

Market Structure Overview

**Goldman Sachs
September, 2009**

Summary

- **The US equities market is increasingly efficient and is broadly regarded as the best in the world.**
 - Spreads are reduced, execution costs are down, and liquidity is up
 - **The investing community (especially retail) has benefitted from the evolving market structure and industry competition.**
 - **Themes in the current market structure debate:**
 1. ***Short Selling, Pre-borrow, & Hard Locates***
 - Rule 204 of Regulation SHO has been effective at reducing fails in the marketplace.
 - The necessity of additional measures to eliminate fails or “naked” short selling are not supported by empirical evidence.
 - 99.9% of trades do not fail.
 - Pre-borrow requirements would dramatically harm liquidity and market efficiency.
 2. ***“Dark Pools” & Reg ATS:***
 - Non-displayed liquidity has always existed.
 - “Dark Pools” are a technological evolution of classic market structure that have brought benefits to institutional and retail trading alike.
 - “Trade-At Protection,” or a reduction to the Reg ATS Fair Access threshold, would not be in the best interest of investors.
 3. ***High-Frequency Trading & Exchange Co-location***
 - Additional trading obligations should be attached to the privilege of co-location and special rebates offered by exchanges.
 4. ***Sponsored Access / DMA***
 - “Naked” sponsored access introduces the potential for significant systemic risk due to the lack of appropriate risk controls.
 5. ***Flash Trading & IOIs***
 - Goldman Sachs believes that actionable IOIs and so called “flash orders” from exchanges should be treated as quotes and subject to the applicable rules and regulations.
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Market Structure Overview

■ Technological innovations have enabled profound change in market structure

- Proliferation of faster and less expensive hardware has leveled the playing field, enhanced competition and increased liquidity
- Allowed for the creation of new quantitative trading strategies – enhancing market efficiency
- Has reduced response times from seconds, to milliseconds, to microseconds over the course of only a few years (exponential change)

■ Changes in the exchange landscape

- Technology advancements have lowered barriers to entry, allowing for more competition
- Post “de-mutualization”, relationships between exchanges and brokers have changed in nature, “the world is flattening”.
- A highly competitive environment has resulted in a large reduction in exchange fees, savings that have been passed on to the end customers

■ “High frequency” strategies have replaced the liquidity traditionally supplied by “specialists” and “market makers”

- Co-location, Sponsored Access, direct exchange data feeds and in many cases there are no specific obligations for these privileges

■ Several seminal regulatory changes have dramatically altered the landscape:

- Reg ATS, Reg NMS, Reg SHO
- Decimalization has had a dramatic impact on displayed liquidity
 - “Penny jumping” has made limit order display for large sizes difficult, has forced the adoption of algorithmic trading techniques which break up orders into much smaller sizes.
- The increased use of algorithmic trading has resulted in “virtual blocks”
 - Our empirical evidence confirms that the ability for sizable orders to access non-displayed (“dark”) liquidity has benefited the trading performance of such sizable orders

■ Automation of manual procedures has driven efficiency gains

- Shift to algorithmic trading for execution of agency orders
- Use of the ATS construct within the broker-dealer has allowed for the automation of internal crossing opportunities before going to the marketplace, previously a manual function

■ A very robust private network has developed, greatly increasing connectivity and access to liquidity

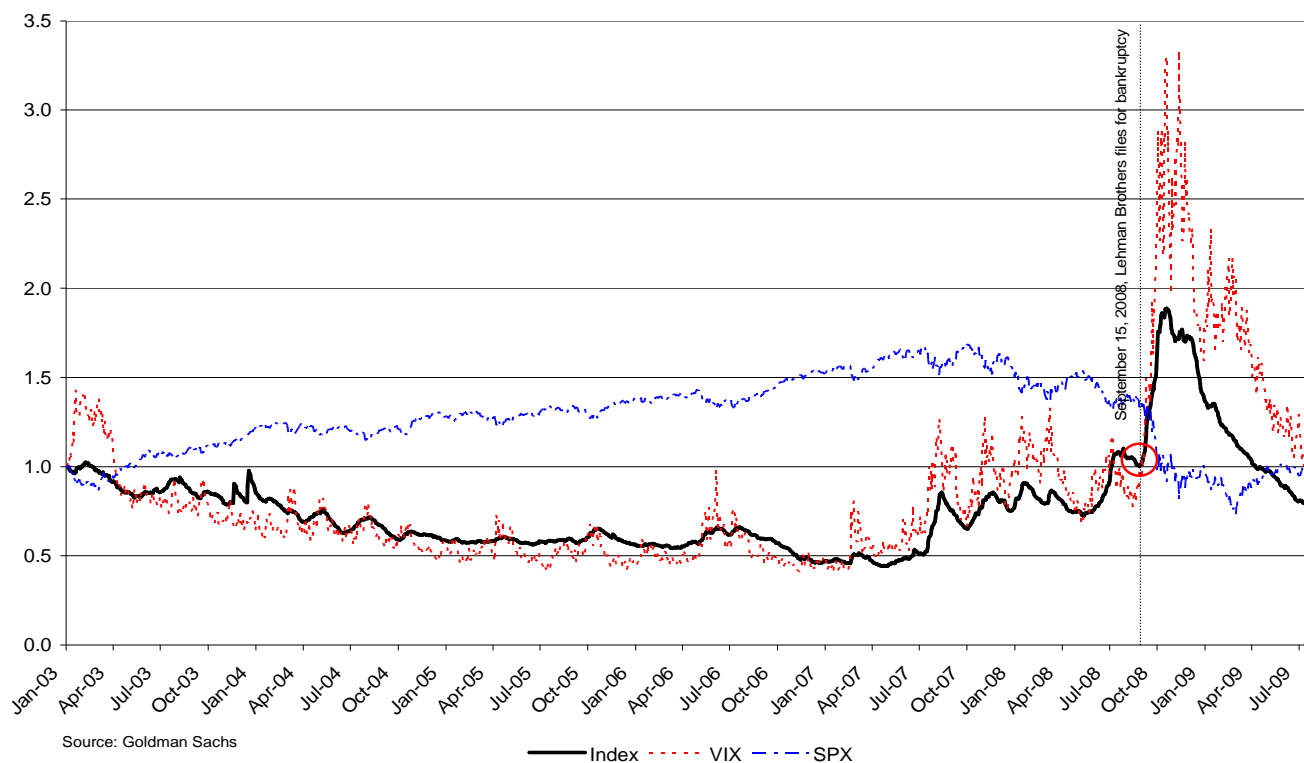
- As part of the Reg NMS intermarket sweep, exchanges are also now connected to both displayed and non-displayed liquidity pools

