



Contents lists available at ScienceDirect

Technological Forecasting & Social Change



The technological transformation of capital markets

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ARTICLE INFO

Available online xxxx

Keywords:

Financial markets
 Information technology
 High frequency trading
 Financialization
 Electronic exchanges
 Financial innovation

ABSTRACT

Technology has dramatically altered capital markets over the past few decades. Technologically induced innovations such as electronic exchanges, high frequency trading (HFT) and exchange traded funds (ETFs) have made trading in capital markets faster, cheaper and more integrated, yet at the same time market liquidity has become more fragmented and opaque. Further, there are concerns that this new paradigm leads to greater volatility and myopia in the core function of finance (raising capital for entrepreneurial activity). Capital markets are clearly complex adaptive techno-social systems that are undergoing dramatic changes yet they are rarely researched from an innovation research or technological change perspective. In this editorial, we introduce the themes and issues highlighted by the papers in this Special Issue that addresses this gap in the literature. The contributions illuminate the technologies and related innovations that are changing the nature of capital markets. However, technology cannot be seen in isolation from other forces, most notably regulation, organisational innovation and new entrants. Moreover, technology is not only changing existing markets, it is expanding the scope of markets. Thus we conclude that financialization (the process by which financial markets become increasingly important in the economy and society) is a technology enabled phenomenon – something hitherto largely overlooked by the financialization literature.

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1. Introduction

“... HFT [High Frequency Trading] is not technology run amok, but rather a natural evolution of markets towards greater technological sophistication”

[(Easley et al., 2013 p. XV)]

“... fundamental changes related to information technology and the proliferation of financial markets have created a financial landscape that is highly opportunistic, transaction driven, and prone to destabilizing herding behaviour.”

[(Boot, 2014, p. 129)]

Financial markets are controversial and divisive, not least since the social and economic fallouts from the 2008 Global Financial Crisis (GFC). On the one hand, some see them as the critical lubricant that oils the global economy, while others see capital markets as the spanner

in the works to a fairer society. This diversity of views is evident in academic literatures, with finance researchers in general providing an upbeat assessment of markets while more sociological focused contributions generally lamenting the increased importance of finance – with this increased importance being described as financialization.

Generally absent in these literatures is an explicit examination of how technology is transforming capital markets. Anecdotal evidence suggests that capital markets are in the midst of a dramatic and technologically driven transformation. Insights into the transformation of capital markets by technology are discernible in the financial press (for instance Popper, 2013 and Ostand, 2013), non-academic books (Arnuk and Saluzzi, 2012; Lewis, 2014; Patterson, 2012), in publications by industry professional bodies (Preece et al., 2012) and in publications by regulatory agencies (ESMA, 2014; IOSCO, 2011).

Capital markets are clearly complex adaptive techno-social systems with profound implications for society should they malfunction (Linstone and Phillips, 2013). Yet they are rarely researched from an innovation research or technological change perspective. This Special Issue addresses this gap in the literature and provides an accessible entry point into this important technological transformation. In this editorial, we introduce the themes and issues highlighted by the papers in this Special Issue.

The rest of this editorial is structured as follows. The next section provides context in terms of the role of IT in finance, generally, and

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then more specifically in the context of capital markets. The following two sections develop the contrasting views about markets evident above, first through the lens of the established finance literature (Section 3) and secondly via critiques of contemporary markets from social and sociological perspectives (Section 4). As intimated above, a limitation of both these literatures is that although they have explored the effects of the technological transformation of capital markets they have not shed much light on how technology has enabled this transformation. In Section 5 we discuss the five papers in the Special Issue which address this gap in the literature. Section 6 provides some concluding remarks.

2. The context: finance and IT

Technology within the financial services sector is growing in importance, bringing more and more innovation to the possible interactions with financial service providers and directly influencing and reshaping financial service operations (Mention and Torkkeli, 2012). The use of electronic payments, the processing of transactions, and the interactions with the customer through various online banking platforms, ATMs, CRM applications, and recently mobile applications for daily banking are all examples of technology-induced innovations in the financial services sector.

Information systems and technology play a leading role in the financial services industry for several reasons. Firstly, finance was among the first sectors to adopt information systems and technology in order to automate processes (Chiasson and Davidson, 2005). Secondly, the financial services industry can be considered as a clear example of a service industry because its fundamental activity is the processing of information and intangible resources (Baets, 1996; Avison et al., 2004). Thirdly, the use of information technology is also known to be relevant as a competitive advantage for this sector (Broadbent and Weill, 1993; Tallon, 2010).

Financial services companies are therefore heavily dependent on their current technology and this creates also possible information security threats. This, coupled with the sensitive data and information that is dealt with in this sector, makes the financial sector a high risk area for information security (Wang et al., 2015).

