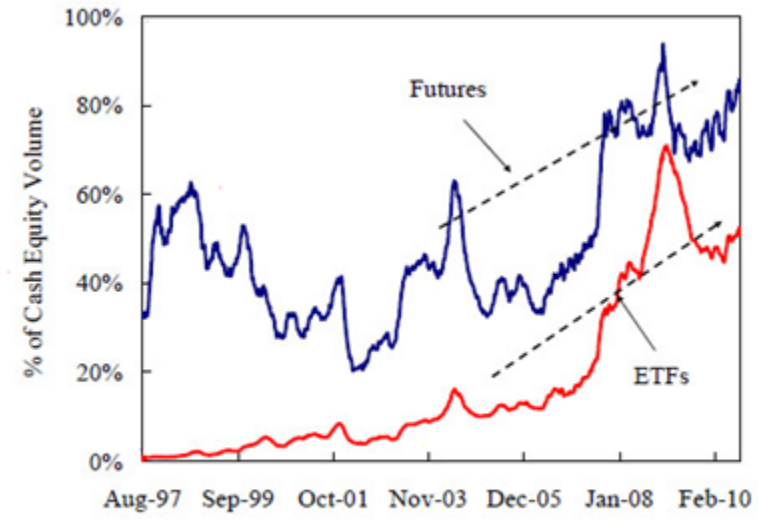
Chart 8. High Volatility Regimes Coincide with High Correlation Regimes—Two Notable Exceptions: Tech Bubble Burst and Now



Source: J.P. Morgan Equity Derivatives Strategy.

J.P. Morgan's Delta One derivatives team suggests that "the level of correlation recorded over the past two years was never realized in the recent history of U.S. markets." Furthermore, the team attributes unprecedented correlations to "increased use of index based products" including futures and ETFs. Chart 9 illustrates the enormous growth in the trading of index products (not including upstairs "swaps" transactions) in the futures and ETF markets relative to trading in underlying equities.

Chart 9. Futures and ETF Volumes as a Percentage of Cash Equity Volumes



Source: J.P. Morgan Equity Derivatives Strategy.

In other words, many packages that contain individual securities trade far more frequently than the underlying stocks. Delta One says that "the growth of index volumes is directly driving excess market correlations." High and rising correlations, in turn, are a signal that the markets are paying no attention to the performance of individual companies, which can't be consistent with what capital markets are supposed to do: allocate capital where it belongs.

We can't seem to list more U.S. companies, so instead, we create enormously complex packages that enwrap the same finite universe of securities and assets and call it "innovation." The increasing indexation of markets for small company stocks, in particular, is now changing the very perception of the economic benefits of index inclusion. Indeed, we have learned that some small company CEOs are demanding promises from exchanges that they will *no*t be included in a stock index, a marked reversal from the historical pattern in which many CEOs hoped their stocks *would be* included in broad indexes because this would enhance their companies' stock prices. We ask whether the index creators thus might be free riding on public company listings and deriving commercial value without fairly compensating the companies themselves. Perhaps a company might wish to be in several ETFs, but not in an unlimited menu of ETF options. Perhaps a company might wish to prescribe where the stock should trade, believing that its investors might benefit from access to the deepest and broadest liquidity pools for the stock. We urge the SEC to consider this question: Should not listed companies today enjoy a commercial right to be compensated for being included in an ETF or index?

Defenders of ETFs composed of newer companies, in particular, may reply that at least the ETFs add liquidity to the trading of these companies' stocks. Any such claim is illusory. Just because small cap companies that may individually be illiquid are wrapped

up in an ETF, which itself becomes liquid, does not make those stocks liquid. Any heavy trading in the ETF will drive the prices of the individual underlying stocks, which will be set in far fewer transactions. Indeed, to the extent that investors view the ETF has a *substitute* for buying the individual stocks, then ETFs may actually *reduce* liquidity in the underlying stocks.

ETFs and Systemic Risk

Beyond the "small company IPO effect," we are worried that the increasing packaging of securities is looking a lot like the financial engineering that created the mortgage mess. Not to mince words, we are concerned about the systemic risk that is being caused by the creation of these packages. In laying out our concerns, we amplify the excellent analysis in a new report titled "Asymmetries in Short Selling of Exchange Traded Funds and the Potential for Systemic Risk" by Andrew Bogan, Brendan Connor, and Elizabeth Bogan.

To frame our analysis, we recount the two major systemic risks of ETFs identified in the Bogan/Connor/Bogan report. First, they note that because ETFs are so easy to short—much easier, more quickly, and with much lower transaction costs than shorting the underlying securities—they are a potential source of market panic on the downside. Thus, it was no accident that well over half of all the trades in the securities with sharp declines on May 6 were in ETFs.

Second, the authors note that heavily shorted ETFs—those with heavy short interest in relation to shares outstanding—may be susceptible to a "short squeeze." One wouldn't think so because unlike stocks, which are limited in supply, ETFs theoretically can be created without limit. However, the major point we highlight here is that, in creating more ETF units, ETF sponsors are liable to purchase the underlying securities, and so the more units that are created, the greater are these purchase obligations. Yet because the underlying securities are in short supply, mounting obligations of ETF sponsors to purchase them exposes the sponsors to the risk that the cash they have on hand will be insufficient, at the sharply higher prices of the underlying securities, to cover those purchases and thus track the index.

It is for this reason that short squeezes expose ETF sponsors to failure. In turn, the failure of one or more heavily shorted ETFs could easily trigger a run on other similarly situated ETFs, causing a panic-driven market meltdown (after a brief run up in prices of the underlying securities subject to the short squeeze).

We believe the danger of this potential chain of events is not well recognized. The data in Appendix 1 shows a list of more than 1,000 stocks and expected trading times of more than four weeks required to build positions equal to the June 30, 2010 short interest in the IWM. This suggests that the ability to carefully track an index may well break down the longer an unfunded short position persists.

Consider that equity-linked futures and ETFs derive their intrinsic value from the value of individual stocks that are included in an index. The birth of such products was enabled by transparent pricing of equity securities in very fast, electronically linked

venues. The Flash Crash report talks about the cascade of orders and feedback effects that migrated from the E-Mini futures contracts to the SPY ETF (the S&P 500 Index ETF), and ultimately to individual securities whose potential "arbitrage" establishes the economic validity of these new instruments. The report acknowledges that "[s]ome ETF market makers and liquidity providers treat ETFs as if they were the same as corporate stocks and do not track the prices of the individual securities underlying the ETF.…Others heavily depend upon the tracking of underlying securities as part of their ETF pricing and algorithmic modeling."

We are told that some 200 firms use a variety of statistical arbitrage and relative price arbitrage strategies—and move from trading venues perceived as most liquid to least liquid during times of market stress. Herein lies the source of potential systemic problems during highly volatile market conditions. The Flash Crash report found that "[a] large majority of ETF market makers with whom we spoke, and particularly those that value underlying stocks as part of their normal market making activities, paused their market making for considerable periods of time starting at about 2:45 p.m. on May 6." The findings show that arbitrage fails to be effective when normal market conditions are not present, and more disturbingly terms these markets to be a "professional's market" where resting retail orders are rare compared to individual securities.

The parallels between the market panic of 1987 and today deserve more careful scrutiny. Today, the J.P. Morgan Delta One derivatives team reports that the dollar value of trading in the derivatives market may be more than 1.5 times the underlying trade in common stocks. This would imply a significant potential mispricing of those stocks and likely set the stage for more "flash crashes" as happened on May 6. Our own analysis of the trading of individual securities that comprise the IWM (Russell 2000 Index) suggests that for a thirty-day period ending September 1, 2010, the IWM traded on average $3.86 billion each day, while the total daily value of the stocks in the ETF traded about $10.5 billion. *In other words, on a typical day, more than 37 percent of the entire trading value of the underlying securities trades is in a single small capitalization index ETF.*

On May 6, news-driven panic created the worrisome liquidity demands about which we worry. Trading volume in the IWM more than tripled over more recent daily averages to $13.1 billion, while the trading in the index constituent securities only doubled to $23.2 billion. The trade of a single ETF was more than 56 percent of the total dollars traded that day in all of the underlying constituent securities.[36] (chart 10).

[36] While the average daily trading volumes are not directly comparable to the trading patterns in May, with the recent sample taken over thirty days ending September 1, 2010, the orders of magnitude and direction are sufficient to suggest a need for fuller investigation.

Chart 10. Comparison of Average Dollars Traded in IWM and Constituent Securities

	Total Average Daily Trade in Dollars (billions)	Dollars Traded on May 6 (billions)
IWM	3.9	13.1
Constituent Securities	10.5	23.2
IWM as % of Total Market Liquidity	36.7%	56.3%

Trading averages as of September 1, 2010, based on prices and volumes reported by Yahoo! Finance over the preceding month, Thomson Reuters data, Kauffman Foundation analysts.

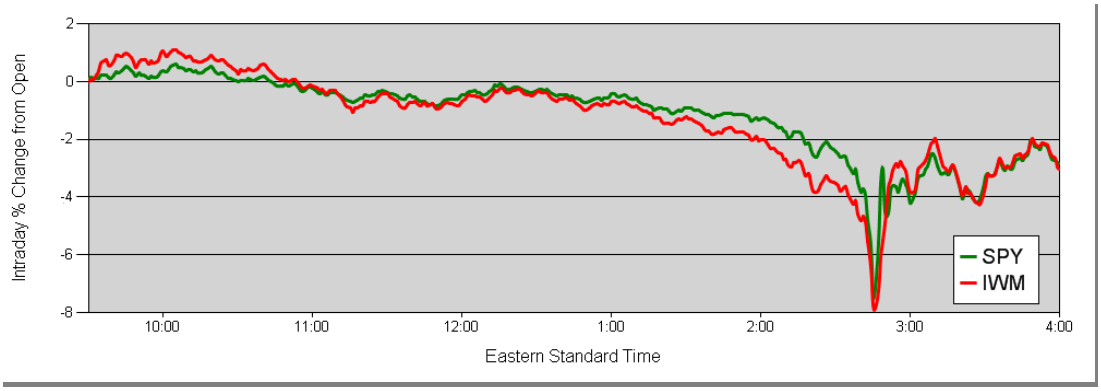
These numbers demonstrate the inherent systemic risk problem that can be created by ETFs that accounts for dominant holdings in some, or most, of their underlying securities. Hedge funds and others stung by illiquid small capitalization stocks during the liquidity and flight-to-safety crisis in 2008 have turned increasingly to ETFs as a perceived more-liquid alternative to individual securities. They view the ability to enter and exit small capitalization exposures instantaneously as a major and flexible trading advantage. However, when a news event such as the EU crisis in May 2010 catalyzes a massive exit from the market, the underlying securities in broad indexes, and most especially in small capitalization or industry specific indexes, can be drowned in a tsunami of derivative arbitrage selling, very likely in a disorderly fashion, by the stampede away from the ETFs of hedge funds, portfolio insurance sellers (e.g. institutions), and retail investors. Put simply, the marketing strategies that sell ETFs as frictionless and unconstrained investment vehicles do not account for the inherent difficulty of trading the securities within these packages; the liquidity of common stocks does not match the investors' demands for immediacy and liquidity today.

Mutual funds maintain cash reserves and can deliver securities in-kind under adverse conditions if investors redeem their shares. ETF sponsors, on the other hand, promise an instantaneous call on capital linked to an underlying market that does not match the derivative in either liquidity or size. Retail investors used stop orders and institutions sold ETFs as part of portfolio insurance techniques when broad market averages moved below the fifty-day moving average of the closing price on the Russell 2000 Index on May 6.[37] Major retail wirehouses have offered investors risk-control software that uses moving average stop-loss algorithms to help investors better protect investment gains. The convergence of these technologies and group behavior around simple moving-average loss management systems on May 6 gave but a preview of likely future market failures if the SEC and CFTC fail to rein in out-of-control liquidity

[37] While the term portfolio insurance was not used anywhere in the report on the Flash Crash, the behaviors were eerily similar to those cited as a main cause of the Black Monday crash on October 19, 1987, as outlined in the Brady Report.

promises made by Wall Street to the nation's investors. A tick-by-tick analysis of trading data on May 6 shows that the market failure in the afternoon began in the IWM ETF, which began its erratic and high-velocity descent shortly after noon (based on data from NASDAQ), and was then followed shortly thereafter by the collapse in the SPY ETF (see chart 11).