While all of this change has not been without its challenges, it has been accompanied by a decline in both implicit and explicit trading costs, benefiting primarily retail and also institutional investors

Are the US Equities markets more efficient..... the trend seems to be in the right direction

- Goldman Sachs constructed an index that corresponds to market inefficiency across the Russell 3000 universe of stocks using two factors: quoted depth and bid-ask spreads
- The chart to the right shows the market inefficiency index, the S&P 500 index, and the implied volatility index (VIX) over the period Jan 2003 to August 2009.
- The chart demonstrates that market inefficiency and VIX are positively correlated.

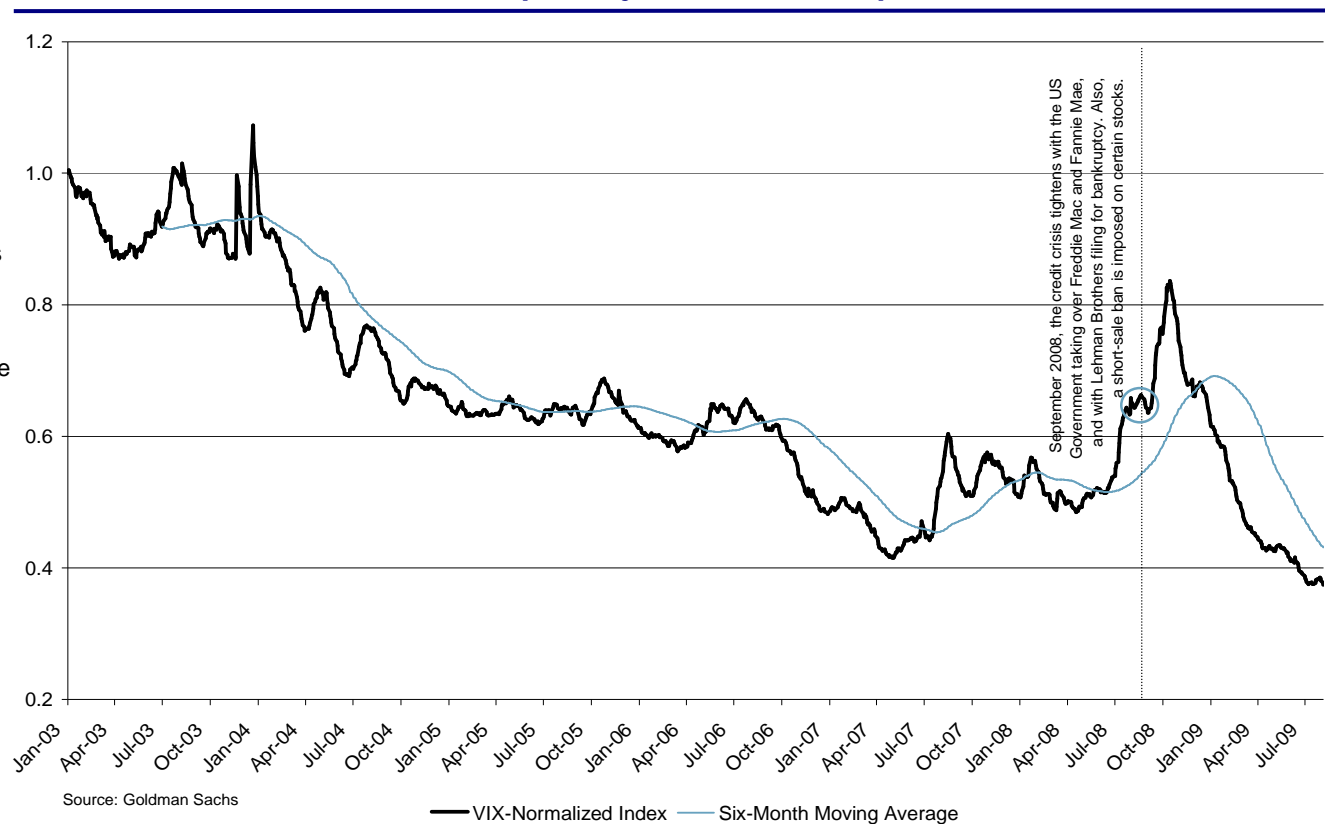
Depth Adjusted Bid-Ask Spread, Normalized to January 9, 2003



Are the US Equities markets more efficient..... the trend seems to be in the right direction

- In order to separate the contribution of the VIX versus those of other factors, we analyze the correlation between changes in the market inefficiency index and changes in the VIX.
- The chart to the right shows the portion of market inefficiency that is unexplained by changes in the VIX. That is, it shows the evolution of depth-adjusted bid-ask index if volatility is held constant.
- After adjusting for the VIX, we observe that market inefficiency steadily decreases over time.
- This can be attributed to several reasons, such as technological advancements, market structure evolution, increased competition, and financial innovations.