Technology also has a leading role in transforming the companies active in financial services by integrating discontinuous phases in the value chain. The result of these new combinations and their automated execution are increased performance. These changes require software tools and adequate hardware infrastructure. An example of a successful transformation through technology within the context of financial services can be found in the application of increased customer focused approaches by leveraging knowledge on customers and the digital interactions with customers (Cooper et al., 2000).

From the above discussion it is not surprising that about 91% of finance industry analysts rated technology as either critical or important to the financial services industry (Accenture, 2011). It is estimated that financial services firms spent between USD 270 billion and USD 460 billion on IT in 2013 globally (Mai, 2012). Further, financial services firms spend more on IT than other industries – IT costs equated to 7.3% of revenues in financial services compared to 3.7% on average in all other industries (Mai, 2012).

2.1. Capital markets and IT

From the discussion above, it is clear that to date the preponderance of the literature on finance and IT has focussed on the management of innovation where the unit of analysis is the firm (for instance Avison et al., 2004; Mention and Torkkeli, 2012). Further, the focus has been on the ‘visible’ parts of finance, namely commercial and retail banking, as well as financial services providers more generally. Emphasis has also been placed on open and collaborative innovation between financial services firms and their technology suppliers (Mention and Torkkeli, 2014; Schueffel and Vadana, 2015). This is what the finance

literature describes as ‘intermediated’ finance but less is known about how ‘direct finance’ is being changed by IT.

‘Direct finance’ refers to capital markets and the institutions that facilitate access to them such as stock exchanges, securities brokers and investment banks. Thus, relatively little is known in the academic literature about how technology is changing capital markets at a more systemic level (i.e., how technology has changed market “macrostructure”). In prescient contributions Coates (1992) and Werthamer and Raymond (1997) predicted in the 1990s that information technology was on the verge of radically transforming capital markets, while Linstone and Phillips (2013) note that contemporary capital markets are an example of ‘too little understanding chasing too much complexity’, potentially leading to low-likelihood, very high-impact failures or “X-events” as described by Casti (2012).

Beyond these exceptions, and as noted in the Introduction section, insights into the contemporary transformation of capital markets by IT/technology are principally discernible in the financial press (for instance Popper, 2013 and Ostand, 2013), non-academic books (Arnuk and Saluzzi, 2012; Lewis, 2014; Patterson, 2012), in publications by industry professional bodies (Preece et al., 2012) and in publications by regulatory agencies (ESMA, 2014; IOSCO, 2011). From these it is evident that technological change, regulatory reform and financial innovation have dramatically altered capital markets over the past few decades. Technology has increased automation of trading and helped lower the barrier to entry for alternative electronic trading platforms, thus increasing the competition for order flow (see Angel et al., 2011).

ICT technologies have also facilitated the spread of high frequency trading (HFT) to an ever increasing number of markets and geographies. HFT has not only increased the speed of trading but also altered the nature of markets, with HFTs often taking on the role of liquidity providers and as such becoming the ultimate market insiders (Diaz-Rainey and Ibikunle, 2012; Hendershott et al., 2011). Furthermore, ICT technologies and deregulation have facilitated the development of maligned financial innovations (such as credit derivatives and securitized loan assets) and ones such as Exchange Traded Funds (ETFs) that offer considerable benefits but also sizable risks (Allen, 2012; Brunnermeier, 2009; Diaz-Rainey and Ibikunle, 2012). The combination of ICTs and deregulation have also resulted in ‘liquidity fragmentation’ or ‘market fragmentation’ with the emergence of alternative trading venues and ‘dark pools’ that have resulted in the erosion of market share for traditional regulated exchanges. This in turn has raised concerns about market transparency and regulation (Preece et al., 2012). Of these various trends the growth of alternate trading venues and of HFT or automated trading (AT) has played a critical role in re-defining contemporary markets. We discuss each in turn.

2.1.1. Alternative trading venues, market fragmentation and ‘dark’ trading

As noted above, financial markets have undergone transformational changes over the past few decades; however, the last decade has witnessed the most significant changes in the way financial trading platforms operate (see Angel et al., 2011). The changes induced by the declining costs of technology and changes in policy, hold significant implications for market structure in several respects. For example in Europe, the enactment of the Markets in Financial Instruments Directive (MiFID) in 2007 coupled with technological advances in trading systems led to the proliferation of trading venues in Europe (i.e., new electronic competitors to traditional stock exchanges or securities exchanges) (Gomber et al., 2015). These include Broker Crossing Networks (BCNs) and Electronic Communication Networks (ECNs) or Multilateral Trading Facilities (MTFs) as they are called in Europe. The growth of alternative platforms, as with AT and HFT, has been largely driven by technology. However, again, policy and the desire to improve competition among trading venues (for example in Europe through MiFID) and the desire to reduce transaction costs by eliminating the middleman have been the main driving forces behind the rise of alternative trading platforms. This competition among trading platforms

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