Chart 11. May 6, 2010 Trade-by-Trade Analysis of IWM (Russell 2000 Small Cap) vs. SPY (S&P 500 Index)



Where there is potential systemic risk, there is the U.S. government, as we know from the bailouts during the financial crisis. Are there similar systemic and bailout risks in the ETF market? Well, yes. The U.S. government already has stepped in to guarantee counterparty risk in the Exchange Traded Product (ETP) marketplace. The London stock market birthed many Exchange Traded Notes (ETN) and Exchange Traded Commodities (ETC) for easy trading access to regular investors in the mid-1990s. Unlike ETFs, these "products" tend to be much less transparent, relying on a sponsor's IOUs (promise to pay) in order to make the product match indexes more closely. Notes and commodity products, just like many ETFs, may use derivatives, swaps, and other financial engineering techniques that rely on the sponsor's ability to make good on ts IOU. In other words, if a sponsor were to go bankrupt or have insufficient capital to back up its promises, the exchange traded products market could seize up and create a panic. This was the case with AIG, the largest sponsor of ETCs in the UK in 2008.

ETF Securities Limited offered more than 100 ETCs in the United Kingdom, German, France, and other European markets, and managed more than $7.5 billion in September 2008. Many of the products issued by this sponsor were backed by credit agreements with AIG, meaning that if AIG were to go bankrupt, the shareholders would become creditors of the firm.[38] The ETF Securities website reported on Sep. 16, 2008, that "[a] number of firms who were making markets in the Commodity Securities stopped doing so yesterday afternoon. The ETFS group is actively working on possible ways of providing investors with liquidity…" Without the federal government takeover of AIG, it is unclear how these contracts could have been managed. More disturbing is that the creation of such IOU-backed products has raced forward and upward without constraint since that time. The U.S. government and its "too big to fail" policies have removed an investor perception of risk in inherently risky products less than two years

[38] Matt Hougan, "Europe's ETF Securities Rattled by AIG," *Index Universe*, September 16, 2008, http://www.indexuniverse.com/sections/news/4529-europes-etf-securities-rattled-by-aig-.html.

after the global financial calamity. More transparency in the ETF market does not rule out the possibility that it too could some day, in a massive sell-off, be exposed to massive “unwind risk” because there are insufficient securities and margins backing the bargains —as in the IWM ETF today. What happens when everyone wants to sell their ETFs, requiring ETF sponsors to unwind the securities they have manufactured? Who will buy the underlying instruments when this happens?

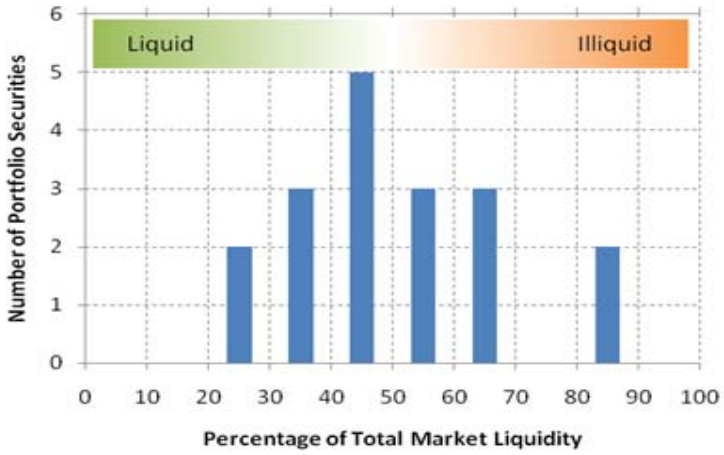
To provide a concrete example, consider what is likely to happen when today’s fifth-largest physical holder of gold bullion (a variety of ETFs) needs to begin destroying units when, inevitably, gold ETF holders eventually want to sell? Will the buyers of physical gold be there to unwind these ETFs as fast as they have been created over the past three or four years of unprecedented pessimism toward paper currencies? The *Financial Times* on August 17 reported that “the arrival, en masse, of investors—particularly buyers of physical gold through bullion-backed exchange traded funds – is the more important of these shifts in the gold market. The popular SPDR Gold Shares, the world’s largest gold ETF, holds more than 1,280 tons of bullion, more than most central banks.” Investors have been promised an ability to easily trade an asset whose long history belies any notion that it is, or should be, easy to trade. Once retail investors decide it is time to sell gold, will sovereign funds stand there with outstretched hands saying “let me take that off your hands”? We think not. That is not the nature of the end of precious metals bull markets any more than it was the end of Internet and telecom stocks in the early part of the decade or the CDO markets in 2008. Now, multiply this gold story by similar problems in many other segments of the market that have been “ETF-ed,” and you get the idea why we are concerned.

Another little-discussed aspect of the rise of ETFs relates to the opportunities provided to hedge funds and high frequency traders to exploit fleeting arbitrage opportunities between securities held in these packages that can generate undesirable knock-on effects in a market sell-off. In his seminal book *A Demon of Our Own Design*, Richard Bookstaber talks about tightly coupled systems which, if left unattended, will regularly produce events like the Flash Crash (where 65 percent of cancelled orders were for ETFs). The speed with which we trade securities has little to do with these effects. What is more important is the introduction of an amazing array of derivative securities against a static or declining number of underlying “cash” equity securities, which suggests that a stock’s relative value in a package may be more important than its intrinsic value. The hedge funds and high frequency trading community worry only about temporary price discrepancies of a stock, or option, or future held in a variety of synthetic packages and overseen by two separate regulators (SEC and CFTC). We already have demonstrated the enormous dollar value traded in derivative securities every day in comparison to the underlying trade of the actual stocks. We also have concerns that hedge funds and others may be approaching ETF sponsors to create even more nuanced indexes in a fashion eerily similar to the practices of mortgage-backed securities traders who asked for custom indexes around trading preferences that could more easily exploit certain securities. Frankly, neither we nor anyone else knows what the unintended consequences of all this activity may be.

Some hedge firms have established sophisticated techniques that set up trades with little market risk, thus allowing them to stomp on the gas or the brakes of small

company stocks held in a glistening array of ETF packages—all the way from broad indexes to lithium, palladium, and now rare-earth packages. Private conversations with knowledgeable traders validate our concerns that a wide array of products can be used to exploit subtle differences in index construction. The liquidity characteristics of the securities underlying ETFs have not been widely studied. The Merrill Lynch-sponsored retail holder (RTH) holds eighteen securities. If we define liquidity as a percent of total dollars traded in the market, we see that ten of the eighteen securities in RTH trade in a pool of securities that may be considered highly liquid -- and noticeably, two can be considered highly illiquid. Some have suggested to us that hedge funds may be suggesting industry "baskets" to sponsors that can isolate certain securities within a broader basket. In the case of the RTH index, one might examine the two illiquid securities within the basket (chart 12). The diversification benefits would not seem to be a primary driver within an industry specific ETF. The SEC should be examining the liquidity "array" within each package and look for the inclusion of stocks with very different liquidity characteristics from others within these industry portfolios. In particular, we suggest that the SEC prohibit inclusion of small capitalization equities in ETFs.

Chart 12. Liquidity of RTH



One unfortunate tendency on Wall Street that seems to happen over and again is that "innovators" create products promising unlimited liquidity—trading ease—for inherently costly, difficult to trade securities. Just because illiquid small cap companies are repackaged, they do not suddenly become liquid. (The same was and remains true of asset-backed securities). This is the fatal assumption in tightly coupled systems. Ask anyone who holds a leveraged ETF in their portfolio for more than a few days and wonders where their money has gone. We think that sufficient evidence exists today to foster enormous unease at the prospects for significant market failures, such as what occurred during the panic on May 6, or in the event of other unexpected situations such as a terrorist attack on a major financial center. Investors have been sold an idea that they need only hit the "eject" button to escape bad news in the market by selling highly liquid ETFs. As May 6 demonstrated, selling of ETFs can mutate rapidly into the destruction of the value of underlying stocks. This is unambiguously evident in our study of resident liquidity in the heavily shorted ETF securities.

The "Fail To Deliver" Problem

To add to these concerns, consider the extremely high rate at which settlement of ETF buy transactions fail because the stock is not delivered to the owners—either because insufficient units are created or the short sellers cannot locate someone willing to lend them stock for the trade. This problem was identified for the SEC more than a year before the 2008 financial crisis. Jim Angel of Georgetown University wrote the SEC that "as of this writing, over 100 ETFs and ETNs are on [the] Regulation SHO Threshold List."[39] These settlement failures affect some of the largest ETFs as well as the smallest. For example, the iShares Russell 2000 Index (IWM) experienced more than thirty trading days in 2007 in which more than 10 million shares failed. These failures were for over $1 billion worth of shares each day.[40] The problem has only worsened since Professor Angel sent his warning letter. According to data from the Basis Point Group, the IWM experienced 188 trading days so far this year of significant "fails" (chart 13).

Chart 13. U.S. Exchange-Traded Funds: Top Ten Fails Securities Out of 927 Securities, January 1, 2010—September 30, 2010

Cumulative % of Total Value of Fails	% of Total Value of Fails	Total US$ Value of Fails	Symbol	Description	Number of Days Failed
29.22%	29.22%	$ 70,861,788,607.01	SPY	SPDR S&P 500 ETF TR	187
38.77%	9.55%	$ 23,154,282,856.87	IWM	ISHARES RUSSELL 2000 INDEX	188
42.27%	3.50%	$ 8,485,442,933.93	QQQQ	POWERSHARES QQQ TR UNIT SER 1	186
44.66%	2.39%	$ 5,791,144,526.51	XLF	FINANCIAL SECTOR SPDR	186
46.78%	2.12%	$ 5,132,105,870.26	FAZ	DIREXION DAILY FINANCIAL BEAR	185
48.84%	2.06%	$ 4,989,167,402.68	FAS	DIREXION DAILY FINANCIAL BULL	186
50.58%	1.74%	$ 4,224,508,899.73	XLE	ENERGY SECTOR SPDR	183
52.04%	1.46%	$ 3,533,167,815.30	XRT	SPDR SERIES TR SPDR S&P RETAIL	178
53.41%	1.37%	$ 3,326,946,319.20	XLI	INDUSTRIAL SECTOR SPDR	177
53.41%	Total Top 10	$ 129,498,555,231.49			
100.00%	Total All ETFs	$ 242,543,476,697.11			
100.00%	Total All Fails	$ 375,735,299,695.78			

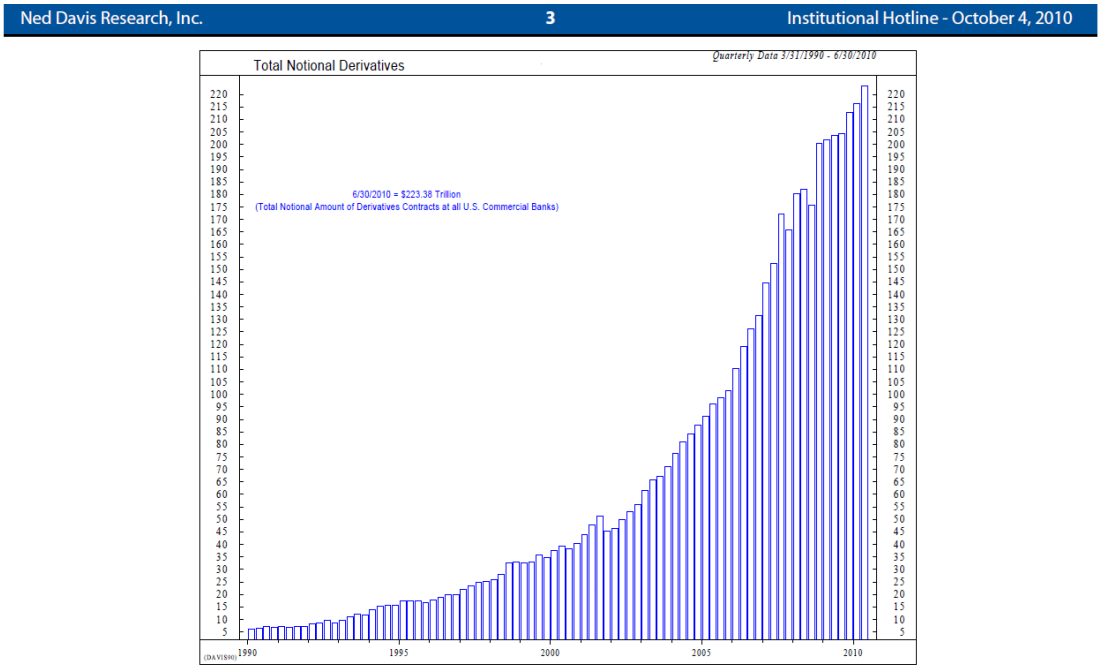
Data Source: U.S. Securities and Exchange Commission

[39] Regulation SHO is a government-mandated report on "hard to borrow" stocks that might command rates as high as 30 percent interest charges per year for a common stock, as in the Tesla Motors example previously cited, before a short seller can transact in the security.

