The New Stock Market: Sense and Nonsense

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I. Critiques of HFTs

"The United States Stock market, the most iconic market in global capitalism, is rigged"

The New Stock Market

- **Secondary markets for trading equities in the U.S. have been totally transformed in the last two decades**

  - *Early 90's:* **trading of stock of each listed company was largely confined to one venue, either NASDAQ or NYSE, handled by dealers or specialists**

  - *Today*: **Almost sixty competing trading venues, each constituting an electronic limit order book where a computer matches incoming marketable orders with standing limit orders posted in large part by algorithmic HFTs**

Not Everyone is Happy With the New Stock Market

- **Michael Lewis**

- **Speeches, investigations, hearings**

- **Law suits, e.g.,**

  - *Providence v. BATS* **against all of the exchanges for high speed connections with HFTs, maker-taker fees, and payment for order flow**

  - *Schneiderman and SEC* **actions against dark pools for misrepresenting their operations**

Overall Take On the Criticisms

- **The new stock market is *truly new* and its operations are still not very well understood**

- **Much of the criticism arises from such misunderstandings**

- **Still, some of the practices the critics condemn, whether for the right or wrong reasons, are in fact undesirable and call for a reaction**
  - **in some cases, the cure is the straightforward application of existing law, e.g. Rule 10b-5's prohibition against materially misleading statements**
  - **in other cases, regulatory changes are needed**

Today's Agenda: High Speed Connections Between Exchanges and HFTs

- **"Electronic front running"**

- **"Slow market arbitrage"**

- **"Exploitation" of dark pool midpoint orders**

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Typical Approach of Popular Critics of These Practices

- **Take a single representative transaction**

- **Show it benefits one party at the expense of another, apparently more worthy, party**

- **Label the wealth transfer "predatory," "extractive," or just "unfair"**

A Better Starting Point for Analysis

- **Take the practice as occurring on a repeated basis**

- **Consider the reaction by the various actors in the market to their knowledge that the practice is going on**

- **Compare the world with, and without, the practice in terms of its ultimate impacts**
  - **which set of impacts conform more closely to what we think is efficient and fair**

Example of Electronic Front Running- Initial Situation

- **Smartmoney Inc, an actively managed investment fund, does research suggesting that Amgen is underpriced, and decides to buy a substantial block**

