

The Appleization of Finance

Reflections on the FinTech (R)evolution

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Abstract

Financial Technology (FinTech) engenders new business models based on the integration of finance and Information and Communication Technology (ICT). 'Big Data' mining, digital money, distributed ledger technology, robo advice and other FinTech applications all threaten to radically change existing financial sector business practices. Incumbent financial institutions, with their legacy systems and sunk costs, are not necessarily the nimblest organizations to embrace these developments as they require cannibalizing existing business models. Nevertheless, as history has shown, if the profit proposition is sufficient, incumbent capital will eventually embrace technological change. This paper argues that while we are becoming aware of the inroads into financial services of tech companies such as Apple Inc., we need to be more sensitive to how incumbent financial institutions themselves have started to mimic the disruptive FinTech firms they seek to neutralize. Organizational models coming out of Silicon Valley are starting to spill-over into the 'more traditional' financial industry. Emblemized by Apple's business model, organizational technologies rest on the lead firm cultivating and monopolizing an infrastructure, creating an 'ecosystem' and/or 'walled garden' where start-ups are 'free' to compete whilst effectively being locked-in in the process. This paper illustrates this through a threefold analogy between Apple's strategies – locking in software developers, customers, and the state into its business ecology – and emerging practices in the financial industry. The analogy suggests that the ongoing Appleization of finance might transform, yet not undercut the oligopolistic position of the financial incumbents riding the latest wave of technological change.

Introduction

Any business in any era must be able to rapidly adjust to the ebb and flow of currents in its industry – or, better still, to anticipate and stay ahead of them. This is doubly true in the digital age, since the pace of transformation is such that any service provider standing still risks being swept away by the changing tides of customer preferences. (World Economic Forum, 2015)

At a time when low economic growth and interest rates are putting 'conventional' banking models under stress, the financial industry is confronted with the potentially disruptive challenges posed by Financial Technology (FinTech), which as a discourse and practice has been gaining momentum since the financial crisis of 2008. Savvy to exploit the potential of digital money (e.g. bitcoin), distributed ledger technologies, online payment systems, and data mining, both 'the GAFA's' (i.e. Google, Apple, Facebook, and Amazon) and a multitude of FinTech start-ups in a range of financial centers are increasingly offering financial services. The above extract from the World Economic Forum's (2015) report *The Future of Financial Services*, which primarily deals with the anticipated impact of FinTech, indicates that FinTech is more than the latest fad in finance and that banks are genuinely concerned about the consequences of these technological developments on their business models. The FinTech concept delineates processes and practices at the interface of finance and digital/online information and communication technologies (ICT) which might radically transform or 'disrupt' the nature, or at least the practice, of finance as commonly understood. The debate on many high-level fora—such as conferences organized by central banks and other regulators—is centered on the power-play between FinTech 'disruptors' and 'incumbents', the latter being big banks that could see their business annihilated. For financial incumbents, the FinTech 'revolution' places them at a crossroads: do they shield their field from the inroads of dedicated FinTech firms, or do they seek to collaborate with them in order to gain competitive advantage vis-à-vis other incumbents? Although FinTech is hyped by consultants who seek to gain from guiding clients through the announced 'revolution' (The Economist, 2015) or 'paradigm-shift' (WEF, 2015), there is little doubt that FinTech is making inroads into 'traditional finance', which requires careful empirical scrutiny.

First evidence from financial centers in Europe suggests that incumbent finance is exploring how the innovative energy of FinTech disruptors can be encompassed in their organizations. This paper argues that it makes sense to regard financial incumbents and FinTech disruptors as being part of two different industrial-institutional fields that are gradually merging (Fligstein, 2002; van Meeteren and Bassens, 2017) in which processes of organizational mimicry (Di Maggio and Powell, 1987) are increasingly prevalent. We observe in this merging industrial field that organizational models and practices based on 'open' and 'networked' conceptions of the firm (Taylor and Oinas, 2006) are diffusing from FinTech firms to incumbent financial institutions. While it has become common practice to study the financialization of corporations such as Apple (Fernandez and Hendrikse, 2015; Froud et al., 2012; Haslam et al., 2013; Lazonick et al., 2013), it seems pertinent to

be sensitive to processes in the reverse direction. We call this process the Appleization of finance as we observe that incumbents are gearing up to construct corporate ecosystems and control digital platforms (Langley and Leyshon, 2016), which function as 'walled gardens', mirroring the way in which Apple has come to enclose software developers and customers in their corporate ecology (Bergvall-Karborn and Howcroft, 2013; Montgomerie and Roscoe, 2013). The analogy between Apple and finance allows us to detect strategies by financial intermediaries to defend their position as obligatory passage points (Bassens and van Meeteren, 2015) in a low growth/interest-rate conjuncture where profits are claimed to be increasingly under stress.

Our argument is structured as follows. We start out by contextualizing the premises of the anticipated FinTech revolution. Subsequently, the present context is put into a long-term perspective on economic-technological change, in which the evolution of the capitalist system is categorized into cyclical transitions from one technological revolution to the next. By showing how the rise of FinTech fits this historical pattern, the notion of a 'revolutionary moment' is qualified. Apart from industries, technological paradigms also transform corporate strategies, with Apple Inc.'s business model assumed paradigmatic for the current era. By sketching the emergence and key characteristics of Apple's corporate strategy, we argue that incumbent finance, at a variety of scales, is seeking to copy and internalize those features having fueled Apple's success story. This occurs through aiming to lock in customers, developers and the state into banks evolving business ecologies, a trend we characterize as the Appleization of finance. In the conclusion, we reflect on how these observations feed back into theorizing historical continuity and change in financialized capitalism.

A FinTech revolution?

This is not the first time the disruptive potential of FinTech is proclaimed. For instance, in the 1990s, ICT-driven disintermediation was expected to radically transform banking. The Internet was to dissolve the economies of scale of a previous era and hence change the power relations within the industry (e.g. van Geenhuizen and Nijkamp, 2001). During the 2000s, however, the algorithm-driven world of *haute finance* seemed to fit a more traditional conception of 'big conglomerate finance' again (van Meeteren and Bassens, 2017). Since the 2008 North-Atlantic financial crisis (NAFC) (Jessop, 2015). FinTech investments have risen sharply since, with venture capital (VC) funding accounting for \$25 billion in 2015 (World FinTech Report, 2017: 25). Nevertheless, this ICT-driven conjuncture is qualitatively different from the 1990s. Until the 2000s, ICT revolutions in banking mostly took place within banks themselves, which built up e-commerce platforms and global communication and wiring systems. Nowadays, the main drivers of change seem to be external to the conventional financial field, at a time when financial institutions fear a profit-squeeze due to low-interest rates, stricter capital requirements, and limited prospects for profitable investments in a zero-growth scenario. More than a way to modernize the organization, like in the 1990s, digitization serves as a way to cut costs, boost

efficiency, and ultimately boost profitability by 2-3% (in terms of Return on Equity) (Financial Times, 2016).