[40] Dr. James J. Angel to SEC Secretary Nancy Morris, May 16, 2008, http://www.sec.gov/comments/s7-07-08/s70708-6.pdf.

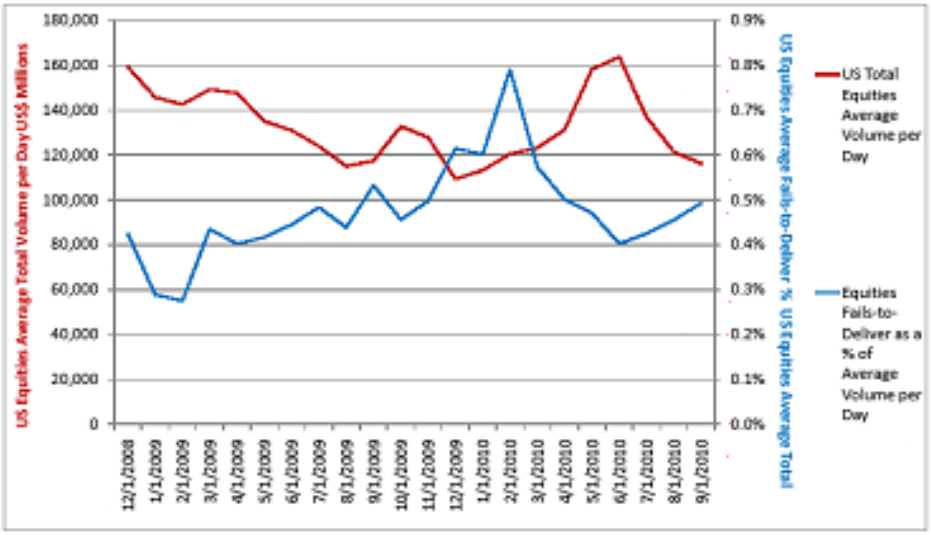
Recent reports from the Bank for International Settlements, as detailed by Ned Davis Research, show that the total notional value of derivatives on commercial bank balance sheets now exceeds the levels reported just before the crisis in 2008 (chart 14). We wonder whether that leverage, once parked in asset-backed securities and mortgage-backed securities, has transmuted into the ETF marketplace where avoidance of borrowing costs, imprudent regulation, and poor understanding of trading practices has created a potent new financial Molotov cocktail aimed at the markets.

Chart 14. Total Derivatives on U.S. Bank Balance Sheets Higher than in 2008



The Basis Point Group provides several other provocative charts that illustrate the magnitude of the problem. A long-standing problem with the failure of individual securities was solved with legislation as part of the Troubled Asset Relief Program (TARP) activities to liquefy the financial system. Large penalties were imposed on custodian banks if stocks failed to settle. This negative incentive fostered a careful regulatory compliance initiative on the part of the banks. The average fails-to-deliver for common stocks today is less than 0.5 percent of daily trading volume for individual equity securities (chart 15).

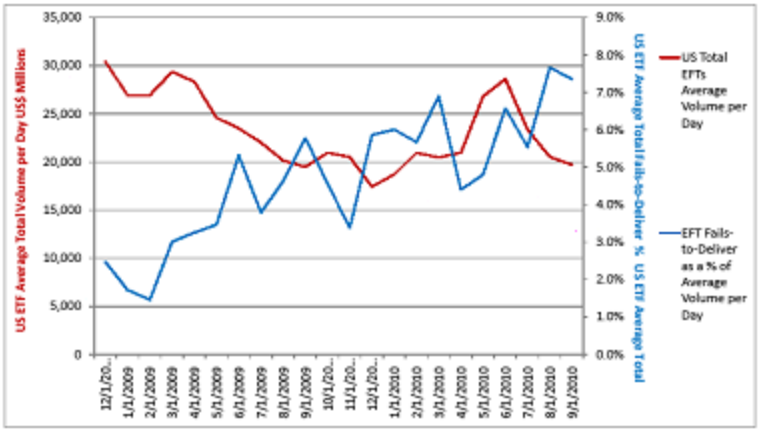
Chart 15. U.S. Equities: Average Per-Day Fails-to-Deliver as a Percentage of Average Per-Day Volume (Assume Twenty-Day Month), December 1, 2008—September 30, 2010



Data Source: U. S. Securities and Exchange Commission, World Federation of Exchanges

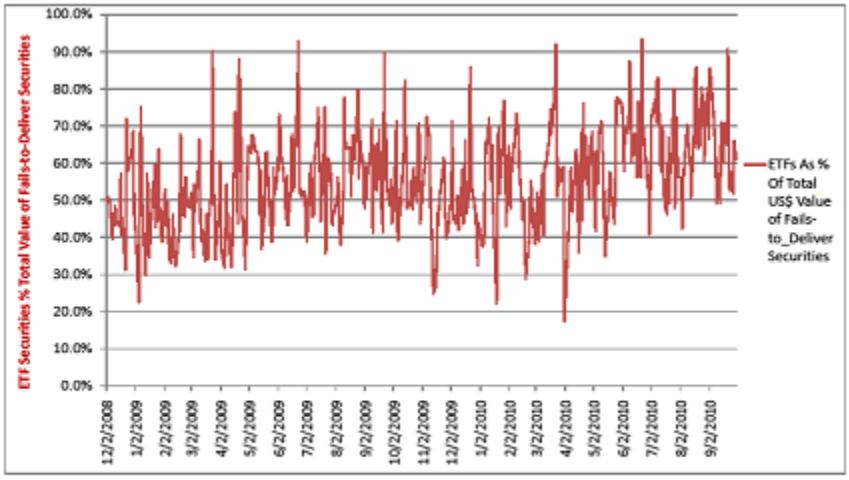
The same cannot be said for ETFs, which consistently escape obligations and rules that govern the trading for individual securities, from liquidity time-outs to locate, borrow, and delivery requirements. It is clear that the sponsor's "promise" to create units sufficient to satisfy demand is not happening. The Basis Point Group suggests that failure rates are ten times higher for ETFs, which now fail at more than 7 percent of daily trading volume, and that ETFs constitute more than 60 percent of the dollars that fail to settle in the market every day (charts 16 and 17 on the following page).

Chart 16. U.S. Exchange-Traded Funds: Average Per-Day Fails-to-Deliver as a Percentage of Average Per-Day Volume (Assume Twenty-Day Month), December 1, 2008—September 30, 2010



Data Source: U. S. Securities and Exchange Commission, World Federation of Exchanges

Chart 17. U.S. Exchange-Traded Funds: Percent of Total Value of Fails-to-Deliver Securities, December 1, 2008—September 30, 2008



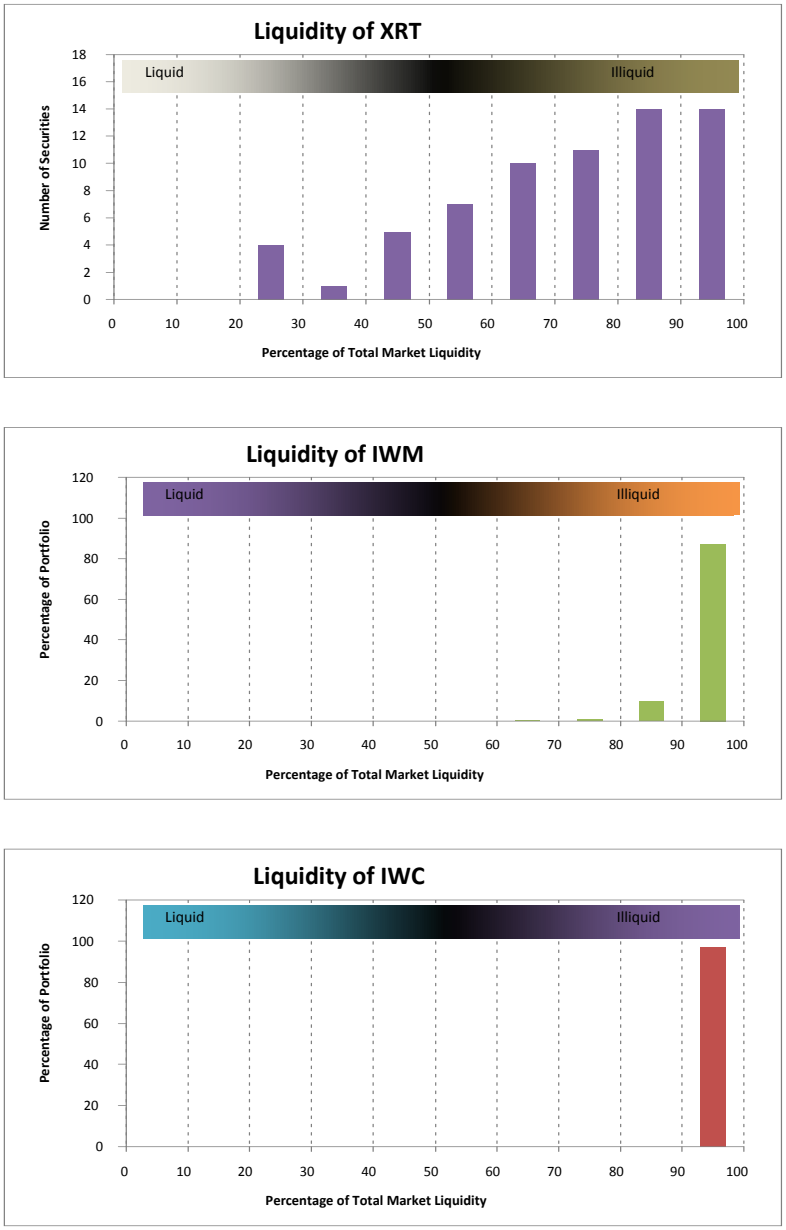
Data Source: U.S. Securities and Exchange Commission, New York Stock Exchange,The Depository Trust and Clearing Corporation

What is the possible explanation for these remarkable data? We believe that investors are not sufficiently informed about their role in the marketplace for short sellers because terms like “hypothecation agreements” and “opt-out ideas” mask the true economics about which all investors should be informed. If a broker who does not own and merely custodies a stock for the owner can earn 30 percent in interest payments a year to lend that security (using Tesla as an example) to a short seller, why should the investor not share in that gain? It is the investor’s share of ownership being used to bet against his very interests with absolutely no remuneration. This would be comparable to a home borrower who rents his home, deposits the rent in his account, and doesn’t pay the bank for principal and interest obligations. The custodial banks already have encountered significant unfavorable media coverage for the failure to adequately collateralize the accounts of major foundations, endowments, and state pension funds who lent securities to borrowers in 2008. Readers may recall that those bets were secured by AAA mortgage-backed IOUs.

The role of custodial banks in this process raises several important questions. The securities lending process is dominated by very few firms with virtually no transparency. Only five or six global custody firms play a vital and central role in global capital markets. Those firms profit from the borrowing and lending business. Naked short selling problems in common stocks were not solved until market penalties were aimed at the custody banks’ income statements. Federal regulators should take aim at the custodial banks to better align trading behaviors in the markets. Custody banks should report each week their fails-to-receive and fails-to-deliver of equity and ETF securities in an analogous fashion to the requirements imposed on U.S. Primary Dealers by the Federal Reserve Bank of New York for debt securities. Exchanges should report short interest on exchange traded ETFs on a weekly rather than biweekly basis.

Securities lending is the grease that allows for the enormous bubble building in ETF “borrows,” but the embedded market structure concern should be about the way ETF packages are being created for a variety of Wall Street traders. An examination of the liquidity characteristics for index constituent securities should be part of the regulator’s job. A cursory review of heavily shorted ETFs (and the micro cap ETF) illustrates the large number of very hard to trade stocks within these packages. The following charts divide the total average dollars traded every day on U.S. exchanges into ten different liquidity categories that constitute the percentages of daily dollars traded. The vast majority of dollars traded in U.S. stocks (the left side of the graphs) are concentrated in the market’s most highly liquid securities—and can be counted on two hands—and represent up to 50 percent of dollars traded in the market every day. Stocks in small cap indexes, though far greater in number, tend to trade far less frequently and constitute less than 20 percent of the total dollars traded in the stock market every day. The vast majority of stocks included in the XRT, IWM, and IWC ETFs trade in the most illiquid part of the market (chart 18). That is the nub of the problem.

