



Critical review

Geographies of high frequency trading – Algorithmic capitalism and its contradictory elements



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ARTICLE INFO

Article history:

Received 12 October 2015
 Received in revised form 8 November 2015
 Accepted 14 November 2015
 Available online 28 November 2015

Keywords:

High frequency trading
 Time-rent neoliberalism
 Space–time compression
 Spaces of timing
 Crises
 Microseconds
 Geographies of finance

ABSTRACT

This paper investigates the geographies of high frequency trading. Today shares shift hands within microseconds, giving rise to a form of financial geographies termed algorithmic capitalism. This notion refers to the different spatio-temporalities produced by high frequency trading, under the valuation of time. As high frequency trading accelerates financial markets, the paper examines the spatio-temporalities of automated trading by the ways in which the speed of knowledge exploitation in financial markets is not only of interest, but also the expansion between different temporalities. The paper demonstrates how the intensification of time–space compression produces radical new dynamics in the financial market and develops information rent in HFT as convertible to a time rent and a spatio-temporal rent. The final section discusses whether high frequency trading only responds to crises in microseconds or constitutes them. It argues that automated trading will not only contribute to accelerate crises, but also deepen them by the ways in which it differentiates the dynamics between financial, fixed and productive capital.

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1. Turbulent financial worlds

Since 2007 we have experienced one significant financial crisis with a temporality of years and months, weeks, and days; shareholders have also experienced 10 crises in minutes, around 300 crashes within seconds and more than 3000 crashes in microseconds (Fenn et al., 2011; Patterson, 2012). Therefore, within the global financial crisis we experience a turbulent financial world, with crises and sub-crises existing in the interface

between different temporalities. For this reason space–time compression (Harvey, 2012, p. 240), or what I would tend to call space–time implosion, becomes of crucial importance to understand the radical new dynamics in the financial market – but also more broadly – to understand the dynamics of contemporary finance driven accumulation regimes.

In the wake of the global financial crises, economic geography took up a new financial agenda (Martin and Sunley, 2011), partly by reintroducing the relevance of finance as a political economy consideration, partly through the search for new conceptual categories within economic geography. As Sokol (2013) argues, there

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is a need for new “conceptualizations of economic geographies if these are to provide a solid analytical handle on financializing economies” (Sokol, 2013, p. 501). While financial geographies cover a vast spectrum of areas, including hedge funds (Teo, 2009), carbon markets (Knox-Hayes, 2013), geographies of investment banking and inequality (Wójcik, 2012), finance and the housing crises (Martin, 2011), financialization of the environment (Lofthus, 2015), and so forth, little attention has been given to the geographies of high frequency trading (HFT). At the margins of economic geography, Zook and Grote (2014) study micro geographies and automated time space compression, and Lewis (2014) notes how HFT is all about speed in coping with the travel distance among the computers that execute the trades. MacKenzie (2014) turns to laser beaming over New Jersey, a new means of technology that accelerates the transmission of stock market data. Muellerleile (2013) looks into performativity between time and space. This paper, by contrast, examines the ways in which HFT produces contradictions in operating at different spatio-temporalities.

In doing so, this article addresses the following questions: What constitutes crashes in minutes, seconds and microseconds? How are they driven? What are the spatio-temporal implications thereof?

Located within the theoretical underpinnings of David Harvey's *Limits to Capital* (1982), the first section conceptually elaborates on the work of algorithms in space and time, under which the value of speed is examined. Then it examines spaces of timing under continuous acceleration and addresses three contradictory elements of the HFT. Lastly it is discussed whether the current capitalist phase of high frequency trading not only contributes and accelerate crises, but also makes crises worse.

2. Time shrinks – but space doesn't?

Michael Lewis' (2014) extensive and elegant writings on high frequency trading convey the relevance of slicing time into ever-smaller fractions as speculative strategies. To Lewis (2014) the present advantage lies in exploiting knowledge faster than competitors do, in order to preserve financial and ideological control: “The entire commercial existence depended on being faster than the rest of the stock market” (2014, p. 18). Trading in high frequency goes toward the highest possible acceleration of capitalism (the speed of light), by the ways in which laser beamers have now come to replace fiber-optic cables (data only travel 2/3 of light in vacuum). Speed, however, is not only of interest (Patterson, 2012; MacKenzie, 2014), but also the expansion and acceleration between different spatio-temporalities.