The competitive pressure on incumbent banks emerges from new more profitable business models in which ICT-focused corporations have a competitive advantage in terms of online product development and operations. FinTech designates ICT applications ranging from alternative funding platforms (crowdfunding), digital ledger technologies, high frequency trading, robo-advice, big data mining in banking and insurance, RegTech, CyberTech, to online payment systems i.e. activities that are conventionally executed by 'traditional' financial intermediaries. Oftentimes, a FinTech application digitizes specific financial functions such as money creation, payment (security), credit generation, risk management, and asset management. These applications alter the cost structure and information asymmetries of these functions, potentially changing how and where they are performed. Disruption thus lies in the possible different structure and power relations within an altered financial field (see Fligstein, 2002). To incumbent finance, tech giants in particular are perceived a big threat, individually and collectively, for their grasp and ownership of technology (and its far-reaching utilities, implications and consequences) is unparalleled, as much as their pecuniary war chests are unrivalled. Individually, tech firms are investing in digital payment systems (e.g. Apple Pay, Amazon or Facebook Payments, Google Wallet) which are disrupting established payment systems in which incumbent banks typically are the obligatory middlemen. Collectively, the GAFAs are increasingly teaming up, for instance in lobby groups such as Financial Innovation Now¹, to convince regulators to cut 'red tape' hindering their inroads into finance. But they are also teaming up in areas like data mining, creating the world's leading partnership in fields like Artificial Intelligence (Mannes, 2016). As the GAFAs offer their services online, typically not supervised by regulators, level playing field issues are said to emerge: these companies are neither bothered by strict financial data rules like traditional financial intermediaries nor by the sunk costs of traditional office networks. Simultaneously, however, tech firms are not allowed to offer basic deposit and savings accounts, which are highly regulated financial domains. The implication is that, until now, FinTech has made most inroads in the realm of payments (i.e. 43% of business, see McKinsey and Company, 2015, p.2), and far less in deposit, credit, account or asset management functions.

The GAFAs, however, are only the top of the iceberg: FinTech is a highly dynamic field comprising venture capitalists, communities of entrepreneurs, hackers, programmers, and start-ups setting up shop in financial centers across the globe. As proclaimed by techno- or cyberlibertarian ideology (Golumbia, 2016; Turner, 2009; Hsu, 2015), FinTech ultimately could deliver the technology to organize finance in a decentralized, unmediated, peer-to-peer system. In particular, distributed ledger or blockchain technology underlying Bitcoin promises an 'emancipatory' and 'more inclusive' financial future. Theoretically, blockchain can help to process and store information in a decentralized way, cutting out the middle man. Interestingly, financial incumbents see distributed ledger technology as the 'Golden Key', as a global

¹ see <https://financialinnovationnow.org>

distributed ledger could in theory function as a real-time memory bank of all payment and credit transactions executed, which, when mined correctly, could offer 'perfect information' on counterparties. Perhaps more utopian, this might be a crucial solution to eradicate endogenous risk once and for all from the financial system. However, fundamentally, the FinTech revolution is one example of the current enrollment of (organizational) technologies to temporarily 'fix' the cyclical contradictions typical of capitalist economies, a broader argument in which we will contextualize the FinTech development below.

Technological revolutions and capitalist crises

The fifth technological revolution

Among scholars of economic-technological history, there is the widely-held notion that the impact of technological change on the organization of the capitalist system comprises cyclical transitions from one technological revolution to the next (e.g. Braudel, 1984; Freeman and Perez, 1988; Mandel, 1975 [1972]). Every era is described by the approximately 50-year Kondratieff cycle, consisting of an A-phase of upswing of rapid growth followed by a B-phase of diminished economic growth/stagnation (Mandel, 1975 [1972]: 108-146). Each phase is defined by a technological revolution and a cluster of associated innovations with propulsive effects on the economy. Figure 1 provides an overview of the historical periodizations as they are widely recognized. Every technological revolution produces a distinct 'techno-economic paradigm' (Perez 2002: 8)²: a set of institutional and organizational practices that puts the productive potential of a technological revolution to optimal economic use. This techno-economic paradigm gradually diffuses throughout the whole economy: the propulsive industry and early adopters of the revolutionized sector tend to be first movers in adopting the new institutional 'best practices', whilst 'lagging' industries need time to catch up. The notion of technological-paradigm has been understood in Marxist political economy as changing configurations of productive forces (Mandel 1975 [1972]: 562-569; Fuchs, 2013). Key here is that a technological revolution changes how capital reaps surplus profits, as old ways of valorizing capital become obsolete in the competitive struggle between capital fractions. New organizational combinations of labor, capital and the cognitive resources embedded in them, allow laying out new and more complex circuits of capital (Lee, 2002). Incumbent firms might have difficulty to adapt, opening up a window of opportunity for other entrepreneurs and capital fractions that are experts in dealing with the new organizational and technological complexity.

This paper is concerned with the trajectory of the fifth technological revolution, that according to Perez (2002) has been driven by accelerating advances

² Perez (2002), when discussing the relationship between Kondratieff cycles and finance, utilizes the same cutoff points of sub periods but has the cycle start at the stagnating B phase where she argues that the 'big bang moment' of the new cycle-driving innovation takes place. Therefore, while the recession of the 1970s is considered the B-phase of the fourth Kondratieff cycle in conventional Kondratieff accounts, for Perez it is actually the start of the fifth technological revolution based on ICTs.

in ICT from the early 1970s onwards. This trajectory coincided with the crisis (B-phase) of the fourth Kondratieff wave and the long decline of the monopoly position of the big conglomerate firms (Fligstein, 2002) that dominated the upswing of the fourth Kondratieff wave.³ The B-phase of this cycle can be characterized by two key aspects. First, the period has shown a growing dominance of finance and financial practices on the structuring of the political economy i.e. financialization (Aalbers, 2017). Second, this era has been called 'cognitive capitalism' (Vercellone, 2007; Birch 2012; Scott, 2012) as ICT's enabled a much more intricate valorization of knowledge and cognitive ability; a valorization that is often only possible after aggregating the contributions of many individuals. Although we want to bracket the question whether cognitive capitalism necessitates rethinking contested theories of labor and value (Birch, 2012; Fine et al., 2010; Rigi and Prey, 2015), we note that financialization drives on unequal access to knowledge. These consist of knowledge asymmetries on how, when and where to valorize and switch between circuits of accumulation (Bassens and van Meeteren, 2015; van Meeteren and Bassens, 2016), and how to use income streams as fuel for securitized financial products (Leysnon and Thrift, 2007).