Chart 18. Liquidity of XRT, IWM, and IWC



Responses to Those Who Say an ETF-Triggered Crash Can't Happen

We are aware that not everyone may agree with our analysis of the problems and potential risks—especially the systemic risks—created by ETFs. One especially influential report that purports to rebut the systemic risks of ETFs was circulated by The Susquehanna Financial Group in an undated talking points memo titled "Can an ETF Collapse? We think not." With all due respect, we think the Susquehanna report is seriously in error. In what follows, we offer a point-by-point rebuttal to some of the report's major claims. We single out the report not just because its source is well known, but because the report has claims that we have heard or seen elsewhere, so we believe

it is important to correct what may be some serious misimpressions about the level of borrowing and liquidity risk in ETFs that raise systemic issues to which regulators ought to pay attention.

Susquehanna Claim: “An ETF cannot be forced into liquidation by redemption, or ‘redeemed out of existence,’ as has been suggested. An ETF manager generally reserves the right to reject a redemption request for an amount in excess of shares outstanding, which was the trigger event described in the alleged ‘ETF doomsday’ scenario. This clause can usually be found in a fund’s public registration statements and/or associated regulatory filings.”

Our Response: During a liquidity crisis, panic is often heightened when market participants are arbitrarily prevented from accessing capital they believe to be liquid and safe. The referenced clause is similar to that used by hedge funds in 2008 that in some cases prohibited redemptions by institutional investors when they invoked “liquidity gates.” While not widely studied, the liquidity seizure within the market spread panic further, as institutions then placed redemption requests with hedge funds that appeared to be performing well because the institutions just wanted to get some cash back under their control. Indeed, when the hedge fund managers invoked liquidity clauses, investors reacted with extreme panic and created a run on the “liquidity bank” of U.S. hedge funds. More than one-third of funds went out of business during the resulting panic, while many financial institutions, needing to meet funding obligations, attempted to access liquidity wherever it was available. This particularly harmed hedge fund investors with long positions in illiquid small cap securities.

In short, Susquehanna’s suggestion that an ETF manager can reject a redemption request for an amount in excess of shares outstanding highlights a market structure problem that requires regulatory correction, and may indict the SEC’s practice of granting exemptions from 1940 Investment Company Act requirements. At the very least, prospectus and summary information, written in a plain language way, should describe allowable net short positions for every ETF and a process that specifies the conditions for mandatory ETF creation,, such as the following:

> The sponsor will invest all new capital into the underlying securities of the ETF and will create sufficient units to be delivered to investors whenever demand for units exceeds 5 percent of the shares outstanding.

Additionally, the SEC should require weekly disclosure by sponsors in a transparent way, such as on the company’s website, that summarizes compliance with the sponsor’s stated objectives. An example follows:

> “IWM is as of today 100 percent net short, meaning the ETF sponsor holds only 50 percent of the underlying stock for the total ownership of the ETF in the market. A new investment in IWM shares would (on average) deliver 50 percent of the capital to the Russell 2000 index stocks and lend the other 50 percent of the investor’s money to short sellers.

The use of clauses by sponsors that “reject a redemption request” are similar to calls to enact strict trading limits on the daily range of securities, futures, and options products, as has been suggested by Paul Tudor Jones, a well-known hedge fund manager. It is important to recall that many institutions worked tirelessly in the late 1990s to remove trading limits from the nation’s securities markets. Such limits work as magnets and frequently pull trading interest to extreme highs and lows; while creating powerful incentives for professional traders who can always access markets in the global shadow financial system.

An example of the danger embedded in the limit movements can be found in the volatility around wheat prices during the Chernobyl nuclear accident in 1986. After news of the accident spread, prices “locked limit up” and trapped those who had sold futures contracts short. Higher margin (collateral) was requested by exchange clearing houses, as almost all futures contracts trade on margin and collateral at exchange clearing houses. Over the next two or three sessions, no trading occurred as markets opened up “locked limit.” After sessions of locking at arbitrarily defined extreme prices, the market reversed and traded “limit down” for a session or two. This occurrence can be documented in a myriad of markets and products over time. If the market had been allowed to seek an appropriate clearing price, far less short-term trading volatility would have been exhibited. Sometimes, fundamental news demands sharp and immediate price reactions. Arbitrary limits of the kind suggested by Jones do not reduce volatility; they embed volatility in the market’s essential structure and extend trading opportunities to the professionals in shadow markets around the globe that are not similarly constrained. Additionally, stock markets should not have the embedded leverage that is part of the game in commodities; that indicts regulators of the equity marketplace. The NYSE plan for brief trading time-outs and a similar plan long used in the German stock market seem to be far better mechanisms for smooth and efficient price discovery in the stock market.

Susquehanna Claim: “Most ETFs have safeguards in place specifically designed to protect against the possibility of an attempted redemption of more shares than are outstanding. Among these is some form of a requirement that a redeeming Authorized Participant (AP) must be able to represent that the shares tendered for redemption are in fact in a deliverable state. Such a requirement ensures that only physically held long shares (i.e. those included in the shares outstanding) can be tendered in a edemption—not those out on loan to another market participant or that were borrowed and subsequently recalled by the lender. Importantly this fact does not imply that the ‘shadow market’ … [referring to securities] which are loaned out and thus not physically held in account are in any way ‘hollow’ or ‘empty’ or otherwise not collateralized simply because they cannot be redeemed.”

Our Response: The obligation to “represent that shares tendered for redemption are held in a deliverable state” is a fine distinction likely to be underappreciated by investors trying to get out of deals they assumed to be in “a deliverable state.” We are told that sponsors, APs, and the Depository Trust Clearing Corporation (DTCC) have few standard reporting obligations concerning the creation and destruction of ETF units. Susquehanna’s claim here is tantamount to a “trust us” statement regarding the market’s expectation for liquidity. The only way to be sure that stocks are in a

deliverable state is to compel creation of units when open interest exceeds some threshold percent of short interest.

Susquehanna suggests that “individual investors whose shares are held in a cash account instruct their brokers whether or not their shares can be hypothecated, or lent out, by the custodial broker. By electing not to allow it, an investor can ensure that physically settled shares backing long positions are always held in account.”

In fact, many of these “consent to lend agreements” are buried in disclosure documents when retail and institutional investors set up accounts. We have elected not to lend our shares at Kauffman, and we are aware that many large mutual fund companies choose not to lend small capitalization securities. Retail investors tell us they were unaware that they could “opt out” of lending arrangements, and that agreement to lend was an explicit part of the brokerage agreement. The correct regulatory response here should be to require brokers to obtain from clients an “opt in” to lending rather than an “opt out.” As part of the opt in, the broker should disclose what the retail investor will earn in interest for lending the stock and the broker should disclose his percent of the loan proceeds in quarterly statements to investors. The data in this paper document that many sponsors run ETFs in a chronic net-short position, as demonstrated by the reported failures to deliver ETFs to new buyers in their accounts. We are told that some sponsors lend out up to 30 percent of the securities within those portfolios to augment interest “earnings,” which are not then rebated to the owners of the ETFs. This activity should be clearly disclosed to investors. Finally, we cannot dismiss easily the irony that Susquehanna’s recommendation to investors to not lend shares, and the apparent leverage built upon free and easy borrowing conventions today, could seriously damage the float required for ETF trading to flourish.

Susquehanna Claim: “[B]ecause ETFs are open ended, there is virtually no limit on how many shares can be created.” This statement implies there can never be a redemption problem, and thus presumably never a systemic risk issue.

Our response: This is where the whole argument falls apart and where many industry participants skillfully avoid looking at the liquidity of underlying securities represented in the ETF units. The economic justification for ETFs relies primarily on a market participant’s ability to immediately arbitrage away differences between a derivative (ETF or futures contract) price and the portfolio value of underlying securities. The notion that “there is virtually no limit on how many shares can be created” is the seductive siren call that ultimately will lead to a major market disruption and failure.

An analysis of the IWM trading characteristics illustrates the growing concentration of ownership of small capitalization stocks in the Russell 2000 Index ETF and may explain the enormous short interest in this security (chart 19). The IWM was reported as the largest institutional holder of ninety-nine securities in mid-October 2010; among the top five institutional holders of 867 equities in the index; and among the top ten holders of 1,737 mostly illiquid, small capitalization securities.

Chart 19. IWM (iShares) Largest Institutional Holders of Stock

	Largest Holder	Top 5 Holders	Top 10 Holders	All IWM Holdings
# Securities	99	867	1737	1953
% of IWM holdings (unweighted)	5.1%	44.4%	88.9%	--
% of IWM holdings (weighted)	2.0%	35.1%	88.9%	--
Mean Days to Buy Stocks for Unit Creation	41	30	28	27
Median Days to Buy Stocks for Unit Creation	34	25	23	23
Total Days Needed to Create Units at 10% of Daily Trading Volume	170	188	188	188

Source: Yahoo! Finance

It appears that the ETF market for small capitalization securities is fast reaching a theoretical maximum and saturation point within a single ETF. It would be impossible for a sponsor or an AP to convert short interest to newly created units today without exacting significant market impact on the securities within the index. In fact, the views expressed in the SEC/CFTC paper on the May 6 Flash Crash suggest that an order representing less than 10 percent of trading volume may have catalyzed the event. If 10 percent of trading volume is considered possibly disruptive to markets in the large-capitalization, broad-market S&P 500 index, then it would be disproportionately more disruptive to the prices of small capitalization securities.

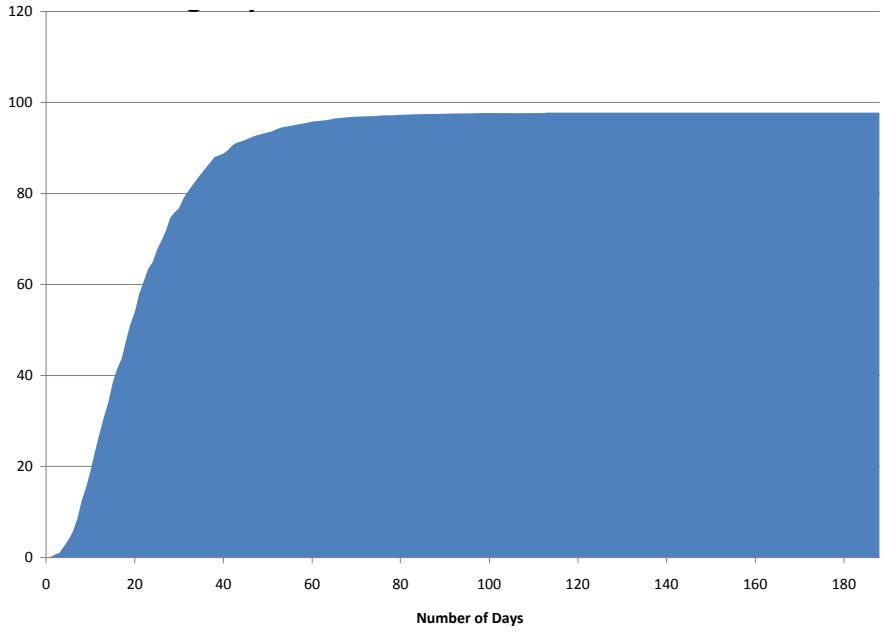
Consequently, we believe that creation of sufficient units in the IWM alone, based on the current level of short interest would likely create a significant short covering squeeze in the value of underlying securities. The chart from the Bogan/Connor/Bogan paper discussed earlier suggests that 230 million units of IWM ETFs were not backed by physical securities at the sponsor level on June 30, 2010 (see page 32). Using Thomson Reuters data, we calculate the average dollars traded for each security over a thirty-day period, and hold the value of the constituent securities at a constant percent of the Russell 2000 Index ETF. We reach the following conclusions:

- Based on thirty days of average daily trading volume for each security (for the period ending September 1, 2010), the sponsor would be able to purchase constituent stocks for inclusion in the IWM index at the same percentages as the current portfolio in only two of roughly 2,000 securities on day one, in only

twelve stocks in two days, twenty-three stocks in three days, forty-eight stocks in four days, and seventy-four stocks in five trading days (chart 19).

