

**Tempest in a Teapot:
Michael Lewis' Flash Boys Solve a Problem that is Barely There**

By Laurence B. Siegel

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Michael Lewis is the finest writer in a generation to turn his attention to the practice of finance, but in *Flash Boys: A Wall Street Revolt* — his account of high-frequency trading (HFT) and of a likeable trader who found a way to beat it — he is a few steps off base. *Flash Boys* is a terrific read, with dashing heroes and dastardly villains. But life isn't like that, and HFT is neither good nor evil. It's a new way of profiting from the trading activity of buyers and sellers of equities. It either raises or lowers total transaction costs by a small amount, but we have no way of knowing which.

Lewis is convinced that HFT is evil and needs to be stopped. In contrast, I believe in evaluating business practices using data about their costs, benefits and unintended consequences and letting those practices be unless they are clearly dishonest and harmful. Applying those criteria to HFT, I am not convinced of its harm. Of course, it is entirely proper that we should look for ways to trade against HFT and keep some of the profit for our clients and for ourselves. That is exactly what Brad Katsuyama, Lewis' hero, did, and he should be commended for his work.

Flash Boys did teach me a lot about modern market institutions, which are so new and complex that most people don't understand them at all. Investment professionals need this knowledge — they should not imagine that the stocks they analyze and trade are brokered in the way that they were in the last century.

But Lewis' animus against HFT, while understandable, should not be the basis for setting policy.

Brad Katsuyama's discovery

Flash Boys has been so widely read and discussed at this point that only a brief summary is needed. In the middle of the last decade, Brad Katsuyama, a young Canadian trader, discovered that the stock purchase and sale orders that he placed on various stock exchanges on behalf of his customers had suddenly become more difficult to execute. As soon as he began to trade, the price would change in a manner unfavorable to his brokerage customers. Every time.

This had not happened before. As Katsuyama eventually discovered, HFT firms were front-running his trades. "I'm the event...I *am* the news," he explained to a trader wondering what news the market was reacting to.¹ Other traders were trading on the news that Katsuyama was buying or selling.

Incredibly, the HFT firms had spent vast sums of money running fiber optics on straight lines between themselves and the exchanges. This enabled them to profit from the saving of a few precious milliseconds of communication time, making front-running possible.

¹ Page 34.

Katsuyama first designed a system, called Thor, for his employer, Royal Bank of Canada (RBC), to deliver orders to the exchanges in a staggered way that prevented HFTs from front-running or otherwise profiting from the fact that he was trading. Then with several partners, he set up a new stock exchange, called IEX, that did the same thing. Their pitch to investors was that they would be treated fairly instead of being systematically ripped off. The exchange succeeded, on some days achieving more trading volume than the venerable NYSE MKT LLC, formerly called the American Stock Exchange.

Understanding HFT

HFT firms earn their living by capturing a part of the already-tiny spread between the bid and offer prices of stocks traded on an exchange. They do so in a way that is invisible to most investors. How can we begin to understand their activity and their impact?

The technical aspects of HFT are best left to Lewis, who has a special gift for making complicated concepts simple. Here, I'll try to explain the economic impact of HFT, as I understand it.

HFT as a middleman

It's possible to imagine a kind of HFT that is completely harmless and in fact beneficial. Let's say that the "market" for 10,000 shares of a stock is \$50.00 bid, \$50.10 offer. (That is, someone stands ready to buy that number of shares if a seller willing to take \$50 appears in the market, and someone stands ready to sell the same number of shares if a buyer willing to pay \$50.10 appears.) Thus, in my example, 10 cents is the market maker's hypothetical maximum gross profit (before subtracting the costs of doing business).

Now let's say that a trader with an especially low cost of doing business would be satisfied with a 6-cent profit. He or she raises the bid to 10,000 shares at \$50.02, lowers the offer to \$50.08, and makes a profit of $10,000 \times \$0.06 = \600 when these orders are filled.

Because the investor who sought out originally to buy the stock has bought it from the trader for \$50.08 instead of \$50.10, the trader has provided "price improvement" of 2 cents per share, or \$200 in total. The original seller sees the same amount of price improvement. Everyone wins except for the original market maker, who is knocked out of the game by this new, low-cost provider of what traders call liquidity.² A HFT firm can, and sometimes does, create price improvement in the market in this way. If that were all that HFTs did, they would be relatively uncontroversial.

Let's compare HFTs to another, better-known kind of middleman, the car dealer.

A detour onto the car lot

² Usually, we think of liquidity as cash in the bank or a credit line. The kind of liquidity provided by a trader is slightly different – it's the offer to convert securities to cash, or cash into securities, at a price very close to the last sale – but goes by the same name.