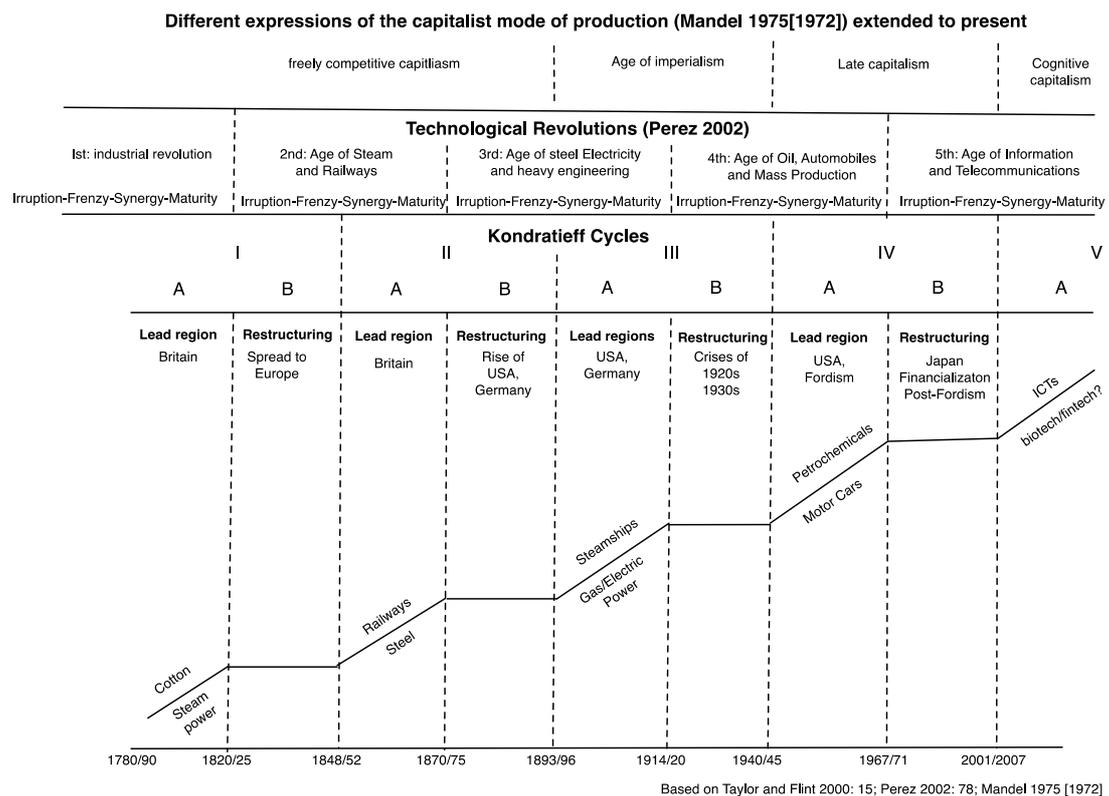


Figure 1. The relation between technology and the evolution of the capitalist system

³ Mandel (1975 [1972]) calls the monopoly period of the fourth Kondratieff wave 'late capitalism', which is somewhat confusing as this paper addresses the period afterwards i.e. a later capitalism than late capitalism.

The internal evolution of the fifth technological revolution 1971-2001-current

Perez (2002) describes a historical pattern of financial involvement in technological revolutions consisting of four distinct phases, whereby each technological revolution finds its expression in an S-curved 'great surge' of economic development in which finance alternately plays the role of accelerator and inhibitor (Figure 1). While the crisis of Fordism starts in the early 1970s, there simultaneously emerged a new set of discourses around future economic development, such as the 'information society', 'postindustrial society' or 'knowledge economy', articulated by futurist-oriented social scientists like Daniel Bell, Alvin Toffler and Peter Drucker (see Brint, 2001; Sokol, 2004; Fuchs, 2013 for critical reviews). Driven by the ascent of ICTs, costs could be radically cut, bureaucracies stifling large conglomerates could be streamlined, and circuits of value could be organized on a much larger scale than before. Essentially, ICTs would enable the current wave of globalization and contribute to overcoming the stagflation crisis of the 1970s. Finance was a crucial early adopter of ICTs and a 'globalization pioneer' (Castells, 2000 [1996]). As financial institutions were top-heavy on routine clerical work, large mainframe computers allowed for significant cost cutting. Moreover, ICTs were able to 'flatten' the geography of finance, as many activities could now be coordinated from afar (Clark and O' Connor, 1997). Ultimately, ICTs would create the high-cost/high-expert world of algorithmic trading and electronic arbitrage so characteristic of twenty-first century 'global finance' (Clark and Thrift, 2005). However, by the mid-1980s the adoption of ICTs in society at large seemed to stall, through an 'applications gap', beyond military and corporate applications causing a crisis in Silicon Valley (Castells, 1998). The promises of the postindustrial society seemed to evaporate, as there were insufficient economic applications to maintain the hardware-oriented growth model of the early ICT revolution.

The solution to the applications gap were a set of practices that have been defined, somewhat ambiguously, through the discourse of 'the network society' (Van Meeteren and Bassens, 2016). In the inception phase of ICTs, the technology was basically a demand-push affair driven by hardware developments (Castells, 1998). As personal computers became ubiquitous in the 1980s, and with the invention of the world-wide web in the 1990s, computer networking became more common, and attention shifted to interoperability and software development. This shift led to competitive 'platform wars', where consumers were to be seduced to be on the same computer platform (i.e. Microsoft Windows versus Apple Mac OS versus Linux) in order to maximize network externalities. After the hegemony of Microsoft software and the rise of the internet were established, a vast array of new transformative ICT applications was foreseen in E-commerce (Leyshon et al., 2005; Zook, 2007). This gave rise to a frenzy phase in which finance played the role of accelerator. Characteristic of the dotcom bubble of the late 1990s was a sharp distinction between 'old' and 'new economy' valuations of economic performance by capital markets (Feng et al., 2001; Perez, 2002). Fueled by discourses produced by consultancies (Leyshon et al., 2005) that the corporation of the future would no longer require physical assets, but instead amass and harness 'information', for a while capital markets were willing to finance loss-leading firms as they sensed the

start of a new wave of technological change and economic growth. That is, until the dotcom bubble burst in 2001, and actual profitability again mattered for corporate survival.