- Said another way, the sponsor could purchase only 3 percent of the constituent stocks in one week without a significant impact on the price of the underlying securities, if one considers orders of more than 10 percent to be potentially disruptive to price, as was implied in the Flash Crash report.
- It would take roughly forty-one days of trading volume (two trading months) to purchase sufficient shares in underlying securities to offset 90 percent of the short interest in the IWM on June 30 (chart 20). Needless to say, the evidence of such accumulation would lead to sharply higher prices in a large number of the underlying securities.
- *The sheer magnitude of the short interest in the Russell 2000 Index ETF suggests that capital that should be finding its way to small capitalization companies in the public market is instead trapped in the ETF "shadow securities system."*

Chart 20.Trading Days Needed to Create Units Sufficient to Offset IWM Current Short Interest at Ten Percent of Daily Trading Volume



Source: Thomson Reuters data, Kauffman Foundation analysis

*Susquehanna's assertion that there is "virtually no limit on how many shares can be created" is either naïve, or another symptom of the quantitative engineer's dis**c**onnect* with the physical trading world and the market's primary purpose, which is to facilitate capital flows to companies building products and hiring workers. The "magic" behind ETF creation and destruction is the agreement that an AP will serve as an electronic specialist to keep the markets aligned. The AP retains the sole ability to either deliver securities or cash to the sponsor to create more ETF units, and/or to ask for either cash or securities to destroy the units during a redemption phase of the market. The promise

of creation is built upon an idea that residual buying interest can easily be put to work in an index during the last part of most trading days.

This analysis suggests that small capitalization companies within the Russell 2000 index may be seriously undervalued because of the failure of the AP and sponsors to create sufficient units to meet the demand of investors, as evidenced by the market delivery failures in the IWM over the past year.

The glaring weakness of the market's current structure with the one ETF illustrated in chart 21 shows the fallibility of a premise that creation units are unlimited, when considering the difficulty in gathering and analyzing data to understand the aggregation of risk across many indexes and sponsors.[41] The fact is that many stocks are in more than one ETF so that, once bad news infects the market, multiple ETFs may all go down, dragging down the values of the underlying stocks in a kind of rapid free fall (that the SEC's post-Flash Crash individual stock time-outs are designed to stop but that, as we have noted, the Commission has yet to apply to ETFs, which—especially in a panic, can be the "tails" that wag the stock "dogs").

Chart 21. Cross Holding Of Securities by Four ETFs

	IWM	IWC	XRT	RTH
IWM	1948	932	18	0
IWC		1324	0	0
XRT			66	16
RTH				18

Yahoo! Finance reports that iShares ETFs are two of the top ten holders for 1,081 securities, and in eight securities, there are four iShares ETFs in the top ten holders.[42] We limit our analysis to iShares because they constitute more than 50 percent of market share for forty-some ETF sponsors.

As an example, Xerium Technologies (XRM) is held in the following iShares ETFs:

- iShares Russell 2000—second-largest holder
- iShares Russell 2000 Growth—fifth-largest holder
- iShares Russell Micro Cap—seventh-largest holder
- iShares Russell 2000 Value—eighth-largest holder

Ultimately, however, as we noted at the outset of our systemic risk discussion, the notion that we should draw comfort from the narrative that ETF sponsors enjoy an endless ability to create new units to meet any demand for ETFs is fatally flawed. The

[41] Yahoo! Finance lists the iShares and other ETFs as large mutual fund holders of individual stocks. However, the iShares do not report the largest owners of those securities. That impedes any understanding of how many hedge funds/mutual funds are using the ETF as a liquidity option on the market.

[42] ADGE, BDGE, XRM, NJR, NYMX, PZZ, STEM, SPF (October 15, 2010)

simple reason is that the more units that are created, the larger is the obligation of the sponsor or AP to purchase the underlying securities, creating the risk that the cash on hand from the sponsor will be unable to cover the cost of the rising prices of the securities in a true marketwide short squeeze. In that event, the ETF sponsor may fail (or like AIG, be bailed out by the government), which as we noted could trigger a crisis in confidence in ETF manufacturing processes and the failure of other heavily shorted ETFs in small capitalization securities.

Remedies for ETF Problems

There are several additional remedies to the ETF-related problems identified here that have not already been outlined, and they are within the authority of the SEC to implement.

First, the SEC could mitigate incentives for creating ETFs that give the illusion of adding liquidity to otherwise illiquid small cap stocks by requiring more disclosure of the securities backing these ETFs. Today, it would require forty-five trading days to buy the required securities to create sufficient units of the Russell 2000 iShares ETF (IWM). Those same shares are held across many different ETFs. However, there currently is no cross-referencing of individual securities held in a number of ETFs. The assumption behind ETF creation is that such creation is open ended. Without regard for underlying liquidity of individual securities, this creates opportunities for serious short squeezes, panic liquidations, or other forms of possible market manipulation.[43] The SEC has granted broad relief from the 1940 Investment Company Act in the sponsoring, creating, trading, and clearing of ETFs. But the Commission so far has imposed no requirements that data on the creation and destruction of ETF units be retained, reported, or analyzed. Consequently, experts in ETF manufacturing processes cannot fully explain unit creation and destruction processes. At a minimum, the SEC must require sponsors, authorized persons, and the Depository Trust Corporation (DTC) to regularly report on the efficacy of implied arbitrage and creation of ETF securities.

Second, the SEC should restore the balance of power for smaller companies relative to the ETFs by allowing exchanges, and/or the companies listed on them, the right to opt in to inclusion in an ETF. One reason to give this power to the exchange: It is likely to have more muscle to negotiate on behalf of its listed companies than the companies themselves. But this may not always be the case. For example, if a company like Facebook were to go public, it might have more leverage than even the exchange, which is a reason to give companies themselves the choice whether to exercise the opt-in rights themselves or give it to the exchange. Either way, if companies were allowed to opt in, then the company executives (working with the board of directors and shareholders) could exercise more control than they now have over how and where the stock will trade. In the process, company choice might slow the ever-increasing pace of indexation, especially for indexes including smaller, relatively thinly traded stocks for which the unwind risks in the event of a major sell-off are much greater.

[43] Hedge funds have intimated that they may be studying and asking for ETF creation that may isolate securities and/or exposures that are different in related industry and sector vehicles. This allows for exploitative pricing and derivatives strategies that would be very difficult for regulators to detect.

Third, the SEC, having already applied stock-specific liquidity time-outs in the wake of the Flash Crash, should immediately apply the same—or more stringent—circuit breakers to ETFs. Until this happens, the markets continue to be exposed to future ETF-triggered flash crashes, which s especially worrisome because, as already noted, ETFs account for such a large share of overall trading.

Fourth, the SEC should consider prohibiting plain market orders for both stocks and ETFs, instead requiring that all market orders have a minimum price of sale (so-called "marketable limit orders"). This also would help control the kind of free fall in prices we saw during the Flash Crash, which could be repeated even with circuit breakers in place.

Fifth, the SEC should require custody banks and retail brokers to inform investors quarterly about the earnings derived from lending securities with a net effective loan rate, and the net effective rate paid to the beneficial owner for allowing his/her shares to be lent. Investors also should be allowed to opt in to stock lending agreements. Today, many sophisticated investors do not understand the vagaries of hypothecation agreements. Plain language disclosure does not begin and end with mutual fund prospectuses.

In fact, our advice to investors, given the grave imbalances in small company securities and ETFs "on loan," would be to stop lending all securities immediately—until they are fairly compensated for their role in one of the most profitable activities for the Wall Street insiders. Until then, they should stand aside and watch short sellers bid the small capitalization stocks sharply higher.

VIII.
The CTA and Artificial Efforts to Promote Exchange Competition

We earlier described the SEC's decision to sanction the creation of the CTA in the interest of promoting competition among exchanges. Here, we cast doubt on the wisdom of continuing this institution, which we believe has been outmoded by technology and which unnecessarily raises trading costs while delaying the reporting of trade data.

In the days before the Internet and microprocessors, there may have been a good case for organizing a centralized data warehouse and requiring all regulated exchanges to report their trades through it. Likewise, the sharing of the tape revenues by the exchanges providing the trade data helped mitigate some of their self-regulatory costs. Several years ago, in an effort compete for trading volume, many exchange members of the CTA began rebating tape charges to traders who chose to report ("print") their trades on specific exchanges. Indeed, there is one exchange in the Midwest that is owned by a number of HFTs. Is there any wonder why their orders print on that exchange?

But why should this kind of artificially induced competition even take place? It's not that we're against competition by exchanges; to the contrary, we're all for it, since only

through competition do firms (including exchanges) stay on their toes in reining in expenses but also continuing to innovate. But competition through rebates only exists because the SEC has sanctioned the functional equivalent of price-fixing of the tape revenue in the first place by the CTA joint venture partners (exchange members). Indeed, the competition for tape revenue rebates helps explain the reported high cancellation rates of HFTs, about which the SEC chair has expressed concern. In fact, these cancellations reflect a readiness of HFTs to trade a stock at any time just to earn a tiny sliver of tape revenues. This competition among HFTs for every trade possible at any time creates unprecedented liquidity for small retail investors. And so the concerns about cancellations are misplaced in general and, to the extent they arise at all, grow in part out of the artificial competition for tape revenue rebates created by the SEC's sanctioned cartel arrangement for setting and collecting tape revenues through the CTA.

There is a sensible solution to all this and that is *to abolish the CTA and require the exchanges to provide all their basic transaction data on a nondiscriminatory basis to data vendors, and then allow the market to set the price for these data.* If the exchanges want to continue providing other value-added information for a price, let them do that, and again have the market set the price. The SEC should establish minimum data requirements (reporting of last sale price, volume data, and depth of book, say, within 20 percent of current market prices) and access to these data for all approved exchanges. The SEC also might compel qualified exchanges to report all data feeds available to customers, obviating concerns raised by some institutional customers that exchanges might be selling data about reserve (hidden) orders to competing interests. We share the view that market participants' concerns about the speed and quality of consolidated market data could best be mitigated by private market solutions. Software vendors will quickly provide links to deep and liquid markets for individual securities around the world.

These reforms would not only introduce more competition among exchanges and thus lower tape charges, but also, direct competition in setting the tape charges would be likely to eliminate—or at least significantly curtail—the currently perverse system of tape rebates. Moreover, eliminating the middleman—the CTA—in data reporting would enable the exchanges to provide this information directly to end users, without the delay introduced by consolidation. Everybody would win except perhaps some exchanges, which now are profitable only because of their slice of the cartelized tape revenue system. But the government should *no*t be in the business of artificially promoting competition that cannot be justified on its own merits.

The SEC should not only remove artificial incentives for inefficient competition among exchanges, but also take steps to affirmatively promote even more competition in trading and cut trading costs. This can most directly be done by giving institutional investors registered as Investment Advisors under the 1940 Act with assets above a certain threshold (say, those with more than $1 billion) that only have long positions and are not leveraged—thus posing little or no risk of default—direct access to exchanges without the need for using a broker-intermediary. In this day of instant virtual communications and electronic order matching, there is no need for middlemen to execute trades. Cut out the middlemen for parties posing no significant counterparty

risk, and trading costs will fall for them and, perhaps, for investors more broadly, as brokers compete even harder for the business of other investors (e.g. retail investors, those who use leverage, and those taking short positions) and investors can better protect information about big orders that continues to seep into trading markets today.

IX.
Reinvigorating U.S. Equity Markets for New Companies

Finally, given the market developments we have identified that are impairing the ability of growing private companies that want to go public (especially during the current slow recovery), it is imperative for policy makers to find ways of jump-starting the IPO market. This would not only give more growing companies access to financing from the public equity markets, but should encourage more pre-IPO financing by investors (such as angel or venture capitalists) seeking alternative and potentially more lucrative (and socially rewarding) ways to liquefy their investments.

Two particular ideas deserve serious consideration by policy makers. First, the SEC, or Congress if necessary, should exempt companies with market capitalization of less than $100 million from the regulatory provisions of the 1933 Securities Exchange Act. This would help facilitate a truly small cap trading marketplace, such as existed thirty years ago in the earliest days of the NASDAQ stock market.