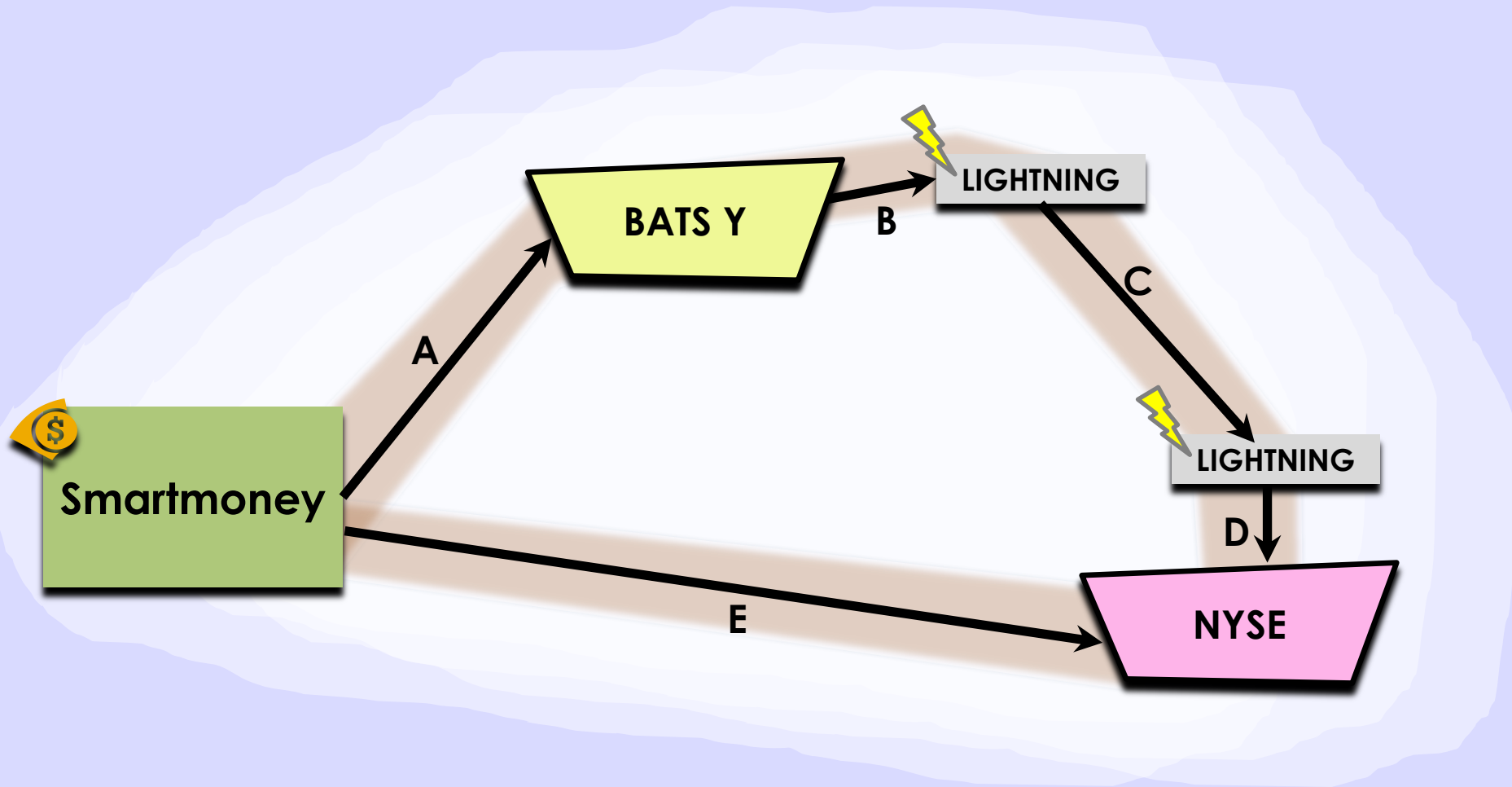- **NBO is $48.00 with 10,000 shares at BATS Y and 35,000 shares at NYSE**
  Lightning, a HFT
  - **co-located at each of BATS Y and NYSE**
  - **posted on NYSE the 35,000 sell limit order that constitutes the $48.00 quote**

- **Smartmoney's broker simultaneously sends market orders for these amounts to the two exchanges**

Example of Electronic Front Running- Initial Situation

If A+B+C+D < E , Lightning can cancel its 35,000 sell limit order on NYSE in advance of Smartmoney's order reaching NYSE

Why Would Lightning Wish to Cancel?

- **Suppose the next best offer on NYSE was a sell limit order at $48.03**
  - — **Lightning could submit a new sell limit order for 35,000 shares at $48.02**
  - — **Lightning would be better off, and Smartmoney worse off, by $700**

- **Suppose instead the next best offer on NYSE was a sell limit order for 35,000 shares at $48.01**
  - — **Lightning will not be able to replace its cancelled order with one that will execute against Smartmoney's order at a more profitable price**
  - — **Lightning may still want to cancel its $48.00 order because the big order coming to BATS suggests an _informed_ trade**

The Fundamentals of the HFT Business

- **HFTs are in the business of making a profit by providing liquidity, just like dealers and specialists were in the old market**
  - **standing ready to buy and sell shares as marketable orders come**
  - **typically have a buy limit order (an offer) and a sell limit order (a bid) on each of several exchanges, with the bid lower than the offer**
  - **"buy low, sell high"**
- **HFT makes money if on average it sells shares for more than it pays for them**