Meanwhile, attaining profits had become increasingly problematic. Overaccumulation, a state in which there is significant excess capital unable to generate above-average returns (Mandel, 1975 [1972], p. 595), intensified. This situation increased the dependence on financial intermediaries to organize profitable capital circuits, through all sorts of practices we commonly associate with financialization, and can account to a certain extent for the process of finance feeding upon itself that contributed to the 2008 NAFC (Bassens and van Meeteren, 2015). In the period after the crisis, interest rates have been kept at record lows to stave off financial panics and resuscitate economic activity, having adverse impacts on savings, pensions and traditional banking. With deposit-based banking under pressure, banks have increasingly embracing market-based banking and/or fee-based intermediation, whereby originating and trading financial products has become central to their business models (Hardie and Howarth, 2013). In this conjuncture, operating retail networks becomes a costly undertaking, incentivizing banks to embrace ICT even more.

Explanations of technological paradigms

The neo-Schumpeterian (e.g. Perez, 2002) and Marxist (e.g. Mandel, 1975[1972]) perspectives largely agree on the periodization of long-term capitalist development, including that there is a lag between the period where a technology emerges and large scale adoption. New practices on how to organize capital valorization are technologically possible but it takes considerable time (decades) before they are put in practice in all segments of the economy to which they can contribute. The two perspectives, however, offer fundamentally different explanations of this lag. For Perez (2002), the main answer is co-evolution: institutional norms and forms need time to fully adapt to the new possibilities. Moreover, as Freeman and Perez (1988) suggest, it might be in the interest of incumbent corporations—the large monopolies of the previous era—to stall the adoption of new technologies when it is against their interest. This makes neo-Schumpeterian theory resonate with some aspects of the technolibertarian attitude (Golumbia, 2016; Turner, 2009; Hsu, 2015) that permeates much of the tech industry: it is the young entrepreneurs as disruptive force that enable the liberating force of the market by washing away monopolies of a previous era.

Finance, according to Perez (2002), plays an opportunistic role in this transition by alternately financing incumbents and disruptors, depending on where the highest profits will be achieved. It is finance, therefore, that might stall the technological adoption in the irruption phase before fueling the bubble of the frenzy phase. In the synergy phase, a realignment between financial and productive capital takes place where actual profits align with the assessments of the financial sector. Therefore, in Perez's scheme, the rise of 'platform capitalism' (Langley and Leyshon,

2016) is predicted to be the new 'normal' where capitalism is finally going to produce beneficial results amounting to 'a golden age' for the masses. If that process results in the transformation or disappearance of incumbent finance, that disruption might be the self-cleaning 'creative destruction' effect of the capitalist system.

On this alleged benevolence of creative destruction, the neo-Schumpeterian and Marxist perspectives disagree. In Perez's (2002) neo-Schumpeterian account, finance and productive capital are distinct entities, but a Marxist relational perspective would stress the mutability of these categories. Capital fractions always look for the highest returns and will try, while incurring significant switching costs (Bassens and van Meeteren, 2015), to mutate from one modality of capital (productive, financial, commercial, see Harvey, 2015) to another if it is worthwhile. This can include delays to free up capital for reinvestment that is 'fixed' in certain productive circuits. The crucial point for Mandel (1975[1972], pp. 47-48) is that this switching will only occur when (anticipated) profits are higher in the new economy than in the old. This requires the combination of push factors away from the old-economy (falling profits) in combination with pull factors toward the new (rising profits). This provides an alternative explanation why initially ICT applications were limited in the economy of the previous tech paradigm: by lowering costs in the old it prevented the new from becoming sufficiently profitable. It also provides a different assessment of the current conjuncture. As there is a 'wall of money' seeking above-average returns, colonizing new spheres of social activity that are not fully subsumed in a capitalist logic (De Angelis, 2001), or attempting to overthrow regulations that prevent the commodification of social relations, are imperative. This explains the encroachment of the GAFAs on nearly every aspect of social life, including finance (Dörry, 2016). For established finance, profit exhaustion in the old paradigm, in combination with competition in the new, might thus prompt a defensive reaction.

The information economy and changing organizational technologies

Mandel (1975 [1972]) makes the case that in late capitalism, technological monopoly rents had gradually become the main source of profits. Large corporates, through technological superiority, were more productive, pushing out less technologically advanced firms in the competitive game. Under cognitive capitalism, the organizational capacity to continuously innovate has only become more paramount for profitability (Storper, 1997). However, as efforts at producing innovations are economically risky, and knowledge is readily copied, the isolated secretive Research and Development (R&D) labs of yesteryear are increasingly inefficient to drive innovation.

This implies that from the 1970s onwards, we can, arguably (Dahlander and Gann 2010), posit the 'stylized fact' that corporate innovation has gradually evolved from 'closed' towards 'open' innovation systems. The tension between open and closed innovation relates to the non-rival character of knowledge, which makes it difficult to commodify (Romer, 1990). This explains the tendency to 'innovate in secret' and protecting results through intellectual property regimes if one wants to

maximize returns. However, this secrecy tends to lead to tunnel visions, a decreased feel with markets, and is therefore inefficient. Resultantly, the last forty years have seen a gradual movement from vertically-integrated and closed innovation to 'network-based R&D', 'open innovation systems' and 'ecosystem development.' The more the innovation ecosystem is able to support experimentation and collaboration and enroll cognitive resources of a wider variety of actors, the higher the number and variety of potential inventions. However, the more actors involved, the more difficult it is to valorize knowledge in a profitable way. The central paradox of cognitive capitalism is that ideas and knowledge collectively produced function as a commons outside the conventional sphere of capitalist social relations (Vercellone, 2007; Rigi, 2013). This creates challenges: the more 'fuzzy' organizational boundaries become in the innovation process, the more important contractual agreements regarding intellectual property and ownership become (Taylor and Oinas, 2006), requiring legal work to divide the spoils. A first important organizational novelty in this respect was the rise research consortia where riskier parts of R&D were shared between large corporations, and competition was in the final product sphere: the joint development of the Compact Disk standard between Philips and Sony is the classic example (Hill, 1997). By agreeing on a platform, the benefits from network externalities could be shared (Katz and Shapiro, 1994). Originally these early instantiations of platform capitalism (Langley and Leyshon, 2016) concerned hardware standards.

During the 1970s a more decentralized model of innovation ecosystems developed in ICT and pharmaceuticals (Biotech) based on VC: riskier parts of the innovation process were done by startup enterprises whose risk taking was rewarded through takeover by an established firm or an initial public offering (IPO). This allowed a division of labor where inventions are done through high-risk, high-yield startup enterprises while incumbent firms take care of the valorization process of these inventions on a worldwide scale (Cooke, 2001; Corea, 2015). However, some innovative small firms—Microsoft, Apple, and more recently Google, Facebook, and Amazon—became giant corporations in their own right, controlling large parts of their respective ecosystems. These innovation ecosystems with their internal reward structure have allowed for a division of labor between large incumbents and networks of innovative startups. The startups contribute to the optimization of innovation in crucial links of global value chains while the large incumbents, whether Apple, or a bank, play the role of facilitating economies of scale, scope and overview (Moulaert and Djellal, 1995).