Second, the Sarbanes–Oxley Act (SOX) should be revisited yet again. For years since that act was passed, there have been continuous complaints from smaller public companies about the unexpectedly and disproportionately high costs of complying with all of the terms of the act, enacted ostensibly to improve the quality of financial reporting and governance by public companies. In fact, compliance costs associated with one particular provision of the act—the infamous Section 404 requiring audits of companies' "internal controls" —have turned out to be significantly higher than initially expected at the time the act was passed. Smaller companies pay, on average, at least $1 million to comply,[44] which may not sound like a lot for larger companies, but for young companies in their growth stage considering going public, $1 million is a serious cost to bear. This fact no doubt contributed to the inclusion of a provision in the Dodd-Frank financial reform bill providing a permanent exemption from Section 404 for small cap companies with market capitalization of less than $75 million.

We suggest a further constructive modification of SOX. The $75 million market cap exemption, in our view, is still much too low since many newer companies reach that threshold fairly quickly, and indeed may exceed it once their IPO is completed. In the latter event, the exemption is of no use. Accordingly, we urge Congress to adopt one additional simple idea: Allow shareholders of companies with a market cap under $1 billion, and/or at least all new companies in the first two years after going public, to vote

[44] See, e.g., CRA International, *Sarbanes Oxley Section 404 Costs and Implementation Issues: Spring 2006 Survey Update,* April 2006, www.complianceweek.com/s/documents/cra_survey.pdf.

on whether their company submits to SOX, or perhaps, more narrowly, to just the internal auditing requirements of Section 404.[45]

SOX was adopted, after all, to serve shareholders. If shareholders of a company want to opt out, that should be their right, and if the market punishes them for that decision in the former of a lower stock price, so be it. Conversely, if the market rewards companies that opt out of SOX, or a part of it, that would provide powerful evidence that the costs of the act (or at least Section 404) outweigh the benefits. In either case, however, providing shareholder choice about compliance with the SOX requirement for new companies should remove one additional barrier for our most successful private companies to access the capital markets and grow internally, rather than sell to a larger, most likely less-entrepreneurial, company.

X.
Summary of Recommendations and Conclusion

There is an old joke about economists looking under the lamppost for his lost keys only because that was where the light was, not necessarily because the keys were there. We have a strange feeling that the recent debate over market structure and trading activities has the same character. The "heat" and "light" have been directed toward activities—high frequency and algorithmic trading—that either have brought real benefits to the market and investors, or have not imposed the harms of which they are accused. In contrast, the main problem to which policy makers should be paying most attention—the proliferation of ETFs and ETF derivatives and the accompanying systemic risks and capital misallocations they entail—so far has been largely ignored. The same is true of the CTA and artificial efforts to promote exchange competition that, in reality, only hurt investors.

Much is at stake in getting the diagnosis right because the emergence and growth of scale companies that are essential for sustained economy-wide growth are at stake. We outlined during the course of this essay a number of recommendations for fixing the problems we have identified. We close by summarizing and categorizing them according to the parties they primarily would benefit. In virtually all cases, the necessary reforms can and should be made by the SEC, without the need for new statutory authority.

For investors, we recommend that the Commission:

- Change sales disclosure practices and require opt-in to hypothecation and lending agreements with complete disclosure of terms and conditions, eliminating the current opt out required for investors to retain control over the securities they own.

[45] We believe this basic idea originated with Professor Henry Butler of George Mason Law School and Larry Ribstein of the University of Illinois Law School), which they discussed in "Where Was SOX?" *Forbes*, December 22, 2008, http://www.forbes.com/forbes/2008/1222/028.html. The idea also was one of the mostly agreed-upon capital markets improvements at a January 2010 conference organized by the Kauffman Foundation of capital markets experts and entrepreneurs.

- Require complete quarterly disclosure of interest earned by brokers through the lending of client portfolio securities, and the percentage of that amount paid to the beneficial owners of common stock lent to short sellers.
- Require ETF sponsors to explicitly describe unit creation and destruction processes in prospectus and summary information, and compel creation of new units when short interest exceeds 5 percent of outstanding shares. Require sponsors to publish weekly compliance statistics on their websites.
- Require custodian banks to report each week fails-to-receive and fails-to-deliver of equity and ETF securities in an analogous fashion to the requirements imposed by the Federal Reserve on primary dealers of U.S. debt securities.
- Recognize that many plain-vanilla institutions managing long-only portfolios are better counterparty risks than registered broker dealers; allow such firms direct access to capital markets without the interposition of a broker.
- Reward traders who reveal the size and price of orders in the public markets. Do not allow dark pools and brokers who pay for order flow to trade at the same price as those revealed in the public market unless the public orders are filled first.
- Constrict or prohibit internalization practices by
  - Requiring price improvement of at least one cent for firms that internalize order flow, including dark pools;
  - Require that all orders displayed with price and quantity to the broad market be satisfied before any internalized order can be matched;
  - Require all market orders to carry at least a minimum acceptable price.

For issuing companies, we recommend that Congress and the SEC:

- Exempt companies with market capitalization of less than $100 million from provisions of the 1933 Securities Exchange Act and facilitate a truly small cap trading marketplace, such as existed thirty years ago in the earliest days of the NASDAQ stock market.
- Allow all companies of $1 billion market capitalization or less to opt out of Sarbanes–Oxley compliance regulations, as designated by the company's stock symbol. The estimated compliance costs of $1 million or more annually dissuades numbers of small companies from accessing public markets. We believe that investors will pay a higher multiple for companies that opt out of this costly regulation, which is better applied to large, complex multinational holding companies.
- Enable a commercial right for companies to better elect where and how the company's stock will trade, including exchange venues and index inclusion. Index creators license and brand indexes based on publicly available information from public exchanges. Companies should be able to opt in to index inclusion and/or to limit the number of indexes in which they are included. Exchanges might negotiate the commercial terms on behalf of listed companies.

For the exchanges:

- Do not repeat the mistakes of history by relying on affirmative obligations for market makers. History shows that affirmative obligations affirm only intermediaries' profits. High frequency traders have sharply reduced trading costs for the investing public.
- Refrain from imposing rigid daily price limits on exchange traded products. Hard limits on daily price movement exacerbate price moves.
- Require broker-dealers to put maximum and minimum limit prices on all orders, including buy-stop and sell-stop market orders without price. Technology has removed the time and information lags that historically placed retail investors at an information disadvantage. Regulators should consider banning market orders in the new age of instantaneous market access. Retail broker dealers don't enjoy the same rebates from limit orders that they do from market orders. They won't change without a nudge.
- Break up the cartel that is the Consolidated Tape Association (CTA) and instead:
  - Create incentives for price competition on market data. Do not allow weak competitors to charge investors too much for market data under the auspices of an anachronistic thirty-five-year-old revenue-sharing plan designed to keep the NYSE from monopoly powers. The world is a different place.
  - Require minimum data transparency for approved exchanges, including last sale price and volume data, depth of book within 20 percent of current market prices, and rules for access to these data.

In sum, it's time to focus on the real issues affecting our capital and not unsubstantiated claims. It is vital we begin building better markets for new public companies trying to attract necessary capital for growth. New listings, not new complex financial packages, should be the focus of the SEC as the watchdog of our capital markets.

Appendix 1:
IWM Component Stocks Requiring Four Trading Weeks Needed to Create Units Based on 10 Percent of Daily Trading Volume Using June 30, 2010, IWM Short Interest

We load historical market data including close price and daily volume for all available ETF constituents using the security ticker for identification. The close price p_n for a security on a given day n is multiplied by the trading volume v_n on that same day to produce the dollars traded d_n. We average the dollars traded over the past thirty days to produce a signal that is used as a predictor of future trading activity. The thirty-day average dollars traded signal $\langle d_n \rangle_{30}$ may be written as:

$$\langle d_n \rangle_{30} = \frac{\sum_{m=0}^{29} p_{n-m} v_{n-m}}{\sum_{m=0}^{29} I_{>0}(v_{n-m})}$$

The Indicator function I takes on the value one when its argument is greater than zero, and zero otherwise.

We purchase no more than η percent of a security's daily trading volume. To predict the number of days N required to purchase a dollar-amount D of a given security, we use the following equation:

$$N = \left\lceil \frac{100}{\eta} \cdot \frac{D}{\langle d_n \rangle_{30}} \right\rceil$$

The operator with upper brackets $\lceil \quad \rceil$ denotes the ceiling function.

Ticker	IWM Rank as Holder	iShares Ranked in Top 10 of Holders	Trading Days Needed to Create Units in IWM
BRID	3	2	188
ISRL	1	2	170
ARDNA		0	128
PATR	10	1	119
ATRI	4	1	117
GABC	1	2	114
ADGE	1	4	113
MOSY	1	2	107
AFP	6	2	106
SLTM	2	3	101
CTO	6	2	97
AVEO		0	97
CSBK	2	2	96
NWLI	8	1	96
ATLO	1	3	95
DRRX	2	1	95
CORT	5	2	94
APAGF		0	93
AMNB	1	3	91
AXN	1	3	91
CSWC	5	2	90
TUC	6	2	89
ESBF	1	2	88
STBC	2	2	87
CZNC	2	3	86
CASS	3	2	86
HTLF	1	2	86
LCI	2	2	86
CNBKA		0	86
FSBK	1	3	85
OFLX	4	2	84
HBCP	1	3	83
XRIT	1	3	82

HFWA	4	2	82
JOUT	5	2	82
SHEN	4	2	81
GSBC	1	2	81
BDGE	1	4	80
UNIS	1	3	80
NKSH	3	3	80
DDMX	7	1	80
LB	5	1	80
GCOM	4	2	79
PWOD	1	2	79
PGC	2	3	78
MSL	2	2	77
FNLC	2	3	76
SRCE	3	2	76
MSFG	2	2	76
FXEN	1	3	75
UVSP	2	2	75
CALP	4	2	75
HPP		0	75
KBALB		0	74
SMHG	7	2	73
KW	8	1	73
DHIL	4	2	71
MEDQ	3	2	71
ARTNA		0	71
WTBA	2	2	70
EBSB	3	2	70
INHX	3	2	70
AGX	2	2	70
WEYS	6	1	70
CCNE		0	70
TOWN	1	2	69
STEL	3	2	69
CAC	1	2	69
MRLN	7	2	69
MOFG	1	2	69
TMP	2	3	68
LGND	2	3	68
BMRC	2	2	68
TUNE	2	2	68
QADI	3	2	68
HHGP	9	1	68
LBAI	2	2	67
ALNC	3	2	67
PCBK	9	1	67
CSU	6	1	67
IMKTA		0	67
PRIM	3	3	66
CIA	3	2	66
PTIE	5	2	66
KFED	5	2	66
HNRG	2	3	65
ACTL	10	2	65
ZIGO	6	2	65
AZPN	6	1	65
MGRC	6	1	65
FARM	8	1	65
ASCMA		0	65
MGEE	2	2	64
NFBK	3	2	64
SPNC	4	2	64
LMNR	1	2	64
CMLS	6	2	64

NSPH	6	1	64
ELOS	4	2	63
PMFG	3	2	63
WBCO	4	2	63
FRM	6	1	63
CLDT	9	1	63
PLPC	8	1	63
TPGI	4	2	62
PDII	10	1	62
ALX		0	62
DGICA		0	62
UBNK	3	2	61
UBSH	3	2	61
EFSC	2	2	61
PGTI	3	2	61
INFI	5	1	61
AMSWA		0	61
FFIN	3	3	60
OABC	1	3	60
LKFN	4	2	60
TDSC	4	2	60
ULTR	6	2	60
CHFC	6	1	60
NWK	2	3	59
LTS	1	3	59
ESGR	4	2	59
WSBC	3	2	59
ASGN	6	2	59
ORRF	2	2	59
BHLB	10	1	59
MSW	6	1	59
NBTB	3	3	58
NATR	2	3	58
BMTC	3	2	58
AHCI	2	2	58
DLA	5	2	58
SCMP	3	2	58
GBL	6	1	58
ELRC	9	1	58
HEES	10	1	58
NATL	10	1	58
ORCC	8	1	58
HRG	9	1	58
SFNC	2	3	57
SYBT	2	2	57
HUVL	3	2	57
PHX	1	2	57
CTBI	2	2	56
NHC	4	2	56
SYMM	5	2	56
ABBC	3	2	56
NEWS	3	2	56
PROJ	3	2	56
BSRR	1	2	56
CKXE	5	1	56
USAK	6	1	56
THFF	3	2	55
BUSE	3	2	55
CCBG	1	2	55
FC	3	2	55
CRWN	2	2	55
PGI	6	1	55
SASR	5	1	55
GRC	6	1	55