The Fundamentals of the HFT Business – cont'd

- **Biggest problem: the orders that arrive to execute against its limit orders are anonymous and may come from an informed trader**
  - an informed trader knows something about the future of a company that the HFT and most of the rest of the market do not
  - buying when an informed trader wants to sell, and selling when he wants to buy, is a losing proposition

- **For the HFT to survive,**
  - the bid must be high enough and the offer low enough (i.e., the spread must be narrow enough) to attract business in a competitive market
  - but the spread cannot be so narrow that money made from trading with uninformed traders is less than money lost from trading with informed ones

What if Electronic Front Running Could Not Occur

- **Without the ability to cancel when they suspect an informed order is coming in, HFTs will post less aggressive orders**
  - Lightning might have offered $48.01, instead of $48.00, to protect itself against the greater danger of selling to an informed trader
  - bid/ask spreads generally will be wider

- **Smartmoney will face bigger spreads, but will actually pay less to trade because no disappearing quotes caused by electronic front running**

- **Retail investor and index funds will face bigger spreads but have never had to worry about disappearing quotes in the first place**

Social Consequences: Positives of Ending the Practice

With lower trading costs, Smartmonies of the world will find it profitable to search out more information

  —**makes market prices more accurate, which adds to the economy's efficiency**

Reduced incentives for HFTs to put resources into the HFT technology arms race

Social Consequences: Negatives of Ending the Practice

- **Wider spreads mean retail investors and index funds (the uninformed traders) face higher costs of trading**
  - **Obstructs them from making utility maximizing portfolio adjustments ("rebalancing") in response to changing circumstances**

- **Wider spreads also mean less efficient allocation of resources over time**
  - **anticipation of greater bid/ask spreads is like a tax on savings and investment**
  - **reduced liquidity increases an issuer's cost of capital and thus gets in the way of the financing of real investment projects that savers and issuers would otherwise want to go forward with**