Before the Internet, car dealers enjoyed huge margins (the equivalent of bid-offer spreads) and were universally hated. Now comes a new kind of middleman, cars.com, which seems to increase trading costs even further in several ways: The site was expensive to build and is costly to maintain, its owners charge dealers for listings and the would-be car buyer has to pay for both Internet access and the computer used to access it.

But the new middleman has, in fact, reduced trading costs tremendously. If I want a particular car, I can reduce my search to two or three dealers that have one in stock. These dealers may try to use the knowledge that I am searching for that car to their own advantage, but they cannot do so very effectively because they have to compete with each other; I will buy the cheapest car that appeals to me.

In this example, price improvement accrues mostly to the customer, but the manufacturer can also sell more cars (because there is more demand for cars at a lower price to the end user). Almost everyone is better off. Only the old dealers, or middlemen, are complaining, and the best of them adopt the new technology and benefit too, making up in increased volume what they lose in margins.

Frédéric Bastiat, the great 19th century French economist, liked to differentiate between what can be seen and what cannot be seen. The middleman's charge, in both the car and HFT examples, is easy to see and may not be liked. The benefit to consumers from the narrowed spread is harder to see, because you have no wide spread in the market to compare it to, but it is just as real and is entirely unintended by the middleman, who only wants to make money.

This is what high-frequency traders should be doing.

HFT as a predator

To some extent, high-frequency traders are trading inside the spread and causing price improvement. But there's more to HFT, and therein lies the rub.

The entire idea of a business firm — of one group of people (agents or employees) acting on behalf of another (principals or owners) — depends on honesty. Agents must act in the interest of principals, not in their own short-term interest. A business can only function properly if it designs incentives for agents to act in this way.

When I engage a broker (a kind of agent) to sell a stock for me, I want him to find a buyer for the stock — not to trade on his own account based on the knowledge that I want to sell. Nor do I want him to sell to a third party the knowledge that I have stock for sale! While the broker is only temporarily my "employee," he typically accepts the "job" under the condition that front-running, or trading for his own benefit before he fills my order, is not allowed. I have a legal right to expect him not to do it. Front-running is a dishonest practice that is rightly condemned.

Are HFTs front-running? Are they doing anything else that is clearly wrong?

I asked Larry Harris, former chief economist of the Securities and Exchange Commission and a famed finance professor at the University of Southern California who studies trading. At a

presentation earlier this month to the Q Group,³ which organizes quantitative investment conferences, Harris grouped HFT activities into four categories: valuable, harmful, very harmful and technological arms race. A recent *Financial Analysts Journal* article written by Harris goes into detail on these activities, and I quote sections of it here with his permission.⁴

Valuable HFT is provided by computer-based trading systems that lower costs. Unlike human traders, they do not lose their focus, cheat or become emotional. They compete with each other to provide liquidity, and “regulators must be very careful that they do not inadvertently harm the high-frequency traders who make markets liquid,” writes Harris.

Harmful HFT is represented by electronic-trading systems that react to news more quickly than humans can. Harris sees no economic benefit in this activity and warns that “regulators should protect investors from these losses by requiring companies to notify exchanges when they expect material information will be revealed during trading hours so that the exchanges can halt trading before the news arrives. Many already do.”

Very harmful HFT consists of front-running. Yes, that is what many HFT firms are doing, and it’s not illegal if the HFTs “do not improperly obtain information about the orders they front-run,” according to Harris. Emphasis on “improperly.” It is legal, for example, to build speed-of-light information transmission lines or to co-locate one’s servers inside or next door to an exchange building.

Front-running strategies may consist of order anticipation or quote matching. (These technical terms are defined in Harris’ article.⁵) Harris regards order anticipation as an acceptable part of the ancient “poker game” between counterparties in any negotiation. Quote matching is more problematic because it relies on the ability to cancel orders quickly. Regulators could restrain this behavior, but Harris warns that “the harm done to market liquidity would be much greater than the benefit obtained.” So we are stuck with very harmful HFT. It’s reassuring that the economic impact is not very large.

Harris’ greatest concern is that HFT is the battleground for an expensive and useless “arms race” in which it doesn’t help a firm to be fast – it only helps to be fastest. A winner-take-all arms race is not only a waste of resources, but also reduces competition. “When the competition among [HFTs] thins out, the remaining traders will no longer have to quote aggressive prices to obtain order flow,” Harris writes. “The costs of trading will rise.”

To stop the arms race in its tracks, “regulators should simply require all exchanges to delay the processing of every order ... by a random period of between 0 and 10 milliseconds,” Harris suggests. (This doesn’t sound like a bad idea, but I’m betting that the next Brad Katsuyama is already figuring out a way to beat it.)

