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The fall of high-frequency trading: A survey of competition and profits

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ABSTRACT

We investigate high-frequency trading (HFT) strategies, inventorying the strategies already studied in the literature and introducing innovative strategies detected by private institutional research. To this end, we expand the existing classification, and we offer names for new categories. In a complementary but original manner, we introduce counter reactions from professional traders in response to HFT predatory strategies. These human answers reverse the usual framework of competition between high-frequency traders (HFTs) and low frequency traders (LFTs) and also widen this cadre to HFTs algos (predators) versus execution algos.

This survey notes that a continuous increase in competition, between high-speed trading algorithms themselves through predatory strategies and from professional human traders adapting and building adequate responses has made the business more difficult and has led to shrinking profits for HFT. In the end, we believe that excessive competition and a change in the current regulation (favorable to HFT) could kill the goose that laid the golden egg.

1. Introduction

Since 2009, when a profit peak was reached, we have witnessed a decline in earnings, volume traded and market shares for the first time in the history of HFT. HFT strategies, which are implemented by complex algorithms to analyze multiple markets and execute orders based on market conditions, are widely studied in the finance literature. Smith (2010), Hoffmann (2014), and Menkveld (2014) examine the impact of HFT strategies on market quality and microstructure. Hendershott and Riordan (2013), Jarnecic and Snape (2014), and Harris (2013) focus more precisely on liquidity, while Boehmer and Wu (2013) investigate on price discovery. Also, Biais and Woolley (2012) modelize asymmetric information problems, and Angel and McCabe (2013) are concerned with the fairness of financial markets. In a complementary manner, authors like Smales (2014) or Kollias et al. (2013) probe HFT's reactions to exogenous news or shocks such as the London bombings, and analyze their impact on market quality. In a more technical way, Brandaouy et al. (2014) survey the impact of (Kolmogorov) algos' design on price dynamics.

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In an attempt to introduce the issue of HFT's profitability in the literature, an empirical study by Kearns et al. (2010) has shown the limitations of potential gains for an omniscient[1] trader; the gains were rather modest (approximately $21 billion for all U.S. equity markets) in 2008. Interestingly, the year 2008 is considered the most sumptuous and profitable year for professional[2] trading (especially automated) for decades. Ellis and Parbery (2005) and Marshall and Cahan (2005) also tested the profitability of technical analysis strategies. When applied to HFT, these strategies have shown slightly positive returns, which is consistent with the technical strategies average results provided by Manahov et al. (2014).

Because the profitability of HFT is a new topic for research on financial markets, we attempt to collect information on some fundamental questions related to HFT: Why is HFT less profitable today? What has changed in the markets since 2009? Are the LFTs (low-frequency traders) able to prosper in an environment full of HFTs (high-frequency traders)? What are the relations between rival HFTs? Is there an excess in the number of trading firms in the industry? Will the fast algorithms[3] adapt and survive at the low volume and reduced volatility inherent in today's markets?

Our work relies on studies by Kearns et al. (2010) and Brogaard (2010) on profitability of high-frequency trading in the U.S. and on Lewis (2014). In addition, there is evidence that industry profits reached $5 billion in 2009, according to a widely cited study from Rosenblatt securities (Schack and Gawronski, 2009; Goldstein et al., 2014). After this study, the European Research Council[4] stated that HFT profits fell to $1.25 billion in 2012 from the 2009 peak, corresponding to a 74 percent decrease, and IBISWorld[5] confirmed the downward movement in revenues in a report[6] (High Frequency Trading in the US: Market Research Report, 2013). Thus, since 2009, we observe a sharp decline in revenues and profits. Rosenblatt Securities further confirmed that HFT market shares sank from 2009, with approximately 3.25 billion shares exchanged per day to only 1.6 billion a day in 2012. According to Malinova and Park (2013), commissions and rebates were cut down to $10.9 billion in fees in 2011. It is a 6 percent decrease from 2010, according to data from Greenwich Associates.[7] Fees represent the core of profitability for HFT through market making (M.M.) and order execution activities. Furthermore, the increase in technology and labor costs has lowered profits of trading intermediaries using HFT for their M.M. activities to a fraction of the levels earned 15 years ago according to Jones (2013). Another study by Popper (2012) states that reduced HFT volumes on U.S. equity markets dropped from approximately 6 billion shares (61 percent of volume) in 2009 to approximately 3 billion shares (51 percent of volume) in 2012, which demonstrates a significant decline in terms of results. Finally, MacKenzie (2011) confirms this downward trend and reveals a sharp decline in estimated profits of approximately 50 percent for the industry during the 2009–2012 period.

However, despite the evidence of shrinking gains for the HFT industry, significant gaps exist in the comprehension of this phenomenon in the research in finance. In this paper, we aim to address one of these gaps by highlighting the rise of competition, which can explain the cause of falling profits in the business of HFT. Recently, trading professionals and researchers such as Easley et al. (2012) have suspected that low-frequency human traders face competition from liquidity predators' high-speed algos specifically designed for this purpose. The HFT literature with Aldridge (2009) defines predatory strategies categories, complemented by research notes from financial institutions (Tse et al., 2012).[8] In this article, we provide further research to include innovative strategies not yet studied in the literature.

Competition between HFTs and LFTs is an important issue that should be explored more deeply; research led by O'Hara (2014) depict human LFTs (not-computerized strategies) as the victims of HFTs in the zero-sum game of markets. In our study however, we aim to present a reversed competition view by emphasizing original strategies and technical responses built by human beings able to overcome HFTs manipulative[9] strategies (pocketing fair profits on their behalf). Several studies (O'Hara, 2014; Biais and Woolley, 2012) are mostly centered on competition between HFTs and LFTs; though, there has been considerable concern in the trading industry, expressed by "standard[10]" high-speed algos runners, about the profit loss and risk threats caused by competitive predatory algos. Widening the competition issue to HFTs versus LFTs seems relevant to the comprehension of the fierce battle inside the markets. In addition, a published note from Loveless (2013), a former high-frequency trader, raises the issue of declining barriers to entry for new entrants in the HFT business since 2010. This study will try to reinforce the framework of enhanced competition between HFTs within the industry as a solution to the profitability question.

[1] Omniscient refers to a methodology employed by the authors, which consists in overestimating (on purpose) the profitability of HFT by counting only the profitable trades.

[2] In contrast to retail investors.

[3] Hereafter named algos.

[4] The European Research Council was established by the European commission in 2007 and emerged as the first pan-European organization for funding research. See MacKenzie (2011).

[5] A high-street provider of industry information in the U.S.

[6] Cited at http://www.prweb.com/releases/2012/2/prweb9221222.htm.

[7] A leading provider of global market intelligence and advisory services to the financial services industry, mainly used by Wall-Street banks to give a ranking amongst their peers.

[8] https://edge.credit-suisse.com/edge/Public/Bulletin/Servefile.aspx?FileID=23285&m=923226224.

[9] These algo strategies, which are sometimes called spoofing, layering or flipper trading, are not official and sometimes illegal; we will present later in this paper the consequences for such trading strategies. By way of illustration, in October 2008 the London Stock Exchange imposed a £35,000 penalty on a firm (its name has not been disclosed) for spoofing.

[10] Trading algorithms were originally designed to improve the execution of big orders (sell or buy side), facilitate market making and profit from arbitrage.