Social Consequences:
A More Nuanced View of Informed Trading

- **Suppose there were three kinds of informed traders:**
  - **announcement traders**
  - **insider traders**
  - **fundamental value traders**
- **Suppose fundamental value traders can take more time and split up their total purchase or sale into many small orders**
- **Fundamental traders could be in a position closer to uninformed traders**
  - **retaining electronic front running might actually benefit share price accuracy as well as its other virtues**
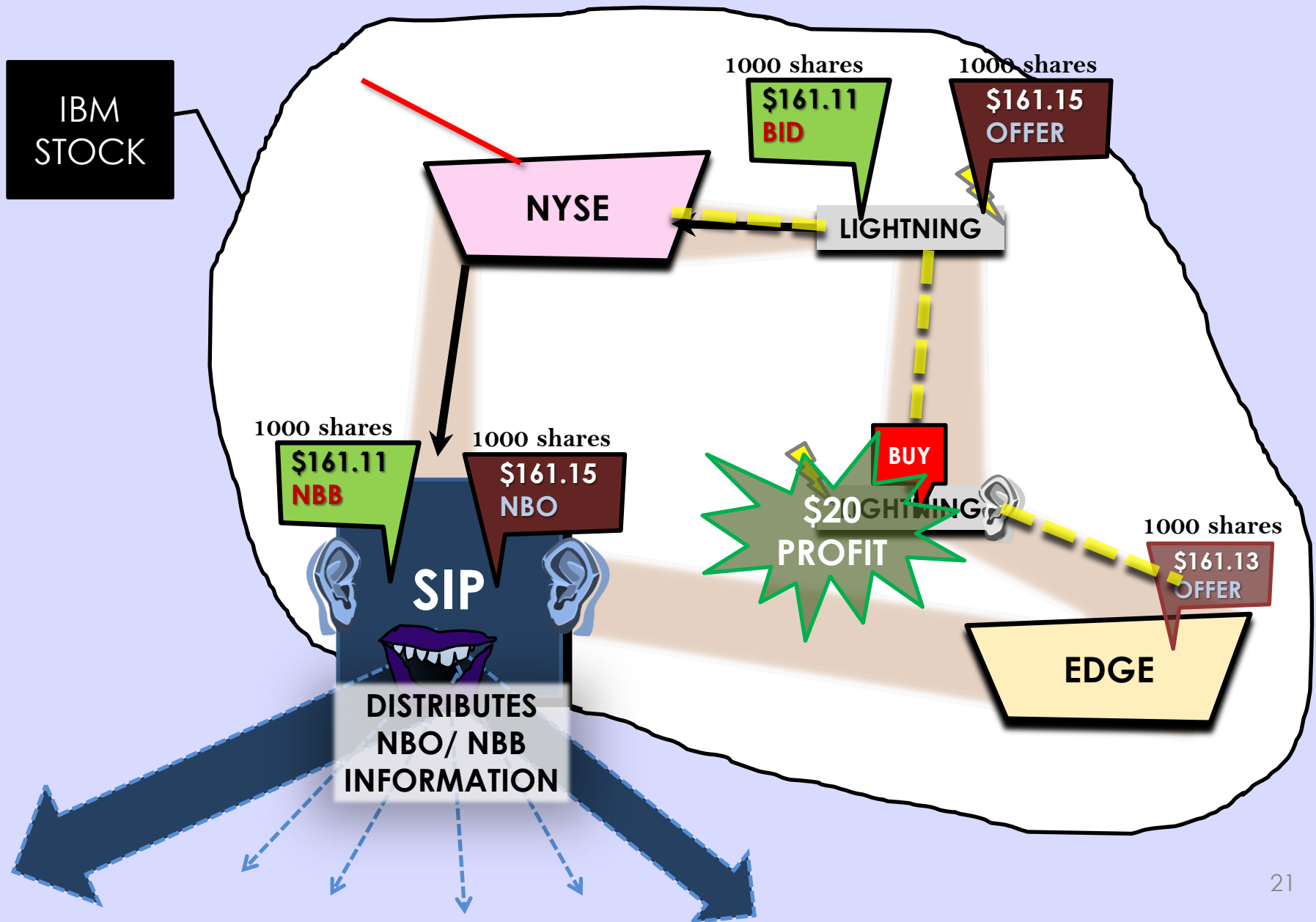
Example of Slow Market Arbitrage – Initial Situation

- **Lightning has orders for IBM on the NYSE that is the NBO**

  - **1000 offered at $161.15**

- **Through co-location at EDGE, Lightning learns of a new 1000 share offer for IBM at 161.13**

What Will Lightning Do?

- **Lightning leaves its 1000 NYSE offer, which briefly remains the official NBO at $161.15 because SIP is slow**

- **If a marketable buy order comes into the NYSE, it executes against Lightning's quote at $161.15**

- **Lightning can then turn around and buy the 1000 shares on EDGE for a sure $20 profit**
  - **so an HFT – Lightning – gets the benefit of the the improved quote instead of an outside investor**
  - **the practice is probably not a goldmine for Lightning, however, many HFTs compete to get the one $161.13 order**

Example of Slow Market Arbitrage

IBM STOCK

NYSE

1000 shares
$161.11
BID

1000 shares
$161.15
OFFER

LIGHTNING

1000 shares
$161.11
NBB

1000 shares
$161.15
NBO

SIP

DISTRIBUTES
NBO/ NBB
INFORMATION

BUY

$20 PROFIT

LIGHTNING

1000 shares
$161.13
OFFER

EDGE

Social Consequences If the Practice Were Not Possible

- **Effective cost of trading for all outside traders – informed and uninformed - would decrease, so in essence liquidity and price accuracy would probably increase**

- **Again, elimination would reduce incentives for HFTs to put resources going into the HFT technology arms race**

- **So, overall, looks like elimination is a social gain**

Example of Mid-point Order Exploitation – Initial Situation

- **The NBO and NBB for IBM are on the NYSE (not Lightning orders) and**
  - 1000 offered at $161.15
  - 1000 bid at $161.11

- **Lightning, through its co-location at NYSE, learns that that the offer on the NYSE has been cancelled and a new 1000 share offer has been submitted at 161.12**

- **Because SIP is slow, the official NBO will briefly remain $161.15 and NBB $161.11**

- **Lightning knows that midpoint orders for IBM are often posted on Opaque, a well known dark pool, but cannot know whether any such orders are posted there now and if they are whether they are buy or sell orders**

What Will Lightning Do?