Harris concludes that HFTs mostly provide valuable services by lowering trading costs. “Markets need to be slowed,” he writes. “Not because HFT is dangerous, [but] to wisely stop an arms race

³ April 6-9, 2014 in Charleston, SC. See <http://www.q-group.org>.

⁴ See Harris [2013].

⁵ See Harris [2013], p. 7, for technical descriptions of these terms.

that will eventually decrease competition among [HFTs].” In other words, HFTs tend to be beneficial until they stop behaving competitively – like any other business.

Pre-existing efficiency of the financial system

HFT firms would, of course, take advantage of large spreads if they existed. But they don’t, because existing institutions have already made the U.S. equity market one of the most efficient and fairest in the world. In such a market, it’s hard for a new layer of middlemen to gain much traction or make much money, a fact made clear by the extreme measures taken to try to do so (such as building a corner-cutting fiber optic cable, followed by a microwave link, from Chicago to New York). It is this efficiency and fairness that stops HFTs from creating more injustice than they do.

It also means that Brad Katsuyama and Lewis’ other flash boys have solved a problem that is barely there. It’s big enough to provide an attractive arbitrage opportunity for the boys, but only because of the combination of their first-mover advantage and the huge size of the market. Most investors can safely ignore high-frequency trading.

HFT as a tax

In a widely viewed *60 Minutes* interview, Michael Lewis exclaimed, “The stock market is rigged.”⁶ It is, in the sense that, if you’re a relatively big buyer,⁷ you’re going to have to pay something like \$50.01 for a \$50 stock.⁸ That’s unfair. Someone is getting a penny that is really yours.

But if you want to see a rigged market that actually hurts, look at your savings account. You’ve been earning zero, while inflation is proceeding at 2% to 3%. Zero is most certainly not the natural or free-market rate of interest.

In other words, you’ve been losing 2% to 3% a year in real terms – 12% to 17% of your capital over the six years of the U.S. zero interest-rate policy – because of the policies of Ben Bernanke and Janet Yellen. Of course, they’re doing it for the good of the country (if low interest rates really stimulate growth), or, more plausibly, for the good of the government, which can gradually eliminate excessive debt this way. Which tax should we be more concerned about: a trading tax amounting to a basis point or two at most, which is avoidable if you don’t trade, or a savings tax of 2% to 3% every year (and not avoidable)?

⁶ *60 Minutes*, CBS Television, March 30, 2014.

⁷ The smallest traders, retail investors who buy 100 to 1,000 shares of stocks, or “odd lots” of fewer than 100 shares, use a different system that is unaffected by HFT. However, small investors typically use mutual funds and exchange-traded funds that are affected by HFT because such funds are managed by large investment management firms that trade on the exchanges.

⁸ One cent on a \$50 stock is 2 basis points. Brogaard, Hendershott, and Riordan (2013, p. 22) estimate the revenue of HFT at even less, 0.43 basis point, or 43 cents per \$10,000. This compares to the all-in cost of trading estimate by Angel, Harris, and Spatt (2013, p. 23) of 40 basis points, both before (2006-07) and after (2012) the introduction of HFT.

Should I even bring up the tax on labor, the income tax, which approaches 40%?⁹

HFT firms' revenues are thus best understood as a small tax on trading. Such a tax has been proposed by the Nobel Prize-winning economist James Tobin as a way of throwing sand in the gears of excessive trading, for the supposed benefit of investors. (The logic is that most trades are noise trades, reflecting imagined information rather than real knowledge, that cost investors money.)

I don't support a Tobin tax, but if we are to have one, I wonder if it is so bad that we pay it to HFT firms instead of to a governmental body. At least the size of a "tax" paid to HFT firms is limited by the spreads in the market, which are very small, while tax rates imposed by governments tend to grow and grow.

The little guy

One of Lewis's main points is that the "little guy," the small investor saving for retirement, is as much a victim of HFT as the hedge-fund billionaire, the investment banking firm partner and the various other rich guys on the financial Monopoly™ board. Take out the word "victim" and Lewis is entirely correct. If the costs of HFT exceed the benefits, a question that still requires more study, then the little guy would be affected as much as anyone else.

How? Hedge funds run by billionaires (or would-be billionaires) typically invest money on behalf of pension funds, university endowments and charitable foundations. The beneficiaries of these organizations, especially pension funds, are the little guys. The bulk of small investors' portfolios is in mutual funds, exchange-traded funds and pension funds – not individual stocks.

Small investors should be concerned about any increase in trading cost. But the professionals who manage these funds can consciously balance the cost of trading against their desire to trade or the strength of the signal motivating the trade and thereby manage this cost. The all-in trading costs faced by investors have come down almost continuously since the May Day 1975 deregulation of brokerage commissions. Trading costs per dollar invested are lower now than they've ever been. The revenues of HFT firms, however, are a novel element of trading costs, about which investors should always be vigilant.