GRIF	10	1	55
TSPT	4	1	55
OMER	2	3	54
PCTI	5	3	54
MNR	3	2	54
MBVT	2	2	54
RAVN	5	1	54
ICGE	7	1	54
FLOW	5	1	54
BARI	4	1	54
UFCS	4	3	53
SIGI	7	2	53
CHG	7	2	53
IPCC	9	2	53
ADPI	2	2	53
CXS	5	2	53
USLM	3	2	53
ICOG	7	1	53
ODC	9	1	53
CIX	6	1	53
SCSC		0	53
CBM	5	3	52
AROW	2	2	52
ABCB	4	2	52
ELGX	5	2	52
CTWS	3	2	52
FMD	5	2	52
RCKB	2	2	52
PICO	10	1	52
CHDN	4	1	52
MOVE	5	1	52
SUR	10	1	52
CMRG	5	1	52
GLRE		0	52
CLNY		0	52
ANTH		0	52
EXPO	10	2	51
GKSR	9	2	51
WCBO	3	2	51
DGII	6	2	51
BFIN	3	2	51
SABA	3	2	51
KRNY	3	2	51
ACUR	1	2	51
WASH	4	1	51
EPHC	8	1	51
TBNK		0	51
BSFT		0	51
NASB	1	3	50
PRK	1	2	50
OCFC	3	2	50
ESSA	3	2	50
CDZI	1	2	50
CWST	3	2	50
ECOL	7	1	50
OSUR	6	1	50
PRO	9	1	50
ACET	7	1	50
RIMG	10	1	50
TTGT	9	1	50
PRM	9	1	50
CYTR	1	3	49
SBSI	1	2	49
PLFE	8	2	49

FRME	2	2	49
FLIC	1	2	49
KEYN	3	2	49
FSCI	6	2	49
KNL	9	1	49
STAN	10	1	49
RNST		0	49
BBGI		0	49
OPK	2	3	48
KAMN	10	2	48
EPL	3	2	48
FBNC	3	2	48
EGBN	3	2	48
GNRC	9	1	48
STFC	7	1	48
TCBK	8	1	48
MITI	4	2	47
MTSC	6	2	47
SPTN	4	2	47
MSEX	3	2	47
SUBK	5	2	47
KVHI	5	2	47
CSFL	6	2	47
COBZ	5	2	47
MPR	5	2	47
TWIN	4	2	47
BLDR	4	2	47
MGPI	2	2	47
ROL	6	1	47
SYNO	4	1	47
YDNT	8	1	47
HOFT	9	1	47
TAXI	8	1	47
MPX	9	1	47
VLGEA		0	47
AMWD		0	47
INO		0	47
BKMU	4	3	46
BCPC	6	2	46
ALOG	8	2	46
SCBT	3	2	46
GPK	2	2	46
BNCL	3	2	46
YORW	1	2	46
AATI	4	2	46
ENZ	7	2	46
NRCI	5	2	46
AFCE	6	1	46
HOME	5	1	46
CLU	5	1	46
NEOG	3	2	45
ARI	6	2	45
CFNL	2	2	45
KNOT	9	2	45
STAA	3	2	45
CERS	4	2	45
JBSS	6	2	45
MCHX	6	2	45
FHCO	1	2	45
EGOV	4	1	45
DORM	9	1	45
CVCO		1	45
FSR		0	45
EURX		0	45

RAME	1	3	44
MMSI	7	2	44
DMRC	1	2	44
ROCM	6	2	44
WINA	2	2	44
PRS	5	2	44
NXST	3	2	44
NAVG		1	44
FPIC	5	1	44
LNDC	4	1	44
BBND	3	1	44
EXAC	8	1	44
MAXY	2	3	43
BPAX	1	3	43
WDFC	5	2	43
AVID	9	2	43
RSYS	3	2	43
FCBC	2	2	43
PDFS	5	2	43
PRST	2	2	43
MATW	5	1	43
PSMT	10	1	43
SJW	4	1	43
BKR	7	1	43
WFD	4	1	43
ARRY	5	1	43
TBBK	7	1	43
SPSC	10	1	43
AGII		0	43
IBI		0	43
TECUA		0	43
TRST	5	3	42
SWX	7	2	42
DNEX	10	2	42
BRC	8	2	42
CHE	9	2	42
MLNK	3	2	42
BANF	5	2	42
VASC	3	2	42
HVT	7	2	42
FUBC	4	2	42
LCAV	8	2	42
AACC	5	2	42
KBW	6	1	42
KNOL	8	1	42
SNHY	8	1	42
HWKN	8	1	42
TYPE	10	1	42
STNG	5	1	42
GPX	7	1	42
CYNO	8	1	42
LWAY	10	1	42
CSGP		0	42
GNCMA		0	42
UIL	3	3	41
CRY	3	3	41
SYNM	2	3	41
MGAM	3	3	41
HEI	3	2	41
CKP	9	2	41
ESIO	10	2	41
EXAR	6	2	41
FISI	2	2	41
IMMR	2	2	41

VOXX	4	2	41
SRSL	2	2	41
ROMA	1	2	41
BOOT	5	2	41
PBIB	2	2	41
ANEN	5	1	41
LQDT	4	1	41
HRLY	8	1	41
EPAX	4	1	41
WHG	8	1	41
VDSI	9	1	41
MSSR	10	1	41
BBSI	5	1	41
NAUH	7	1	41
CGC	2	3	40
HBOS	1	3	40
HELE	8	2	40
PKE	10	2	40
FFIC	3	2	40
LSE	4	2	40
MYE	5	2	40
DSPG	7	2	40
AMRI	7	2	40
TOBC	1	2	40
HIL	6	2	40
INET	6	1	40
AP	10	1	40
MGI	7	1	40
USAP	7	1	40
EVC	5	1	40
UMH	2	3	39
TG	5	2	39
ATNI	7	2	39
DNBK	4	2	39
CCRN	8	2	39
FFCH	4	2	39
TRNO	7	2	39
PLXT	2	2	39
DFZ	3	2	39
ABCD	3	2	39
TISI	5	1	39
EXLS	8	1	39
GBLI	7	1	39
ARCL	10	1	39
CSS	10	1	39
EMCI	9	1	39
GAIA	6	1	39
LG	3	3	38
SNTA	1	3	38
CLC	7	2	38
AMSG	8	2	38
CIR	8	2	38
WMK	7	2	38
CTS	8	2	38
MRCY	4	2	38
COHU	8	2	38
OPY	3	2	38
SRDX	7	2	38
LABL	4	2	38
ATRO	2	2	38
PEBO	5	2	38
REX	7	2	38
WGOV	4	1	38
AMN	6	1	38

EBF	7	1	38
UHT	4	1	38
SPRT	5	1	38
VTAL	8	1	38
RELL	6	1	38
LYTS	6	1	38
CTGX	5	1	38
ROLL		0	38
IILG		0	38
CRAI		0	38
BJGP	1	3	37
CUR	1	3	37
ESL	8	2	37
SXT	9	2	37
CW	7	2	37
ABM	9	2	37
RLI	9	2	37
MLI	8	2	37
TR	5	2	37
INDB	6	2	37
DEL	7	2	37
GLBC	9	2	37
UTSI	2	2	37
SHOR	3	2	37
KTOS	3	2	37
VRTS	2	2	37
EPAY	8	1	37
DUF	7	1	37
AAON		1	37
HUGH	2	1	37
VITA	9	1	37
ASGR	8	1	37
ALCO	4	1	37
TESS	3	1	37
VALU	8	1	37
ZGEN		0	37
IRIS		0	37
IBOC	2	3	36
SKY	8	3	36
TDY	7	2	36
BLKB	10	2	36
JJSF	10	2	36
NPK	5	2	36
DCOM	7	2	36
MEAS	6	2	36
DYAX	5	2	36
JRN	8	2	36
AVTR	5	2	36
GST	3	2	36
SPAR	6	2	36
CYTK	4	2	36
GUID	2	2	36
HOKU	1	2	36
STWD	10	1	36
EEFT	6	1	36
FPO	5	1	36
MKTX	9	1	36
STEI	9	1	36
KNXA	5	1	36
HGIC	10	1	36
ACCL	6	1	36
CMCO	6	1	36
HYC	6	1	36
PNY	5	3	35

TRMK	3	3	35
MDTH	4	3	35
SUPG	1	3	35
AERG	1	3	35
NWN	8	2	35
CATO	7	2	35
LDR	7	2	35
CBB	5	2	35
ABAX	7	2	35
FORR	9	2	35
OMCL	8	2	35
FIX	10	2	35
KKD	4	2	35
WRES	3	2	35
END	3	2	35
METR	3	2	35
PGNX	4	2	35
PNCL	5	2	35
JMP	4	2	35
EBTX	2	2	35
BXG	4	2	35
LMNX	7	1	35
PBH	7	1	35
CEVA	7	1	35
CRVL		1	35
FSTR	6	1	35
KRG		1	35
HCKT	9	1	35
CNU	2	1	35
UACL	10	1	35
CNVO	8	1	35
SMSC		0	35
LNY		0	35
UMBF	2	3	34
UBSI	4	3	34
FSP	5	3	34
DHT	2	3	34
PRGS	9	2	34
CYBX	7	2	34
IRET	4	2	34
NTCT	3	2	34
UNF	9	2	34
SEB	6	2	34
HALO	2	2	34
RIGL	6	2	34
PMT	5	2	34
GMO	1	2	34
ACTU	2	2	34
DEST	2	2	34
LEE	1	2	34
MCRI	10	2	34
VCBI	3	2	34
PFS	6	1	34
PKD	9	1	34
ICFI	9	1	34
COKE	10	1	34
GHM	5	1	34
PCCC	6	1	34
FCFS		0	34
HOMB	4	3	33
PURE	1	3	33
WWON	1	3	33
BDC	8	2	33
SSS	7	2	33

HCSG	6	2	33
VIVO	6	2	33
OTTR	2	2	33
SAFT	5	2	33
CNSL	4	2	33
UEIC	9	2	33
STL	5	2	33
PSEM	8	2	33
FTWR	2	2	33
UEC	2	2	33
ASI	8	2	33
SNMX	5	2	33
GRB	4	2	33
OPWV	2	2	33
ACAT	9	2	33
MDS	7	2	33
DK	4	2	33
SVVS	6	1	33
ACIW	9	1	33
MSA	10	1	33
BLT	6	1	33
AIMC	6	1	33
ZEP		1	33
CBZ	7	1	33
TRK	10	1	33
AREX	5	1	33
ECHO	9	1	33
CUTR	7	1	33
GTEC	8	1	33
FWRD		0	33
CBR	4	3	32
GOOD	1	3	32
OSIR	3	3	32
CRIS	1	3	32
SJI	4	2	32
HAE	10	2	32
ALE	6	2	32
FUL	7	2	32
DAR	5	2	32
MCGC	2	2	32
EPIC	5	2	32
CDR	6	2	32
GIFI	7	2	32
SFE	5	2	32
MCS	7	2	32
TCAP	2	2	32
CVGW	6	2	32
IAAC	3	2	32
MRGE	1	2	32
STMP	6	2	32
ALIM	6	2	32
TAST	4	2	32
OUTD	3	2	32
HNI	6	1	32
GSM	3	1	32
FELE	6	1	32
CNMD		1	32
TBI		1	32
TRGT	5	1	32
AEC	7	1	32
CCOI	9	1	32
PBNY	5	1	32
RNWK	7	1	32
CRRC	6	1	32

UDRL	10	1	32
CFX		0	32
AEA		0	32
SSNC		0	32
STBA	3	3	31
VICR	3	3	31
NGSX	1	3	31
LUFK	6	2	31
DFG	8	2	31
IIVI	8	2	31
TYL	3	2	31
UFPI	7	2	31
ISBC	2	2	31
ROG	9	2	31
SHFL	7	2	31
WIRE	8	2	31
ELMG	8	2	31
EXAS	1	2	31
UTL	2	2	31
GRM	7	2	31
UFI	5	2	31
PLUS	4	2	31
JKHY	8	1	31
RDK	8	1	31
HITT	6	1	31
CPHD	8	1	31
CGNX		1	31
LRN	8	1	31
BBOX		1	31
STNR	7	1	31
HWAY		1	31
TRAD	8	1	31
USPH	10	1	31
TOMO	4	1	31
DHX	9	1	31
TLEO		0	31
JCOM		0	31
KSWS		0	31
PIKE		0	31
USMO	6	3	30
NARA	4	3	30
VICL	3	3	30
ALTE	4	2	30
BMI	5	2	30
CRBC	4	2	30
FARO	8	2	30
HNR	3	2	30
CPK	2	2	30
APSG	4	2	30
INSP	5	2	30
MTRX	5	2	30
RTK	2	2	30
PMTI	4	2	30
GSOL	2	2	30
MDF	1	2	30
LCUT	2	2	30
KCLI	3	2	30
GTN	6	2	30
EPM	3	2	30
OPXT	8	2	30
NHI	3	1	30
SYNT	10	1	30
GTY	4	1	30
OPNT	7	1	30