- **Lightning sends to Opaque an IOC sell limit order for 1000 shares at 161.13**

- **The Lightning order will fill if there is a 1000 share buy midpoint order at Opaque**

- **If the order fills, Lightning sends a buy limit order at $161.12 to NYSE, which it hopes will execute, making a $10 profit**
  - **the placer of the buy order on Opaque loses the possibility of buying instead at $161.115**

Example of Midpoint Order Exploitation

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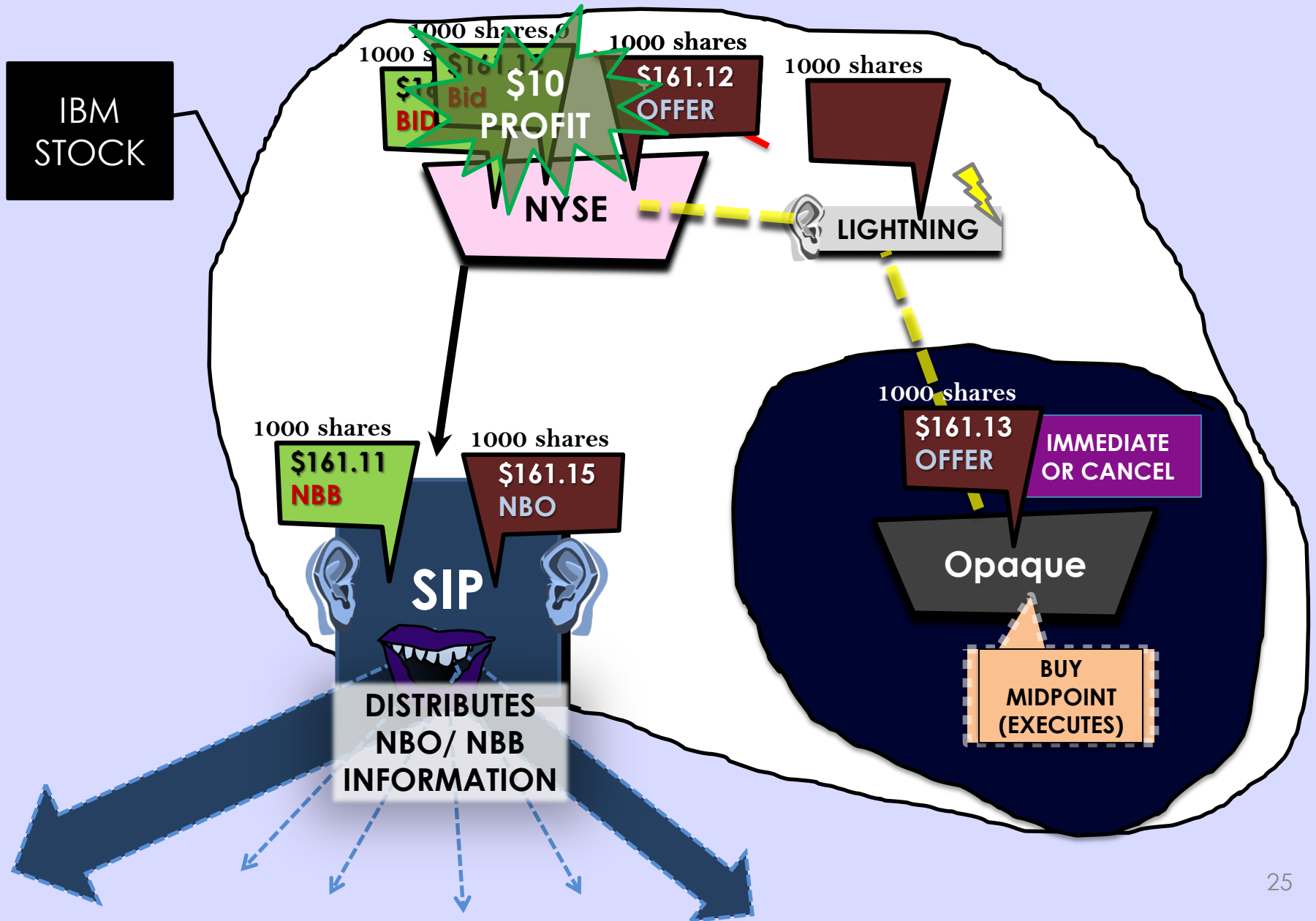
Social Consequences If the Practice Were Not Possible