Brad Katsuyama's modest heroism

Lewis' hero Katsuyama, who takes the HFT industry down a few notches, is not particularly heroic by today's audacious standard. We like our heroes to endanger their lives to rescue a damsel in distress or defeat the invading army. What Katsuyama did was much more prosaic: He was hired by RBC to find a way to boost business by lowering its customers' trading costs, and he did, making a well-deserved, medium-sized fortune along the way. Then he started a new business to do the same thing.

This observation is not to deny the importance or merit of Katsuyama's work, but to praise it. I admire people who demonstrate the value of small tasks performed extremely well. The Warren Schmidt character in the movie *About Schmidt*, a retired actuary played by Jack

⁹ Here, FICA tax is included in the income tax rate.

Nicholson, was ridiculed for having spent his life in a boring technical pursuit. I found him to be a thoroughly admirable contributor to society.

Why? The social benefits of insurance are huge. I can only afford one house. If mine burns down, I am in deep trouble – so I’m delighted to be able to insure it against fire. But if we are to enjoy these benefits, someone has to do the legwork of figuring out what insurance companies should charge. If they charge too little, they go broke, making it impossible to pay benefits. If they charge too much, consumers cannot afford the insurance. Bully for actuaries! And praise is likewise due the many other engineers and artisans who toil, mostly in obscurity, in our complex society so we can reap the fruits of their work without knowing very much about it.

That is what Katsuyama is: an engineer-entrepreneur who found an unmet need and filled it. Other critics have questioned his heroism, but I find his story (and those of Edison, the Wright Brothers, Bill Gates, Steve Jobs and Elon Musk) much more compelling than the tale of some damn fool who rushes into battle unarmed and slaughters a bunch of enemy soldiers with whom he had no real quarrel in the first place.

“Wall Street has gone insane”

Wall Street has always been a little crazy, but the latest salvo from Lewis – “Wall Street has gone insane”¹⁰ – is even more strident than his initial comment that the market is “rigged.” Lewis sounds as though he’s discovered a cache of suitcase nukes stolen from the Russians by a gang of terrorists. In an article in the *Guardian*, the reporter Emma Brockes writes, “If the 53-year-old [Lewis] started off angry, opposition to the book has sharpened his stance into a moral crusade. [Lewis says he deplores] [t]he idea that the smartest, richest elites of society find this an acceptable activity. This predatory activity.”¹¹

Actually, I just want more information on the true costs and benefits of HFT so I can make up my mind. While HFT firms are not angels, and the small costs they impose on long-term investors add up, Lewis’ anger is unseemly. I am more concerned about children starving in Africa.

Conclusion

HFTs do indeed contribute to liquidity, although ordinary investors rarely feel their contribution. They charge a very small Tobin tax and provide a benefit that is also small. Markets are sufficiently liquid without them.

This does not mean that their intention or goal is to provide liquidity or that they are trying to benefit other people. No, they are trying to make money by trading. We do not expect liquidity from the benevolence or public-spiritedness of traders any more than we expect, in Adam Smith’s words, “the benevolence of the butcher, the brewer, or the baker” to provide our dinner.

Liquidity in the market is a natural, unintended and predictable consequence of traders trying to make trading profits.

¹⁰ *The Guardian*, “Michael Lewis: ‘Wall Street Has Gone Insane,’” by Emma Brockes, April 16, 2014.

¹¹ *Ibid.*

The behavior of HFTs also has predatory aspects and may simply be a waste of money. The question is whether HFTs are doing anything to upend the usual assumption that people should be allowed to do whatever they want, so long as they do not harm others. Some harm from ordinary business practices is even allowed (e.g., pollution) as long as the public benefits of the business exceed the public costs by a generous margin.¹²

If HFT revenues are a tax, then (before counting any benefits they produce) they do some harm. One must then ask whether the benefits outpace those costs, and by how much. This is not a moral question but an empirical question for which we do not yet have an answer. The answer is in data yet to be collected and studied.

And the data have changed because of the activities of Brad Katsuyama. The battle to rein in the costs imposed by HFT may have already been won.

Wayne Wagner, who founded a highly regarded trading-cost-measurement firm, Plexus Group, muses, "If instead of using a carbon-based life form to trade stocks, you use a silicon-based life form that doesn't come in late or complain about its bonuses, and that makes fewer mistakes, you've probably made buyers and sellers better off."¹³ Wagner's witticism, along with persistent watchfulness regarding any new trading costs that might arise, is probably the best response to Michael Lewis' misplaced anger.

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¹² We also regulate pollution, making some behavior by business unacceptable no matter how large the benefit of the polluter's core business.

¹³ Personal communication.