VIX-Normalized, Depth Adjusted Bid-Ask Spread



A highly competitive industry where participants are pushing into each other's traditional space...

■ The Industry is healthy...

- 8 Public Exchanges / ECNs with significant market share
- 20+ ATSS
- Dozens of agency-execution brokers
- Robust vendor population (market data, trading analytics, etc)
- Record volumes

■ Participants often are located in multiple spaces throughout market structure

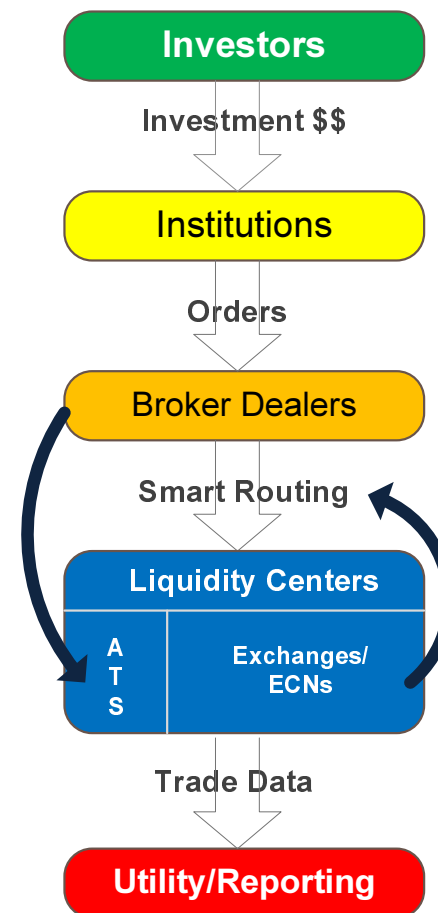
- Ex- Goldman Sachs is an institution, a broker, and a liquidity center.
- There has been bleeding of roles- exchanges and brokers have pushed into each other's traditional space.
 - Many of the topics in current public dialogue are primarily competitive issues, rather than matters of market integrity

■ No dominance by any one player

- Investors have more options/access than ever before
 - Brokers compete for customer order flow through innovative tools and aggressive pricing
 - No broker has more than 8-10% market share
 - Exchanges compete for order flow by reducing execution fees
 - Gradual move from duopoly towards balanced market shares across many venues

■ Fierce competition has fostered innovation

- Technology advances and “processing power” have grown exponentially.
- Ultimately resulting in more powerful data, decision tools, and lower costs for the end customer.



Has the Evolution of this Market Structure Brought Benefits to the Investing Community?

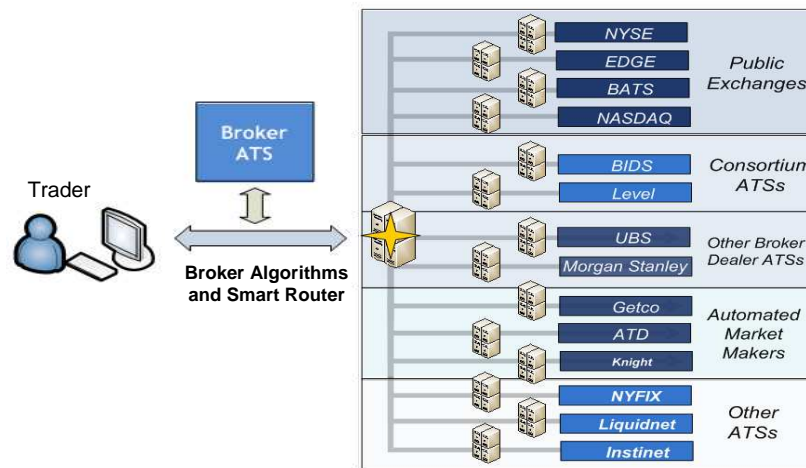
Then

- Market participants “liquidity” (willingness to buy/sell securities) goes largely undiscovered due to an inefficient and cumbersome process
- Broker-dealer liquidity is largely unattainable
- Relationships provide traders with access to liquidity
- Market Makers are directed captive retail orders
- There is minimal competition between trading venues. Investors compete to find liquidity and exchanges have