MEG	8	1	30
MG	7	1	30
VSEC	3	1	30
PKOH	4	1	30
LVB	7	1	30
BAMM	5	1	30
VOCS		0	30
XRM	2	4	29
PPHM	1	3	29
NWBI	2	2	29
VRUS	9	2	29
MANH	9	2	29
ORIT	2	2	29
SPB	2	2	29
WPP	4	2	29
MHLD	3	2	29
ISPH	4	2	29
PKY	7	2	29
BGFV	4	2	29
FUR	4	2	29
ELON	2	2	29
ENSG	2	2	29
ZIOP	6	2	29
DVAX	5	2	29
AHC	4	2	29
GSAT	5	2	29
TAYC	3	2	29
NYNY	2	2	29
THRX	7	1	29
SCHL	8	1	29
EFII	8	1	29
RDEN	4	1	29
MXWL	8	1	29
LPSN	4	1	29
MRTN	7	1	29
CRAY	3	1	29
BHS	5	1	29
MEI		0	29
DIVX		0	29
NJR	5	4	28
AWR	6	3	28
NTLS	8	3	28
SNTS	1	3	28
PSB	7	2	28
INSU	7	2	28
FFBC	7	2	28
RT	5	2	28
CBU	5	2	28
ACTG	1	2	28
HMN	7	2	28
TRAK	8	2	28
HLIT	8	2	28
MINI	8	2	28
NAFC	8	2	28
GB	9	2	28
VVI	6	2	28
EHTH	5	2	28
OKSB	4	2	28
CV	4	2	28
AVNW	6	2	28
CBK	10	2	28
COMV	2	2	28
RLRN	2	2	28
CHSP	5	2	28

VOL	6	2	28
OCNW	3	2	28
GRNB	3	2	28
NDSN	6	1	28
BOBE	5	1	28
TCBI	8	1	28
PODD	7	1	28
HPY		1	28
BGS	7	1	28
LAYN	7	1	28
UAM	6	1	28
NPSP	8	1	28
HURN	4	1	28
MYRG	6	1	28
OPTR	10	1	28
RENT	4	1	28
IXYS	7	1	28
SRI	7	1	28
PLOW	7	1	28
COWN	6	1	28
PTSI	7	1	28
STE		0	28
SGEN		0	28
BHE		0	28
NCI		0	28
NWPX		0	28
CHCO	4	3	27
IDA	5	2	27
WABC	5	2	27
WWW	10	2	27
AIT	7	2	27
WST	9	2	27
SSD	8	2	27
TWGP	9	2	27
ONB	6	2	27
ACO	7	2	27
JAKK	10	2	27
RCRC	7	2	27
HTH	4	2	27
ERES	7	2	27
FRPT	4	2	27
ATSG	2	2	27
EXTR	2	2	27
CMN	8	2	27
OMPI	7	2	27
RURL	3	2	27
NUTR	8	2	27
OLP	2	2	27
TRID	4	2	27
UVE	2	2	27
BLUD	6	1	27
MLHR	7	1	27
SRX	9	1	27
IPHS	7	1	27
CRA	5	1	27
CPSI		1	27
SEM	7	1	27
ANGO	10	1	27
ALC	5	1	27
IMN	6	1	27
OYOG	9	1	27
PRSC	7	1	27
TMH	10	1	27
MOV		1	27

TVL	8	1	27
HALL	4	1	27
PZN	8	1	27
DTSI		0	27
KFRC		0	27
INWK		0	27
RLOC		0	27
GFC		0	27
FAF	3	3	26
NBS	1	3	26
GBCI	8	2	26
FMBI	5	2	26
SKYW	7	2	26
CCMP	6	2	26
NSIT	9	2	26
GLF	3	2	26
SSYS	10	2	26
GFF	6	2	26
PBY	6	2	26
PAET	9	2	26
SCOR	5	2	26
RAD	5	2	26
FRED	10	2	26
BLX	1	2	26
INAP	4	2	26
PNX	3	2	26
SUPX	9	2	26
EXL	7	2	26
CHUX	7	2	26
LDL	7	2	26
RLH	5	2	26
FALC	4	2	26
BAGL	4	2	26
WSBF	3	2	26
WGL	6	1	26
LWSN	6	1	26
ARJ		1	26
ABCO	7	1	26
MOD	6	1	26
OFIX	8	1	26
GLT	6	1	26
SONO	6	1	26
XXIA	9	1	26
WMG	5	1	26
NGS	5	1	26
IIIN	6	1	26
SHLO	10	1	26
REN		0	26
ABMD		0	26
WMAR		0	26
NYMX	1	4	25
BKI	5	3	25
MDVN	4	3	25
SGMO	2	3	25
APPY	1	3	25
MSCC	9	2	25
UNFI	5	2	25
WXS	6	2	25
VSAT	6	2	25
UMPQ	5	2	25
FNB	9	2	25
ESE	10	2	25
EDE	3	2	25
NPBC	9	2	25

TTMI	4	2	25
CWT	2	2	25
LTC	6	2	25
SUI	4	2	25
IN	10	2	25
CODI	4	2	25
UTEK	5	2	25
EPIQ	6	2	25
SUP	5	2	25
PCYC	6	2	25
GTS	7	2	25
CASC	8	2	25
HEV	3	2	25
LAVA	3	2	25
PRFT	5	2	25
ACLS	4	2	25
CWCO	3	2	25
PRTS	3	2	25
ASFI	5	2	25
FMER	5	1	25
GWR	8	1	25
LFUS		1	25
NC	5	1	25
MIG	7	1	25
RNOW	9	1	25
HAYN	7	1	25
ANAD	3	1	25
TRC	8	1	25
EGY	5	1	25
KAI	5	1	25
LF	6	1	25
FIBK	8	1	25
HF	6	1	25
RTIX	5	1	25
ZZ	6	1	25
TIER	10	1	25
RSTI		0	25
CHRS		0	25
ESC		0	25
DEPO	2	3	24
NABI	3	3	24
TPCG	1	3	24
ABVT	7	2	24
CATY	6	2	24
ORB	6	2	24
IVC	10	2	24
CUB	6	2	24
CRDN	5	2	24
DEXO	2	2	24
JBT	10	2	24
DM	5	2	24
SGI	5	2	24
BMTI	3	2	24
AXAS	1	2	24
AVD	8	2	24
CBOU	2	2	24
RECN	8	1	24
BJRI	10	1	24
SCS	8	1	24
MCF	5	1	24
LGF	7	1	24
ATMI		1	24
ZINC	8	1	24
RRR	4	1	24

DENN	7	1	24
ARP	6	1	24
LLNW	5	1	24
SEAC	5	1	24
AIQ	8	1	24
SUSS	8	1	24
CPD	5	1	24
OXPS		0	24
RDEA		0	24
FMR		0	24
LXU	4	3	23
HMSY	5	2	23
NKTR	7	2	23
BKH	7	2	23
NWE	9	2	23
EGP	10	2	23
HBHC	6	2	23
AKR	10	2	23
GCO	6	2	23
ZOLL	8	2	23
MWIV	10	2	23
CSGS	5	2	23
OFG	3	2	23
AIN	10	2	23
BH	8	2	23
KS	3	2	23
HTGC	4	2	23
FSS	8	2	23
ARAY	4	2	23
PLAB	9	2	23
ININ	4	2	23
WIBC	8	2	23
GGS	4	2	23
CRTX	3	2	23
GRA	7	1	23
ALKS	10	1	23
DCT	7	1	23
COHR	8	1	23
DXCM	10	1	23
SFLY	8	1	23
LDSH	9	1	23
RPT	7	1	23
IRBT	9	1	23
GPOR	5	1	23
CWEI	5	1	23
DCO	5	1	23
HWK	7	1	23
DWSN	7	1	23
VNDA	7	1	23
APAC	4	1	23
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GLCH	6	1	23
PNSN	9	1	23
AVA		0	23
IART		0	23
SEH		0	23
CADX		0	23
EPR	6	3	22
KED	2	3	22
PRA	6	2	22
CNL	9	2	22
TTEK	6	2	22
MPW	4	2	22

EZPW	4	2	22
MKSI	9	2	22
FDP	6	2	22
IO	7	2	22
BRKL	8	2	22
OSIS	5	2	22
SSI	6	2	22
SCL	5	2	22
NEWP	8	2	22
DY	7	2	22
RTEC	8	2	22
KEI	8	2	22
ADC	2	2	22
LNG	1	2	22
TZOO	5	2	22
FTEK	3	2	22
FXCB	4	2	22
HLS	9	1	22
OLN	6	1	22
ELS	6	1	22
MENT	5	1	22
EXBD	10	1	22
MBFI	8	1	22
KFY	7	1	22
ARTG	6	1	22
HTWR	5	1	22
LORL	7	1	22
ELY		1	22
TESO	7	1	22
CVI	7	1	22
CVGI	8	1	22
CLMS	9	1	22
SBX	5	1	22
VIAS	7	1	22
IFSIA		0	22
RA		0	22
MAPP		0	22
XPRT		0	22
WSO	9	3	21
UNS	7	3	21
PPD	2	3	21
PNFP	5	3	21
IMMU	4	3	21
SPPI	1	3	21
NVAX	4	3	21
MILL	2	3	21
ATU	6	2	21
CYMI	7	2	21
SUSQ	5	2	21
HUBG	8	2	21
POOL	8	2	21
TSRA	5	2	21
FOR	8	2	21
VHC	1	2	21
ASTE	8	2	21
ENZN	4	2	21
ALNY	6	2	21
EXEL	6	2	21
SMA	7	2	21
OXM	3	2	21
SXI	4	2	21
SMRT	3	2	21
TWO	3	2	21
CAS	8	2	21

IVAC	7	2	21
NVEC	2	2	21
TNL	4	2	21
MTSN	6	2	21
THMD	4	2	21
USEG	2	2	21
AEPI	5	2	21
CFNB	5	2	21
ARBA	7	1	21
PLT	8	1	21
MRH	6	1	21
MTX	6	1	21
INFN	6	1	21
VGR	3	1	21
ARTC	6	1	21
AEL	3	1	21
TNC	9	1	21
KOP	6	1	21
EDR	9	1	21
SNCR	5	1	21
OMN	3	1	21
CORE	4	1	21
ZOLT	7	1	21
RVI	6	1	21
SPEC	4	1	21
STXS	6	1	21
SBNY		0	21
SMTC		0	21
MMS		0	21
SBH		0	21
NTGR		0	21
OAS		0	21
AIR		0	21
WMGI		0	21
VLCM		0	21
KELYA		0	21
GEOI		0	21
STRL		0	21
VPHM	4	3	20
TASR	3	3	20
NCT	1	3	20
EXR	6	2	20
CBST	8	2	20
ICON	9	2	20
POL	5	2	20
JDAS	4	2	20
OCLR	2	2	20
COLB	6	2	20
ASEI	4	2	20
PZZA	6	2	20
PRI	3	2	20
AZZ	6	2	20
QTM	2	2	20
BABY	7	2	20
SMSI	6	2	20
KOPN	3	2	20
POZN	2	2	20
BEAT	2	2	20
BBW	2	2	20
FURX	3	2	20
OMI	7	1	20
HXL	6	1	20
AOS	9	1	20
PCH	7	1	20

AAI	4	1	20
MANT	8	1	20
ADVS	8	1	20
RBN		1	20
TMRK	5	1	20
GTLS	6	1	20
BLC	6	1	20
ASF		1	20
EIG	10	1	20
IPCM	7	1	20
ART	8	1	20
ABG	7	1	20
MBLX	5	1	20
LOOP	9	1	20
KNSY		1	20
CLRT	4	1	20
FIZZ	5	1	20
AH	7	1	20
RRTS	6	1	20
REVU	5	1	20
PETS		0	20
CBEY		0	20
SAIA		0	20
RBCAA		0	20
DMAN		0	20
ONE		0	20
ENV		0	20