- **Make trading in dark pools less attactive**
- **Dark pools, if functioning correctly, are where uninformed traders can find each other**
- **Eliminating the practice would make the cost of uninformed trading lower with the accompanying improvements in the risk management and allocation of resources over time**
- **Again, would also have the benefit of reducing resources going into HFT activities**
- **Might however marginally reduce share price accuracy since dark pools would pull more uninformed trades from the exchanges**

Role of Regulation

The availability of these practices to HFTs is not an inevitable result of advanced technology

Regulation too plays a "but for" role

- co-location being allowable

- rules about dissemination of trade information- Reg NMS Rule 603(a)(2) – and its current interpretation by the SEC

Reinterpreting or Amending Reg NMS to Eliminate These Three Practices

These practices would not be possible if private feeds did not make data available to HFTs ahead of everyone else

Rule 603(a)(2) prohibits exchanges from "unreasonably discriminatory" distribution of market data

Current SEC approach to 603(a)(2):

- **sending data to HFTs *in advance* of sending it to the SIP has been interpreted as "unreasonably discriminatory" distribution and has prompted enforcement action**

- **But sending data *simultaneously* to the SIP and to an HFT has been acknowledged as happening without the suggestion that it is illegal and has not been the basis of enforcement action**

Reinterpreting or Amending Reg NMS to Eliminate These Three Practices- cont'd

A different, perfectly plausible, interpretation that would end all three practices:

> sending data simultaneously to the SIP and an HFT is also "unreasonably discriminatory" distribution where it predictable that it will reach one end user, the HFT, first

Alternatively, if one feels there has been too much reliance on the current SEC interpretation of 603(a)(2):
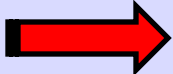
> amend the rule, going through the full procedures associated with an administrative agency rule change

Conclusions

- **With a better understanding of the new stock market, the three practices are not as nefarious as portrayed by the critics**
  - electronic front running in fact has little in common with traditional front running and may well even be efficiency enhancing
  - takes creative lawyering to find electronic front running to be an insider trading violation under Rule 10b-5
  - slow market arbitrage appears to have no redeeming social value
  - mid point exploitation has a mixed social impact but is probably negative
- **This better understanding suggests, though with less drama, that on balance it may well be a good thing that HFTs have the information advantages that allow electronic front running, but the world would probably be better off if HFTs did not have the information advantages that allowed the other two practices. Question is which dominates**

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II. HFTs and Volatility

The Level of Volatility Generally

- **Lewis compares 2004-2006 (HFTs not so important) with 2010-2013 (HFTs dominate) and finds a 40% increase in intraday volatility**
  - concludes HFTs made the market undesirably more volatile
  - a single observation can be misleading, however, because many things affect volatility
  - also no obvious theoretical reason to think HFTs contribute to general volatility

- **Comparing 2010 to present with 1990s and early 2000s suggest the HFT period is associated with lower volatility**