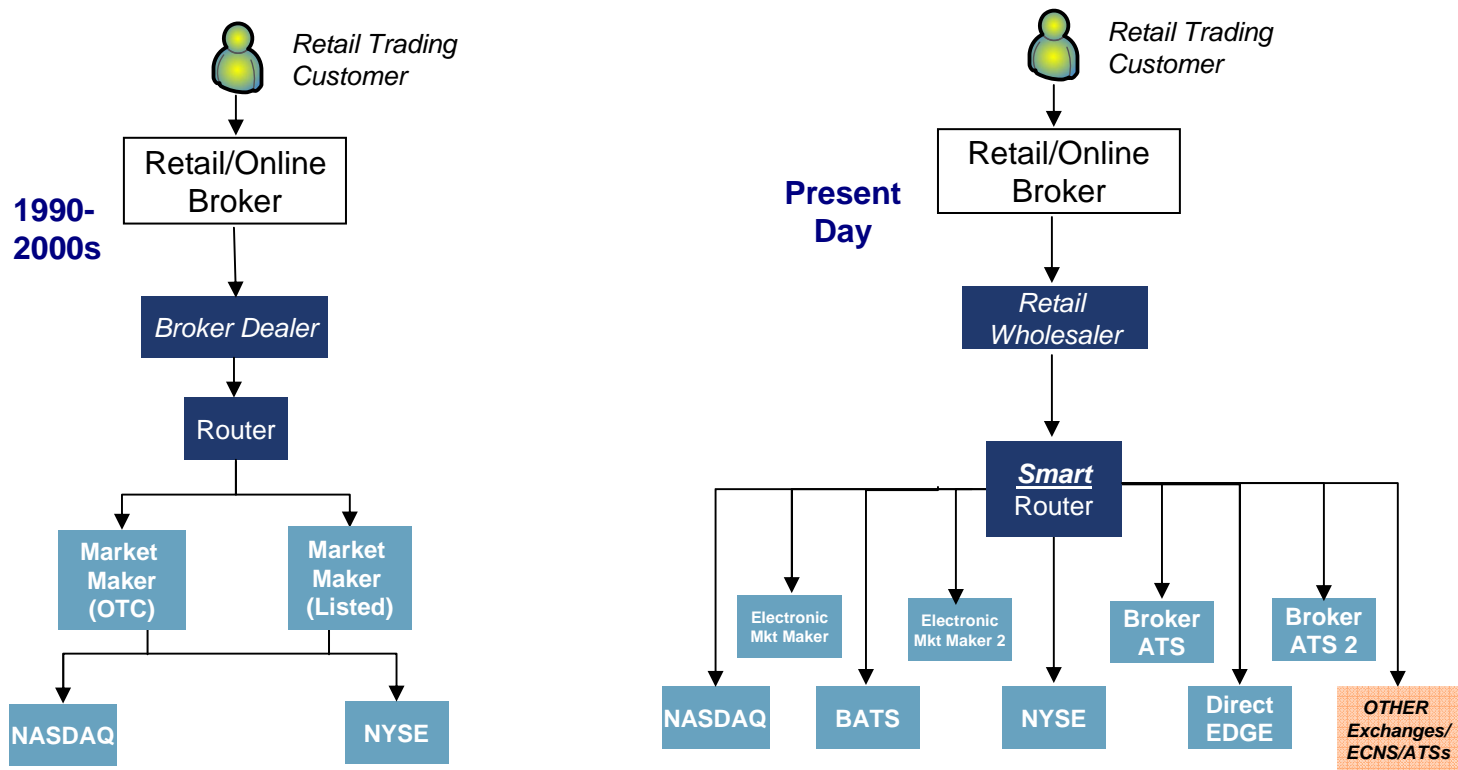
Now

- Once inaccessible liquidity can now be connected to and simultaneously accessed with the push of a button.
- Broker-dealer buy/sell interest has been turned electronic in ATSS
- Electronic trading venues provide participants equal access to liquidity
- Market Makers must compete for retail orders, resulting in increased willingness to trade, superior execution prices, and faster trading
- Trading venues compete for investors order activity and aggressively reduce their pricing



As a Result of this Intensely Competitive Market Structure, The Retail Trading Community is More Empowered than Ever Before

- Increased competition has led to industry wide price compression among trading destinations. These economics ultimately make it to the retail trading customer in the form of reduced execution costs (ex \$5 trades with Online Broker XYZ)
- Fragmented market share pushes venues to achieve superior execution (speed, price) on behalf of retail customers
- Electronic market-making and Broker ATSs replace manual execution services- improving efficiency, lowering costs, and reducing information leakage



Part II: Themes in the Current Market Structure Debate

1. *Short Selling, Pre-borrow, & Hard Locates*
 2. *“Dark Pools” & Reg ATS*
 3. *High-Frequency Trading & Exchange Co-location*
 4. *Sponsored Access / DMA*
 5. *Flash Trading & IOIs*
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Short Selling and Fails to Deliver

I. Review of Short Activity

- Heavy covering during short sale ban and market decline during fall of 2008
- Short activity rose sharply after the March 2009 market low while market was rising

II. Rule 204 of Regulation SHO has been effective

- Reduction in CNS fails to deliver
- GAO Report shows 99.9% of trades settle on time

III. Additional measures to eliminate fails or “naked” short selling are not necessary

- Pre-borrow suggestions have significant costs
- Hard locate proposals require significant and complex infrastructure development
- Pre-borrow and hard locates are not a guarantee of delivery

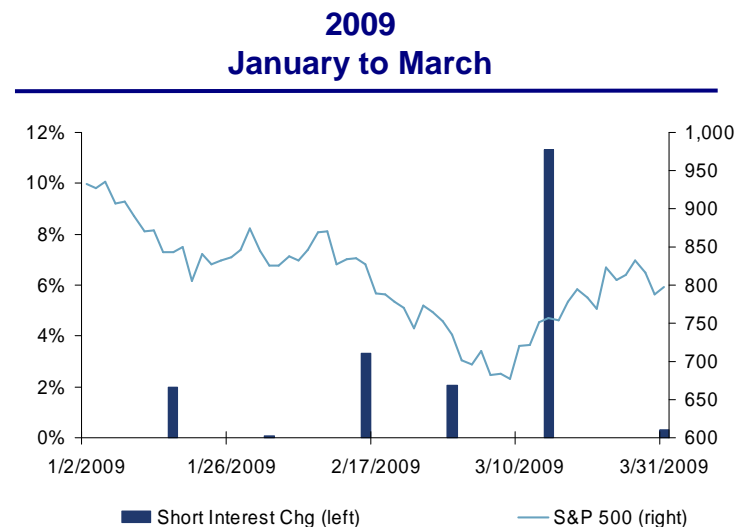
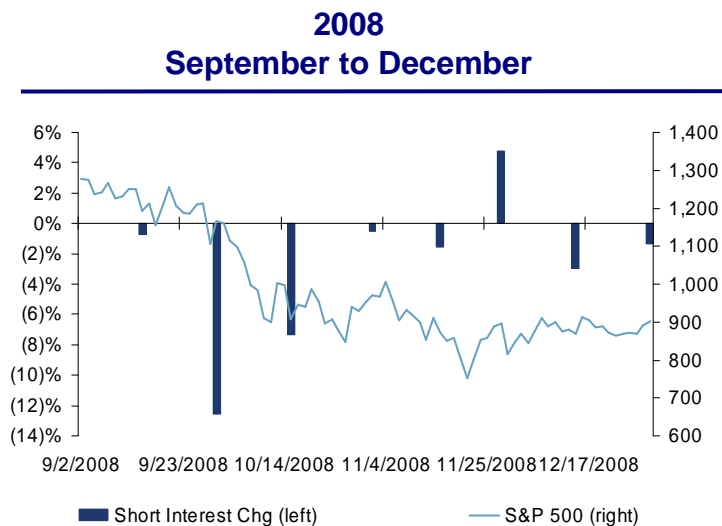
IV. Prime Brokerage No-Action Letter