Thus, these ecosystem developments lead to new ways of financial service provision, such as crowdfunding (Langley, 2016), which potentially disrupt established financial profit channels. What is interesting is that this need seems to be acknowledged by the industry itself: financial service providers, particularly commercial banks and insurers, are rapidly transforming their business models hinging on dense retail networks. This is resulting in rapid and growing rounds of lay-offs in the European financial sector (Noonan, 2016), with implications for how the sector will legitimize future superprofits (Mandel, 1975 [1972]) combined with shrinking employment. To start broaching the question whether this will lead to undoing of financial incumbents, or rather their further empowerment, the next

section explains Apple's strategies for dominating innovation, production, and consumption ecosystems which, as we will argue in section 5, have growing appeal to financial incumbents. The emergence and evolution of Apple's business model emblematically illustrates how technology has transformed an early disruptor into an incumbent tech firm reminiscent of yesteryears' monopoly capitalists.

Apple's business model: Controlling the ecosystem

You guys were the rebels, man, the underdogs. But now, are you becoming The Man? Remember back in 1984, you had those awesome ads about overthrowing Big Brother? Look in the mirror, man! (John Stewart, quoted in Isaacson, 2011: 518)

Forty years ago, so the story goes, Apple Inc. started its phenomenal rise to global prominence from a garage box in California, where Steve Jobs and Steve Wozniak assembled their first computers. The legendary Jobs was not an inventor, but proved a creative genius in combining different technologies for personal use (see Isaacson, 2011). What made Apple stand out among other tech firms was its democratic appeal, making personal computer programming affordable to all, in contrast to larger rivals IBM, and later Microsoft (Linzmayr, 2004). Apple originally emerged as a countercultural force, as a disruptor – product of Californian hippie culture merging with Silicon Valley's libertarian ideas around entrepreneurship (Saxenian, 1994).

Ousted from Apple in 1985, Jobs started NeXT Computer where most of the technologies underpinning the Mac and iPhone were first developed. His idea was that you empower users by simple interactions, and with NeXT this philosophy became hardwired in the programming environment (van Meeteren, 2008; Hsu, 2015). This was Jobs' version of technolibertarianism: freedom under controlled circumstance; a simple platform enabling creativity without deep knowledge of the infrastructure. When Jobs returned to Apple during the late 1990s, this thinking was rolled-out throughout Apple's emerging ecosystems around OS X (for computers) and later iOS (for mobile devices) – a philosophy-cum-strategy that with the turn of the century would come to lure in customers and developers alike (Linzmayr, 2004; Deutschmann, 2000). For this strategy produced highly-lucrative business models centered around the iPod (from 2001), the iPhone (from 2007) and the iPad (from 2010), as well as iTunes (from 2003) and the App Store (from 2008), turning Apple into one of the most profitable corporations in the world.

Today, Apple is organized as a typical, flexible post-Fordist corporation, outsourcing production and assembly to third parties to focus on its core competencies (R&D, marketing and sales). At the same time, however, Apple remains a peculiar vertically-integrated firm, controlling 'all major critical parts of the chain' (Bajarin 2011). Resultantly, Apple enjoys high levels of control, arguably the highest in the tech world (see Eisenmann et al 2008). Apple's infrastructure is characterized by a tightly-controlled integrated ecosystem comprised of OS X/iOS software operating on its hardware devices, which allows the firm to rely on third-

party developers on the back-end to write applications or content with its exclusive code. From iOS development onwards, Apple increasingly encouraged (OS X) or mandated (iOS) outside developers to build applications made available through Apple's App store. In so doing, not only did Apple bring 'outside' innovative and disruptive energy into its ecosystem, maintaining control whilst externalizing risk-taking, it also made Apple devices all the more attractive for customers at the front-end of the ecosystem, due to the wide variety of applications offered. The Apple business model can therefore briefly be characterized as one that 'locks in' developers and customers into a controlled ecosystem, while being supported in a more infrastructural sense through locking in the state.

First, at the back-end, in order to benefit from network externalities, Apple had to convince developers to program on their emerging OS X platform in the 2000s. Fortunately for Apple, after the dot.com burst of the early 2000s there was an oversupply of programmers, and Apple managed to seduce many developers to work with their tools due to its specific software-design philosophy (van Meeteren, 2008). On OS X computers particularly in the 2000s, the operating system was relatively 'closed' in the sense that its interoperability with other platforms was limited, seeing developers and users 'locked in' within Apple's integrated infrastructure. With the introductions of the iPod and iPhone, moreover, this 'closedness' became an institutional and policed feature. Getting the music industry to collaborate with Apple's music store and iPod infrastructure necessitated the adoption of anti-piracy measures — digital rights management (DRM) — much to the chagrin of Apple.⁴ In the case of iPhone and iOS there were engineering arguments to restrict access to the device. Badly written software made the iPhone slow and unstable, and Apple decided that a closed system could alleviate these concerns (Hsu, 2015; Isaacson, 2011). Following the example of iTunes, the digital music store for the iPod, developer protests against the closed iPhone helped create the highly successful iOS App store (Isaacson 2011; Hsu 2015), which in 2015 generated more than US\$20 billion revenues and US\$6 billion profits, turning this platform into another profit machine (Keizer, 2016).

As Bergvall-Kareborn and Howcroft (2013) explain, Apple effectively controls software development via its ecosystem, allowing them 'to milk the masses for inspiration.' This allows Apple not only to externalize the development costs and the risks of failure, but also to censor the market, through the App Store—the obligatory passage point for developers that wish to mass-market their Apps. This places App developers in a precarious position, whilst Apple controls the platform, taking a 30% cut of the revenues. Since this monopsony position is in tension with the company's erstwhile democratic and rebellious appeal, it needs to legitimize itself towards developers. Traditionally, Apple's behavior of policing its platform has been acceptable to developers because it resolved a tragedy of the commons, maintaining a coherent platform that optimized user experience. Developers found Apple's behavior legitimate as long as it performed this role of 'benevolent dictator' (van

⁴ Steve Jobs personally and publically advocated against 'closed' DRM: <https://web.archive.org/web/20080107121341/http://www.apple.com/hotnews/thoughtsonmusic/>

Meeteren, 2008; Hsu 2015) to a sufficient degree. Thus, by seducing outside developers to lock themselves in, Apple has been able to thrive upon its countercultural image of yesteryear. It is here that a paradox of freedom emerges, and arguably is successfully overcome: for Apple controls all the parameters relevant to the overall infrastructure, with third-party developers 'freely' developing applications within the controlled setting. Apple's open-yet-controlled ecosystem can be grasped through the metaphor of a 'walled garden', conveying that there is merit to cultivating 'markets' within a controlled space (controlled by 'the wall'). This wall keeps the 'bad capitalism' out and lets the 'good capitalism' prevail on the inside. The platform capitalist (cf. Langley and Leyshon, 2016) is the 'benevolent dictator' that secures the wall so that the garden can flourish.