- **Conclusion: claim that more HFT ⟹ more volatility is unproven empirically**

Efficiency Considerations

- **Would the NYSE specialist "lean against the wind" system less prone to flash crashes?**

  – maybe, but is it worth the cost

- **Short term deviations from share prices do not seriously undermine the role accurate prices play in the real economy**

- **Liquidity as a general matter is better in the HFT world than in the old dealer/specialist world**

Flash Crash - May 6, 2010

- **Dow drops 9% and then largely recovers all in less than 30 minutes**

  – **Accenture fell from $39.98 to $.01 and largely recovered**

  – **Apple soared at one point to $100,000**

  – **many blamed HFTs**

- **Federal report as to cause: large sell order ➡ flight of liquidity**

  – **HFTs temporarily exited the market rather than just widening spreads when adverse selection fear became extreme enough**

- **HFTs not predatory, just unheroic**

Wealth Transfer Considerations

- **HFTs cannot make money if they do not trade**

  - **neither winners nor significant losers**

- **Losers are persons who put in market sell orders for the stocks that went way down**

- **Winners are the persons who put in way-out-of-money limit orders**

- **Self help advice: always use marketable limit orders**

III. Payments to Brokers

Agenda

- **Maker-taker and taker-maker fees**

- **Payment for order flow**

Maker-Taker Fees - The Simple Model

- *Assumptions*: **Rebate and fee each equal R; one venue; competitive market with rational, well informed traders; all traders submit orders directly to venue (i.e., no brokers)**

- *Effect on liquidity suppliers*: **Reducing offers (and increasing bids) by R puts HFTs in the same economic position as if no rebates and fees**

- *Effect on liquidity consumers*: **A marketable order needs to pay R, but the bid or offer that this order executes against will be improved by R**

- *Conclusion:* **Presence or absence of maker-taker fees have no effect on anyone**

Maker-Taker Fees - Complicating the Model Partway

- **Inequality of the rebate and fee is of no consequence: just the venue's charge for its services**

- **Multiple venues with different fees should not matter – same calculations are made with each**

Maker-Taker Fees - Complicating the Model Partway-*Continued*

- **Inserting brokers makes no difference as long as the other assumptions hold**

  - **Brokers still compete**

  - **Investors are still rational and well informed and can contract with brokers costlessly**

  - **Rebates will be passed on to non-marketable order customers in form of lower commissions; fees will be passed on to marketable order customers in form of higher commissions**

Maker-Taker Fees - Complicating the Story More

- **Two features of the real world:**

  - **brokerage fees are fixed on a per execution basis (may reflect customer shortcomings or cost of contracting) and so do not depend on which venue order is sent to**

  - **hard for customer to monitor broker performance**

- **Consequences:**

  - **broker has incentive to send orders to the highest rebate or lowest fee venue regardless of quality of execution**

  - **particularly acute problem with limit orders**

Taker-Maker Fees

- **Identical analysis applies**

- **Why do some venues have them in the first place?**

  – **a venue that gets more marketable orders (by paying for them) is a more desirable place to send non-marketable orders**

Payment for Order Flow - The Simple Model

- **If brokers and internalizer each operate in fully competitive markets, the practice has no effect**

  - **internalizers need to pay for any gain they get in matching uninformed orders either through better execution prices or through how much they pay for the order**

  - **customers receive the better execution benefits directly and payment for order flow indirectly in the form of lower brokerage fees**

Payment for Order Flow - Complicating the Model

- **If internalizing is not a fully competitive business, internalizers keep part of the gain so payment for the order will be smaller than in the absence of the practice**

- **If brokerage is not fully competitive or customers are not sufficiently informed to police brokers, payment will not be fully passed on in the form of lower brokerage fees**

Policy Recommendations With Respect to Both Practices

- **Unclear the extent to which the complications of the simple model hold with respect to each practice**

- **Requiring brokers to pass on to customers the rebates and payments for order flow would not be a very costly regulation**

- **In this situation: "If it might be broke, fix it"**