- Industry sponsored solution
- Requires prime brokers to monitor customer order marking and report back to executing brokers

I. Review of Short Activity

Short Interest Fell Sharply

- During the Short Sale Ban (Sept 18 - Oct 8, 2008), public short interest declined 19% while the market declined 15%. [1]
- Public short interest accelerated as the market began to rally in March 2009



Source: Values calculated from Bloomberg Data

[1] Bloomberg Data: NYSE Short Interest on Sept 15, 2008 (14.7BN shares) compared to Oct 15, 2008 (11.9BN shares)]

II. Rule 204 of Regulation SHO has been effective

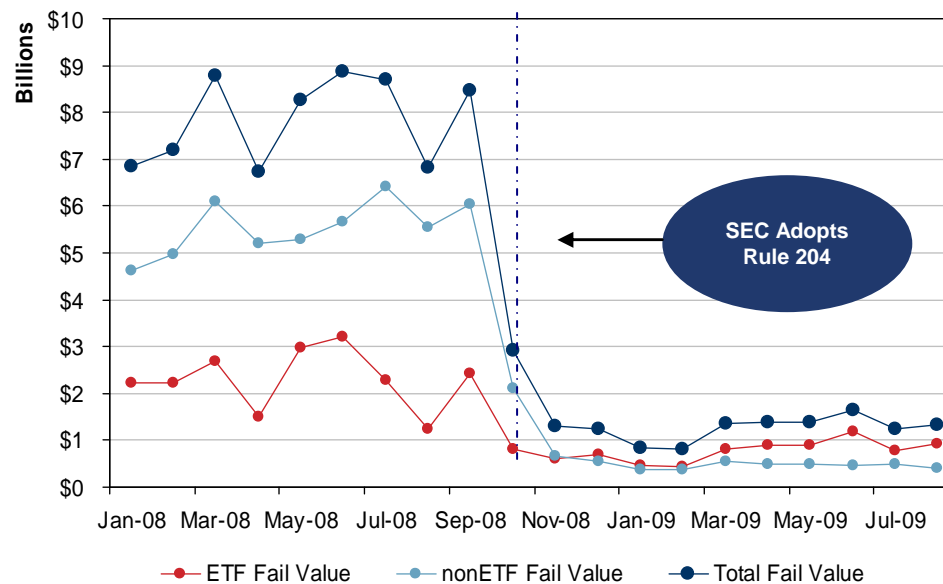
Reduction in CNS Fails

Since Implementation:

- **89% reduction in CNS fails for non-ETF's**
 - Before 204 = \$5.5BN
 - After 204 = \$633MM
 - **Reduction of \$4.9BN**

- **67% reduction in CNS fails for ETFs**
 - Before 204 = \$2.3BN
 - After 204 = \$772MM
 - **Reduction of \$1.5BN**

- **82% reduction in CNS fails for ALL stocks**
 - Before 204 = \$7.9BN
 - After 204 = \$1.4BN
 - **Reduction of \$6.4BN**



Source: <http://www.sec.gov/foia/docs/failsdata.htm>

III. Additional measures to eliminate fails or “naked” short selling are not necessary

- Pre-Borrow and Hard Locates do not guarantee delivery
 - Under the MSLA, lender’s reserve the right to recall securities
- Only a small percentage of locates actually result in the need to borrow
 - 99.9% of trades do **not** fail
 - We estimate that less than 5% of all locates result in securities borrow transactions.
- Pre-borrow requirements would dramatically harm liquidity and market efficiency
- July 2008 Emergency Order mandating pre-borrower significantly increased transaction costs
 - GAO report estimates balance sheet impact of up to \$2 billion/day for those 19 financial securities only. [1]
 - Clearance brokers do not have access to short sale proceeds, therefore need to fund pre-borrows at unsecured rates
 - In the Securities Lending Market, the weighted average lending fee on the 19 Financial securities increased 238% (from 39.4 bps to 133.2 bps) [2]
 - In the Cash Trading Market, post the July 2008 Emergency Order, the Bid/Ask spread for the 19 Financial securities increased 20% on average (from 5 bps to 6 bps) [3]
- Hard locate requirements will not eliminate “Naked Short Selling”
 - “Naked” short sellers do not comply with locate requirements, nor make delivery on sales
 - Short sales marked as long sales will not be discovered

[1] GAO Report; SEC Office of Economic Analysis (available at: <http://www.sec.gov/comments/s-730-08/s73008-37.pdf>)

[2] Goldman Sachs Securities Lending

[3] Calculated from Reuters data

IV. Prime Brokerage No-Action Letter

Industry sponsored solution

- Pending No-Action Letter – August, 2009
 - Replacement of 1994 letter, with changes to reflect Regulation SHO
 - Requires that Prime Brokers monitor customer order marking
 - Prime Broker compares order marking between customer and executing broker
 - Un-reconciled discrepancies must be reported to executing broker
 - Short Sale Locate Compliance
 - If Prime Broker does not have record of locate, must contact customer to identify the source
 - If locate source does not confirm the locate, prime broker must notify executing broker
 - If locate source confirms locate but fails to deliver, prime broker must notify executing broker
 - Long Sale Compliance
 - Prime broker must validate position in customers account
 - If position not held at prime broker, must contact customer to identify location
 - If position is not held long, prime broker must notify executing broker
 - Executing brokers that receive these notices must consider this information in determining in subsequent transactions whether it is reasonable to rely on future representations by such customer
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What are “Dark Pools”?