Second, at the front-end Apple has lured the customers into the App store – also a walled garden – by what Montgomerie and Roscoe (2013) call an 'own the consumer' strategy: the business model is designed to drive consumers in and then hold them there. Examples of this are Apple content that can only be played on Apple devices or strategies that demands of customers to buy expensive hardware to access relatively inexpensive Apps. This expensive hardware also implies that the customer would experience high switching costs. Finally, legal-technological fine-tuning makes that customers tend not to own the content they have purchased, but acquire the right to lease it on a number of devices, rights that are not transferrable outside the ecosystem. By developing products like the iPod, iPhone and iPad on the front-end of its ecosystem, and closely policing the downloadable content through iTunes and App store, Apple saw itself transformed from the disruptive outsider of yesteryear into the giant incumbent tech firm it is today.

Third, also in tension with Apple's traditional image, is that ecosystem control and the gains from such endeavors are enabled by what Mazzucato (2013) calls 'the entrepreneurial state', using its sway to boost, license and reward 'private sector' innovation. Much of the innovation utilized by Apple can be traced back to developments financed by the US government. It is the state who allowed entrepreneurs to overcome the uncertainty associated with venturing into new areas by taking on the burden of high fixed-cost investments, while the gains have been privatized. Far from starting from a tabula rasa, Apple relied on inventions financed through public funding: the integrated circuit, the graphical interface, and later the internet. Moreover, Silicon Valley engineers were typically trained at public universities in the area. Moreover, Apple has been savvy in designing tax avoidance strategies (Fernandez and Hendrikse, 2015), limiting its own contribution to public funds, which could in fact enable future investments in high-risk, high-gain technologies, instead pumping up Apple's share price and dividend payments to its shareholders (Lazonick et al., 2013). All the while, narratives about the unique innovation climate in Silicon Valley's technology clusters carefully conceal these crucial and structural subsidies.

Countering by copying: The Appleization of finance

For financial institutions navigating a merging field of finance and technology, the innovations and strategies championed by the GAFAs and FinTech startups are to be mimicked, replicated, or reverse engineered, in order to better connect with their customers and counter falling profits, while maintaining their leading positions. Apple's example of how to orchestrate an ecosystem is particularly interesting for financial institutions. Like Apple, financial incumbents want the best of both worlds: a controlled space wherein you can set loose the disruptive countercultural energy of outside developers in the back-end environment of the bank, who then develop applications that improve banking efficiency and customer service. Incumbents want to enjoy the spoils of a decentered innovation ecosystem, whilst maintaining control. And, financial incumbents also marshal state power to enhance or safeguard their activities. Apple's business model, it seems, has begun to influence how financial incumbents see their own business models: the metaphor of the walled garden has consciously entered the minds of financial incumbents (e.g. Dapp, 2015, speaking for Deutsche Bank). In this defensive/counterinsurgency strategy, financial incumbents seek to become benevolent dictators by bringing outsiders into their ecosystems i.e. embracing, capturing and internalizing the rise of FinTech within the (legal) realm of incumbent finance, in order to develop 'walled garden' business models through which they can better connect with customers and developers.

Concretely, we identify three ideal-typical, nested defensive tactics reminiscent of the lock-in strategies pioneered by Apple, through which incumbent finance embraces, captures and internalizes the outside threat posed by potentially disruptive FinTech firms. Specifically, we distinguish Appleization at the level of individual financial firms, collective financial clusters, and jurisdictional financial sector, through which incumbent finance seeks to attract and 'lock in' customers, developers and the state, with the ultimate aim to maintain their privileged positions.

Financial firm Appleization

Why shouldn't banks also transform themselves into digital ecosystems in order to strengthen the ties with their customers by offering a wide range of financial services from a single source? (Dapp, 2015: 5)

Like Apple, incumbent financial institutions are currently streamlining their organizations, cultivating ecosystems with walled garden characteristics for developers and customers. On the back-end, incumbents have set up incubator- and accelerator-like settings, bringing third-party FinTech developers into their organizations. These (start-up) companies develop stand-alone applications to better connect with customers at the front-end, or built solutions to test in- and integrate with the existing infrastructure of the incumbent, with the aim to streamline back-end operations such as compliance, security or data privacy. Reminiscent of Apple, a general aim of bringing in FinTech outsiders is to generate an 'harmonious interplay between implemented hardware and software' used within the bank, and between

bank and customers i.e. to develop 'monetisation strategies (walled gardens)' (Dapp, 2015, p. 1). The key focus in this setting is proofing—proof of concept—with executives from the incumbent sponsoring firm typically closely involved in the process. Financial institutions thus 'open up' their infrastructures to third-party developers, but only after they have been carefully brought in, typically after signing confidentiality agreements and the promise that these outsiders adhere to the codes of conduct of the sponsoring institution—the bank's unique 'operating system'. The ways in with these ecosystems are set up differ considerably, and are continuously subject to change. Incumbent financials operate these types of settings throughout the various financial centers in which they are active, each unique in terms of setup and specialties.

Modern, platform-based online banking

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Figure 2. A possible banking platform (source: Dapp, 2015, p. 20)

Behind the incubators operated by financial firms typically resides a web of dedicated corporate partners, such as accountancy, consultancy and law firms. Likewise, most of these incubators take a slice of equity in- or give seed financing to their selected startups, although not necessarily so. Angel investors and VC firms (operating independently and/or with funding from the incumbent) lubricate linkages within the accelerators or incubators i.e. between financial incumbents and FinTech

disruptors. In so doing, in similar fashion to Apple, developments costs and financial exposure/risk are externalized. According to a leading venture capitalist in the field, 'banks have to transform their spaghetti of systems into a single platform' (Claerhout and Lijense 2015), making it easier for outside developers to plug in their innovations in the existing infrastructure, ultimately leading to a more attractive walled-garden platform for customers to interact with the bank online (and harder for customers to switch to other financial services providers). Banks seek to build digital walled gardens for reasons of customer convenience and security, but even more so '[s]ince the products, services and hardware can be monetarised more easily inside walled gardens than in open corporate structures' (Dapp, 2015, p. 8) (see Figure 2).