Whereas Lewis (2014) is fully aware that ‘time competition’ is (ac)counted by the travel distance of market information from A to B, hence limited by ‘physics’ (speed of light), he comes to a similar conclusion as does Donald MacKenzie et al. (2012). For MacKenzie et al. (2012) trading in high frequency is all about speed: “In high-frequency trading (...) time shrinks, but space doesn't” (2014, p. 286). The implication appears to be that time and space need to be separated ontologically – or at best – that time shrinks faster than space. In the following, it is argued that their contribution is not only limited to the matter of time and space, but also illustrates how the spatio-temporal perspective(s) we offer, is imperative to emancipate contradictory elements of these accelerating mobilities of capital.

Let us first turn to explanations in conventional economics. One view represented by the U.S. Commodity Futures Trading Commission (CFTC) and the U.S. Securities and Exchange Commission (SEC), suggests that crises at sub-second level are ensured because large traders use automated execution. Selling large volumes in

high frequency affects prices because of changes in market depth. Thus HFT may produce imbalances if the rates of incoming orders that require execution in microseconds outpace the market depth of buyer interest. For this reason the demand and supply curves are more accurate, rather than an abrupt or punctured market curve, when accounted for in ever-smaller timescales. Therefore, in general HFT improves liquidity, and turbulence is only part of such improvements (Herndershott et al., 2011). The owners of the means of HFT production, such as investment banks, holding systems or hedge funds, put such arguments forward. Another set of explanations promoted by Deutsche Bank (2011) among others, suggests that the volume of HFT is never constant, exactly as for the market in general. In peaks of trading, therefore, fluctuations are only the result of corrections to supply and demand within these time frames. The result is the same. HFT improves liquidity and equilibrium between supply and demand. A third perspective emphasizes how HFT takes into consideration small variations in prices of a particular share traded in different markets simultaneously. Insofar as difference exists, turbulence is a result of corrections to new ‘states of equilibria’ within microseconds (International Organization of Securities Commissions, 2011). Once again, in the name of the free market, HFTs improve liquidity and correct price differences across markets. Thus, all three accounts suggest (apart from the liquidity thesis) that HFT does not trigger crises within these fractions of time; HFT responds to them. Whereas the first two sets of explanations only consider time, the third integrates a spatial framework in that it argues that through new technological devices we can better overcome (more effectively) space through faster distribution of market information. Following Harvey (2012), neither space nor time are abstract objectives; rather the spatio-temporalities of HFT exist as socially constructed products. What characterizes these conventional explanations is that the matter of time and space is abstracted in ways that hold space fixed as a constant (Harvey, 1982), time as the variable. It is illustrative of the challenges faced by Lewis (2014) as well.

3. Spaces of timing – and the value of a millisecond

The distinction between HFT and other forms of electronic trading is not only the astonishing speed; it is also the ability to carry out orders within microseconds, making potentially the same share changing hands thousands of times per second or the ability to take into consideration financial news and key reports before everyone else (Groß-Klußmann and Hautsch, 2011). HFT is (temporary) non-human trade (Haug, 2012). No person will ever be able to compete against these algorithmic strategies. Yet, it is not algorithms that profit from these non-human-trades, but those with access to perform HFT strategies.

The value of speed relies on access to market information before the competitors. What is sold is access to ‘free market information’ before the competitors, or as Lewis (2014) puts it, what is sold is essentially speed. The entire existence depends on being faster than the rest of the stock market. Thus it is knowledge about private space (ownership of a share as boundary making) that is exploited (exploits) and constituted in public space (the market place), in ways that create temporal ‘market informational’ monopolies. When algorithms speculate within microseconds, it reduces information to only a matter of affecting the immediate form of appearance (Haug, 2012). Further HFT reduces automated socio-economic decision-making to be relevant only in HFT time, whereas other spatio-temporalities are outraged. Algorithmic capitalism, therefore, refers to a process whereby the value of speed is essential to appropriate value out of other processes. Insofar as it is speed that is traded, it only has value to the extent it is a scarce

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