What is a “Dark Pool”

- The term “dark pool” is used to refer to a wide variety of either trading centers or services offered by *ATSs* (alternative trading systems), *ECNs* (electronic communications networks), and broker-dealers. Depending on the context, the term has been used, for example, to refer to the following types of trading centers or services:
 - (a) an *ATS* that does not display quotes publicly;
 - (b) *internalization* practices of a broker-dealer;
 - (c) services at an exchange or *ECN* that allow for some or all of the quantity of an order to not be displayed publicly; and/or
 - (d) a trading center whose reported volume is not separately identified when it is reported to the *Consolidated Tape (or Ticker)*.
- Most commonly, the term "dark pool" refers to an Alternative Trading Systems (*ATS*).

What is an *ATS*?

- An *ATS* is a SEC-registered, non-exchange, trading venue.
 - Typically, *ATSs* do not publish real-time bid/ask information; derive their pricing from the publicly available National Best Bid Offer (*NBBO*), and are thus referred to as “dark.” All trading activity in *ATSs* must occur at, or inside, the *NBBO*.
 - Within the US many large broker-dealers, including Goldman Sachs, have registered their own *ATS* with the SEC.
- *ATSs* are highly regulated entities. They are, by nature, affiliated with registered broker-dealers and, accordingly, their activities are governed by the provisions of the Securities Exchange Act of 1934. Additionally, *ATS* are registered with the SEC and their operations are subject to the provisions of SEC Reg *ATS* and Reg *NMS*.

Who uses *ATS* “dark pools” and why?

- Institutional traders, hedge funds, asset managers, and broker-dealers all have the choice to access “dark pool” *ATSs*.
- Trading in an *ATS* offers opportunities for improved trading performance, reduced market impact, lower transaction fees, and less opportunity for information leakage. Most importantly, participation is entirely optional

“Dark Pools” : Common Myths

■ **Myth 1: Broker ATS “dark pools” create a two-tiered market structure which disadvantages retail investors**

■ **Reality:**

- There is not a “two-tier market” with respect to liquidity access. The retail trading community is more empowered than ever before
 - Retail access through “wholesalers” and exchange routing products
 - Retail smart routers which intelligently incorporate dark pools for increased liquidity access at favorable economics
 - Increased competition from dark pools **pushes all execution venues to compete for retail order flow with superior execution** (speed, price)
- **Increased competition has led to industry wide price compression among trading destinations.** These economics ultimately make it to the retail trading customer in the form of reduced execution costs
 - Ex- \$5 trades with Online Broker XYZ
- While market structure evolution has not been without its challenges, they have been accompanied by a secular decline in both implicit and explicit trading costs, **benefiting primarily retail investors**

■ **Myth 2: “Dark” (or non-displayed) trading activity is a recent market phenomenon**

■ **Reality: Non-displayed stock trading is not new.** However, the way it occurs has rapidly evolved with technology

- NYSE Floor brokers – historically the largest form of “human reserve orders”
- Orders resting on trading desks
- Unexecuted part of orders resting either with brokers or in hands of investment managers
- Today, faster and cheaper technology, together with greater connectivity among market participants, exchanges, and ATs has made the search for liquidity, across many various sources, a smooth, high-speed, process

“Dark Pools”: Common Myths (continued)

■ **Myth 3: Non-displayed liquidity undermines the quality and quantity of publicly disseminated trade information**

■ **Reality:**

- Trade Reporting Facility (TRF) volumes have hovered in the 20% range (adjusted for transitional players) for the last few decades
 - In 1993 NYSE estimated that dark liquidity (excluding activities on the floor) accounted for 20% of US equity volume
- Too much emphasis has been placed on the impact of displayed vs. non-displayed venues
 - A survey of exchanges, leads us to believe that approximately **60%** of shares ordered in “displayed” markets make use of reserve functionality.
 - As way of example, greater than 80% of GS orders to exchanges utilize display/reserve logic of some sort
 - “Displayed” markets have themselves introduced completely-hidden and midpoint-peg order types
 - As a result, the distinction between “displayed” and “non-displayed” marketplaces is a spectrum rather than a discrete, binary one
- Non-displayed orders and related trading activity **are** part of the price discovery process. Market participants leverage automated trading tools which shift between passive (non-displayed) trading and aggressive (displayed) market interaction.