Financial cluster Appleization

Besides initiatives undertaken at the firm level, we identify the collective Appleization of finance rooted in particular financial services clusters/centers. The overall aim of collective Appleization for incumbent finance as a whole is to maintain control over developments in the disruptive FinTech industry, by creating shared ecosystems or cartel-like platforms through which potential outside FinTech threats can be analyzed, enclosed and neutralized.

It is not the first time banks have come together to collectively develop new technologies, the emergence of Swift is a case in point (Scott & Zachariadis, 2012). Concerning our own research⁵, we see that specific FinTech incubators controlled by individual banks are located, clustered and nested in a collective ecosystem setup by groups of financial institutions. These joint or networked platforms are typically setup to explore, cultivate and pursue common interests. Some of these platforms rent out office space, offering a neutral ground within which financial firms can setup incubators i.e. individual Appleization strategies, taking advantage of network effects. Crucially, these joint initiatives, in and of themselves, do not function as incubators, but are better seen as collective ecosystems through which incumbent financial firms create spaces within which they maintain contact with one another, with FinTech firms and communities, in environment that is ultimately cultivated and controlled by themselves. 'Lubricating' venture capital firms might also be involved in these joint platforms, creating a larger community.

The ways in which these collective ecosystems are setup differ considerably. For example, there exist both industry-initiated top-down and bottom-up initiatives, yet financial incumbents tend to join the latter as well (Ginsel, 2016), arguably afraid to miss out on the next 'big' FinTech innovation. Moreover, accountants, management consultants and other 'para-financial' players are typically tied into such initiatives. Furthermore, where certain collective ecosystems are characterised by a more strategic nature of aligning industry interests, there equally exist more operational hands-on collective platforms, of which Level39 in the London Docklands – the 'largest technology accelerator for finance, retail, cyber-security and future

⁵ This research takes places in Brussels and intends to map out geographical changes in the organization of advanced business services, including finance, in the metropolitan area.

cities technology companies'⁶ – arguably is the best known. In this case, the collective ecosystem housing FinTech developers is not (directly) owned and controlled by banks, but by a large real estate developer housing the world's leading financial incumbents.

*Owned wholly by the Canary Wharf Group, Level39 launched in March 2013 [...] Located in the heart of Canary Wharf, Level39 is uniquely positioned just minutes away from the decision makers of key financial institutions. The world's leading banks and consultancies tackling billion-dollar problems. Our entrepreneurs are in the heart of the action, developing the technologies to solve these issues.*⁷

Canary Wharf is comprised of large office towers, leased by financial incumbents such as HSBC or JPMorgan. Likewise, the Canary Wharf Group i.e. a real estate business is owned by a variety of incumbent financial players. Similar collective initiatives exist or are being rolled out throughout the world's leading financial centers. Where most collective initiatives were initially setup for strategic reasons, to cultivate relations, articulate common goals, and represent the industry as a whole, some of them are currently evolving into operational hubs like Level39 (Ginsel, 2016). These location-bound clusters are set up to be aspiring nodes in global networks of financial innovative practices (Amin and Thrift, 1992; van Meeteren and Bassens, 2016) that are to be 'captured' by incumbent finance through locking-in innovative startups. This competition of clusters exemplifies the emergence of competing ecosystems that seek to represent an entire sector – all seeking to capitalize upon anticipated network effects – and often incumbents sponsor a multitude of these initiatives. Lastly, clusters also reach out to one other across borders, some of which having signed formal memorandums to enhance cooperation, augmenting their respective reach whilst effectively creating a giant 'network of networks' through which financial incumbents aim to enclose the FinTech threat.

Financial sector Appleization

Lastly, some ecosystem maintenance occurs beyond firm or cluster level, instead taking place at the level of the financial industry as it is represented in a given jurisdiction. For there are financial interests which are best be defended collectively vis-à-vis the state. In most cases this still is the national state, as banking regulation is still very much a national affair, even though Europe-wide rules are shaping up to address the FinTech revolution. Sector-level Appleization, therefore, signifies the cultivation of- and capitalization upon a broad regulatory environment conducive to the financial industry's incumbent-yet-evolving business model. As we recall, besides

⁶ <http://www.level39.co>

⁷ <http://www.level39.co/news/level39/>

locking in its customers and developers, Apple is also very capable to capitalize upon the state. We see a similar development unfolding regarding incumbent finance's embrace of FinTech, for they too are enjoying/seeking maximum public support to advance their embrace of FinTech and maintain their incumbent position, whilst equally seeking to minimize their fiscal duties.

Throughout Europe, financial incumbents are pushing politicians, regulators, central bankers, etc. to make way for FinTech through fiscal policy and regulatory changes, thereby creating a level playing field with the lightly-regulated GAFAs. In practice, this includes calls to allow the set-up of 'regulatory sandboxes'⁸ to create a state-approved 'beta setting' to test one's digital applications. Some regulators prove more willing to create sandboxes than others, playing a key role in 'forging innovation hubs to increase accessibility to start-ups, clarity around the authorization process, and to help inform reform' (Cockerton, 2016, p. 42). At the same time, financial incumbents are pushing state actors to maintain strict financial regulations as barriers of entry to keep the GAFAs disruptors out. Incumbent finance has, through its special status vis-à-vis the state, a gatekeeper position in which they can selectively grant disruptors access to shielded, regulated, financial (sub)markets. Banks are particularly obsessed with maintaining high barriers to obtain banking licenses, which would make it impossible for tech giants to take on deposit-taking and credit functions, and hence challenge the incumbent's role as middle man. In short, financial incumbents want regulators to create the freedoms that tech firms enjoy in areas like data privacy and product testing, whilst at the same time fiercely protecting their monopoly edge by pushing regulators to maintain strict financial regulations.

Like Apple, banks have typically have geographically organized their activities to minimize tax. Where Ireland effectively functions as Apple's global tax shelter (Fernandez and Hendrikse, 2015), financial incumbents are similarly pushing governments to setup tax shelters to attract FinTech startups tied to their ecosystems. For example, the 'Digital Belgium' plan involves a tax shelter for FinTech start-ups, new conditions for crowdfunding, a reduction in labor costs, and fiscal reductions for investors in digital ecosystems.⁹ Likewise, France has created a beneficial fiscal and regulatory environment for FinTech firms, offering grants, tax credits, subsidies, tax shelters, and so forth, whilst having a pro-active financial regulator who has 'responded positively to innovation in financial services with lighter regulation of non-banking entities' (Clot and Pailhon, 2016, p.46). Meanwhile, at the European level (re)regulations sometimes tend to favor disruptors (Brunsden, 2016) as part of building the European Single Market (Milne, 2015). The debate on these levels is also part of wider geo-economic positioning of the European Union (EU) vis-à-vis the inroads of US tech giants, having recently led to an explosive political collision over the fiscal responsibilities of Apple (Barker and Beesley, 2016).