Myth 4: Dark Pool ATSs make up a large portion of US trading activity

Reality: Less than 10% of market volume transacts in ATSs which are “non-displayed”

VENUE	JULY 08	LAST 3 MOS	JUNE 09	JULY 09	%CHG (M/M)	%CHG (Y/Y)	% CONS VOLUME
BARCLAYS LX	51.0	23.1	19.6	29.7	51.53%	-41.76%	0.34%
BIDS TRADING	12.4	11.0	10.0	12.3	23.00%	-0.81%	0.14%
BNY CONVERGEX VORTEX	4.4	6.6	7.3	5.5	-24.83%	23.86%	0.06%
CITI MATCH	50.5	34.6	33.5	33.5	0.00%	-33.66%	0.38%
CREDIT SUISSE CROSSFINDER	71.0	140.4	137.2	136.0	-0.87%	91.55%	1.55%
GETCO EXECUTION SERVICES	47.1	109.7	102.5	94.6	-7.71%	100.85%	1.08%
GOLDMAN SACHS SIGMA X	142.0	117.0	115.0	113.0	-1.74%	-20.42%	1.29%
INSTINET CBX	21.9	20.4	18.0	20.4	13.06%	-7.08%	0.23%
ITG POSIT	~28.0	~21.5	~20.6	~21.2	2.67%	-24.46%	0.24%
KNIGHT LINK	103.0	111.7	101.0	95.0	-5.94%	-7.77%	1.08%
LEVEL	44.1	51.1	48.6	50.9	4.73%	15.42%	0.58%
LIQUIDNET	41.4	27.8	24.6	28.9	17.28%	-30.31%	0.33%
MORGAN STANLEY MS POOL	22.5	48.5	51.5	44.0	-14.56%	95.56%	0.50%
NYFIX MILLENNIUM	27.7	15.8	15.6	15.1	-3.22%	-45.67%	0.17%
PIPELINE TRADING	~14.6	~9.5	~8.6	~8.0	-6.98%	-45.21%	0.09%
UBS PIN	25.0	~41.4	~40.7	~39.4	-3.32%	57.40%	0.45%
TOTAL	706.6	790.0	754.2	747.2	-0.93%	5.75%	8.52%
CONSOLIDATED U.S. EQUITY VOLUME	9634	9890	9640	8767	-9.06%	-8.97%	NA
% TOTAL VOLUME IN DARK POOLS	7.34%	7.99%	7.82%	8.52%	NA	NA	NA

Source: Rosenblatt Securities, company data; All volumes are average per day, in millions, single-counted and matched only (excluding shares executed at partner pools or displayed markets).
~ Denotes Rosenblatt Estimate

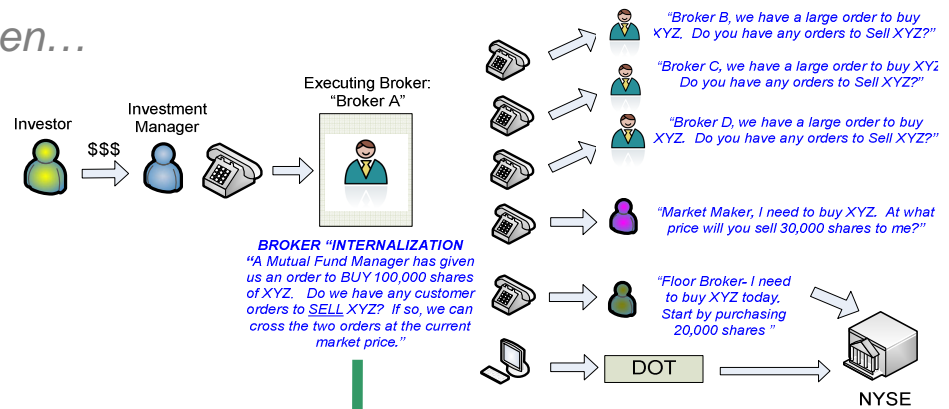
Myth 5: Reg ATS has resulted in a market which is “too fragmented”

Reality: Technology Has Automated Traditional, Manual, Trading Procedures into More Effective Workflows, w/ Access to Greater Overall Liquidity.

Price discovery is not broken, but has evolved into a high-speed process facilitated by smart routers and algorithms

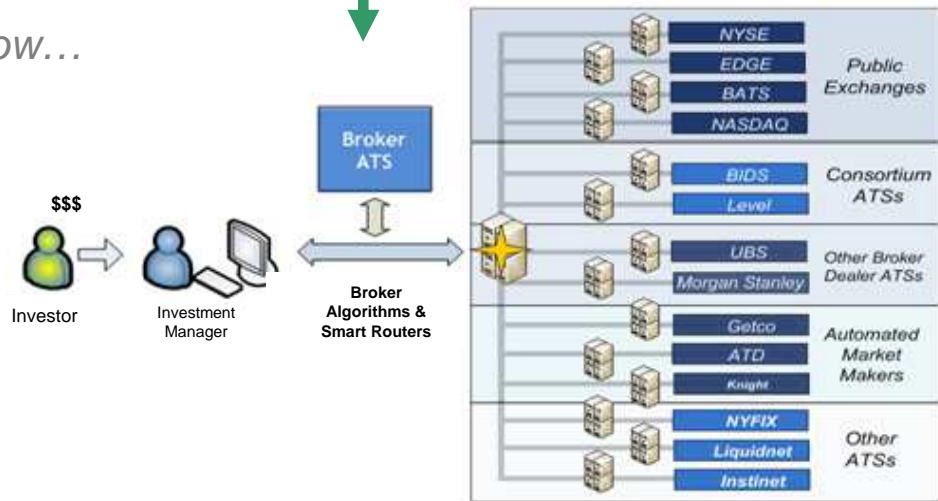
- Highly inefficient, manual, and time consuming process to execute a sizable order
- Many market participants acquire knowledge of the order with no obligation to trade.
- In the absence of finding a match upstairs, there are limited exchanges to which to send the order. There is no competition for executing the trade quickly and/or at a favorable execution price

Then...



- Although liquidity is fragmented across many destinations, it is accessed in a high-speed, fluid, and optimized manner
- The executing broker's ATS automates the previously manual function of customer order flow internalization
- Sophisticated algorithm and smart router logics provide greater anonymity and enhance execution quality
- The end user is empowered. Exchanges and other liquidity centers vie for customer orders by offering lower latency and improved execution prices

Now...



“Dark Pool” / Reg ATS Regulation

■ Post-Trade Transparency

- GS supports aggregate volume attribution to Broker ATSS
- Standardized periodic reporting and/or real-time

■ Consideration for NBBO “Trade-At” Protection

- NBBO trade-at protection would effectively create a virtual “CLOB” (Central Limit Order Book) which the SEC has previously concluded **would be anti-competitive**.
- **Increases costs** by forcing industry participants to access same price away and pay a higher access fee.
- **Inhibits innovation** by dis-incentivizing business models that provide potential for liquidity (size) and price improvement.

■ Reg ATS 5% Fair Access and Display Requirements

- Clarification around the rules and procedures in response to breaching the 5% threshold is needed
 - Automatic quoting obligation?
 - Symbol-specific?

■ Consideration of lowering the 5% Fair Access threshold

- **Scenarios that allow complete open access threaten liquidity pool quality control**
 - Caps-out the consumer benefits of non-displayed execution currently available to retail and institutional trading alike
 - **Trade execution quality suffers** – retail and institutional activity becomes increasingly exposed to predatory market participants.
 - Spurs a new wave of fragmentation as consumers and brokers aim to backfill lost non-displayed trading opportunities in venues where Fair Access has not yet been breached and participant population is still controlled.

While small changes and clarifications could improve REG ATS, we believe “Trade-At” protection, or a reduction to the Fair Access threshold, would not be in the best interest of investors.

What is High-Frequency Trading?

■ Overview

- In general, it is accepted that HFT refers to trading strategies that have a holding period that range from minutes to a fraction of a second.
- “High frequency” strategies have to a large degree replaced the traditional roles of “specialist” and “market maker” in providing liquidity to the marketplace.

■ Co-location

- In order to reduce latency, HFT market participants physically place their equipment at the exchange or ATS’ data centers. One of the primary advantages of co-location is the ability to establish queue position, which allows execution priority at desired price points.

■ **Goldman Sachs believes that those who participate in HFT with certain benefits, such as co-location, should assume additional obligations and be subject to appropriate regulatory oversight.**

- Some of the obligations we believe are necessary include:
 - Implementation of a price improvement quota and best bid-ask quota
 - Systematic monitoring of trade cancelations to execution ratio and liquidity posting to taking ratio
 - Ensuring that exchanges have broad powers to regulate HFT, including remedies for failures to comply with the previously stated obligations

What is Sponsored Access?

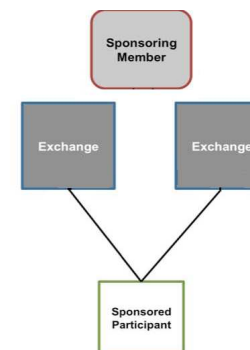
Definition (*source: SIFMA*): **Sponsored Access** is the practice of a non-member using the exchange membership of a broker-dealer. This is typically done by co-locating the hardware and software and bypassing the broker-dealer's order management infrastructure.

Two Types of Sponsored Access:

1. Naked Sponsored Access (Direct Market Connections)

- Provides the Sponsoring Participant with the ability to transact directly with the exchanges using a Market Participant Identifier (MPID) associated with the Sponsoring Member. The Sponsoring Member does not have the ability to ensure that the order flow complies with applicable risk thresholds and regulatory checks.

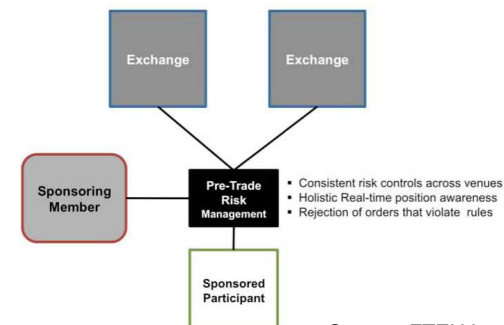
1. Naked Sponsored Access



2. Sponsoring Member / 3rd Party Systems

- The Sponsored Participant uses a 3rd party system that enables the Participant to transact directly with an exchange using the Sponsoring Member's MPID. The implementation of controls via the 3rd Party System provides the Sponsoring Member the ability to ensure the Sponsored Participant's order flow complies with applicable risk thresholds and regulatory checks.

2. Sponsoring Member / 3rd Party Systems



Source: FTEN Inc

Goldman Sachs believes that Naked Sponsored Access introduces the potential for significant systemic risks due to the lack of appropriate pre/intra/post trade controls.

“Flash” Trading & IOIs

■ “Flash” Trading

- Goldman Sachs does not utilize flash trading offerings unless instructed to do so by the customer
- Best-ex consists of multiple “factors,” including
 - Speed and price certainty
 - Opportunity for size and price improvement
 - Clients will determine which of these factors is most important and accordingly the ability to opt-in, or opt-out, of these features is most important
- Benefits to retail investors
 - These programs are associated with lower fees, which help wholesalers keep costs low, which in turn pass back to retail broker-dealers in the form of higher payment for order flow

■ IOIs

- Many different flavors
 - Used historically in the process of searching for natural liquidity
 - Used in the process of inter-market routing
 - Used in the context of ATSS to attract contra-side order

■ Potential Issue – depreciation of SIP data usefulness

Goldman Sachs believes that actionable IOIs and so called “flash orders” from exchanges should be treated as quotes and subject to the applicable rules and regulations. To the extent that non-quote order information is not fully displayed, it should have a corresponding obligation.