⁸ 'Sandboxing' in computer security terms means that applications are restricted in the access that they get to the wider functionality of the computer system if that is not necessary for the application to function. Apple championed mandatory sandboxing for developers in their app store and its spillover to FinTech experiments is remarkable. For context, see <https://developer.apple.com/library/content/documentation/Security/Conceptual/AppSandboxDesignGuide/AboutAppSandbox/AboutAppSandbox.html>

⁹ See: <http://fintechbelgium.be/2015/06/25/tax-shelter-crowdfunding-for-startups/>

Ultimately, the battle for state support currently entails an intense discursive struggle over which type of institutions are to be trusted with the responsibilities over financial intermediation. In that context many regulators deem it irresponsible to go 'all in' with tech newcomers who typically speak a different 'language' than is common in gentlemanly banking circles. Ironically, it appears European financial incumbents manage to take the higher moral ground even though they were deeply embroiled in irresponsible activities that led to the 2008 NAFC.

Conclusions: FinTech amongst ongoing capitalist enclosures

[C]apitalism is a complex, adaptive system which has reached the limits of its capacity to adapt. (Mason, 2015: xiii)

In his book *Postcapitalism* (2015), Paul Mason criticizes revolutionary thinkers for their failure to anticipate the adaptive capacity of the capitalist system. Nevertheless, the main (and somewhat puzzling) claim of Mason's argument is that the unfolding ICT revolution *is* going to bring about the end of capitalism as we know it. Although we do acknowledge the revolutionary potential posed by ICT, for the time being we draw more cautious conclusions: that is, capitalism, as always operating with the state as its loyal enforcer, will undoubtedly adapt and transform itself as a result of FinTech innovations, but these changes will in all likelihood not bring about the end of (financialized) capitalism for the foreseeable future. Instead, we see a range of adaptive strategies being rolled out to keep the system rolling as intended – the Appleization of finance sketched in this paper is merely one such strategy in this regard.

Reading contemporary ICT-related changes in the financial industry through the analogy with Apple allows us to start projecting the anticipated impact of the FinTech revolution for financial incumbents. Here it is first of all important to recall that Apple in fact started as tech disruptor in Silicon Valley, yet, ironically, has managed to become an incumbent over time. We observe similar chameleonic behavior in finance: at a time when tech giants are entering finance, financial incumbents are embracing the technological-organizational practices of their disruptive challengers. More specifically, financial firms, whether individually, at cluster level or sector-wide, are extending their sway over FinTech development, aiming to enclose developers and customers in their ecosystems, whilst pushing the state to guard their positions. Even though the analogy raises a plethora of empirical questions about the strategies at play when the industrial field of finance and ICT merge, this is what we have come to define as the Appleization of finance.

While Appleization concretely points to how incumbents build walled-garden ecosystems to maintain centrality in their industrial field (Fligstein, 2002), on a more abstract level this unearths quintessential mechanisms of capitalism. Instead of a revolution, FinTech seamlessly fits patterns of long-term capitalist development, for in the *longue durée* disrupter-incumbent alternation is a norm rather than exception (Perez, 2002). The Appleization of finance is an expected outcome of capitalist

(organizational and technological) change, captured by notions of exclusion, enclosure or indeed ‘walled gardening’ i.e. elementary dynamics of capitalism itself (e.g. De Angelis 2001, 2004). The walled garden is hardly Steve Jobs’ creation. On the contrary, Apple has merely come to update a technology that seems as old as humanity itself. For even the word ‘paradise’ (indeed, featuring an apple) is traced back to the old Persian language Avestan – *pairidaēza* – meaning “a wall enclosing a garden or orchard” (Mehra 2011: 889). In our nomenclature, the walled garden is employed as a ‘lock-in’ metaphor, referring to exclusive business models seeking to capture income. In this sense, the rise of modern capitalism is very much a story of ongoing enclosure, of bringing ‘the outside in’ via mechanisms of appropriation and exclusion, driven by territorial expansion and technological innovation. For capitalists, although coming to preach the gospel of free markets, their chief objective has always been to enlarge and protect one’s cultivated patch (Braudel, 1984), or, in the words of Adam Smith, “to widen the market and to narrow the competition” (2003 [1776]: 338).

It is here we stumble upon the contradictions of the FinTech walled garden built by incumbents: on the one hand, it is a closed platform intended to keep out intruders and maintain one’s incumbent patch, yet on the other it is cultivated to bring in the disruptive forces associated with innovation. This strategy brings together and synthesizes opposing tendencies, say the open, creative, decentralized and horizontal settings associated with innovative disruption, versus the closed, controlled, centralized and vertical settings typical of incumbent capital. Strictly closed or open systems or platforms, however, are better viewed as ideal types. After all, even an anarchic technolibertarian fest like *Burning Man*, typically celebrated as the Alfa and Omega of self-organization, actually remains a paradise in the classical sense – a closed-off and controlled space within which these chaotic, creative and spontaneous interactions blossom (see Turner, 2009; Uitermark, 2015). With corporate organization (once again) transformed to enclose and internalize any threats outside itself, with financial incumbents seeking a ‘controlled demolition’ of the old to defend their lucrative positions, and with the capitalist state always lurking in the back as ultimate censor or enforcer of the status quo, one ought to scrutinize promises of technological emancipation. To elaborate the Schumpeterian metaphor: the Appleization of finance is predicated on seeking a ‘controlled demolition’ or ‘creative reconstruction’ of the old at most, in order to maintain their relative positions in the new era.

Although we do not neglect or reject the revolutionary potential of ICT or FinTech, our findings suggest that the latest technological wave, as before, can be enclosed by incumbent capital, by encircling outside threats and internalizing their logics. Despite the promise of postcapitalist collaboration, the reality is that rampant digital enclosure is shaping the Internet itself, with the GAFAs monopolizing their respective fields of business. The implication would be that, instead of heralding the last days for incumbent finance, Appleization may in fact be a strategy to even further reinforce their lucrative position as obligatory passages points, whilst realizing cost reductions at a time when regulations are viewed burdensome. For financial centers this is in turn a strategy to remain a strategic site under this new mode of financial

intermediation (cf. Bassens and van Meeteren, 2015). In this scenario, digitization might be less revolutionary or emancipatory in nature as technolibertarian prophets preach, but will instead raise the walls of financial exclusion. For the foreseeable future, therefore, it looks likely that incumbent finance, countering-yet-embracing the disruptive forces of FinTech, will maintain pole position in the world of finance. The FinTech evolution, not revolution, therefore seems more appropriate.

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