



The Appleization of finance: Charting incumbent finance's embrace of FinTech

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Abstract

The rise of financial technology (FinTech) engenders novel business models through integrating financial services and information and communication technologies (ICT). Digital currencies and payments, data mining, and other FinTech applications threaten to radically overhaul the financial sector. This article argues that, while we are becoming aware of how technology giants such as Apple Inc. are making inroads into financial services, we need to become more sensitive to how financial incumbents mimic ICT firms while aiming to neutralize the FinTech challenge. Practices from Silicon Valley are spilling over into 'traditional' finance through a process we dub *Appleization*. We illustrate how incumbents aim to remain indispensable amidst rapid digitization. Mimicking tech strategies, financial incumbents resort to transforming legacy ICT systems into integrated platforms, cultivating entrepreneurial ecosystems where startups are 'free' to compete whilst effectively being locked into the incumbent's orbit. We illustrate this by comparing Apple's business features (locking-in developers, customers and state into a hybrid business model based on a synergy between hardware, software and data-driven platform components) with emerging practices in the financial industry. Our analogy suggests that the Appleization of finance might radically transform, yet not undercut the oligopolistic position of financial incumbents.

Keywords

FinTech, financial innovation, platform capitalism, entrepreneurial ecosystem

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.

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Introduction: A FinTech revolution?

At a time when low interest rates are putting conventional banking under stress, the financial sector is also confronted with the disruptive challenges posed by Financial Technology (FinTech), which has been gaining momentum since the North Atlantic financial crisis of 2008. FinTech denotes the digital transformation of financial services, a process unfolding via the diffusion of Information and Communication Technology (ICT) applications in the field of finance, ranging from alternative funding platforms (crowdfunding), distributed ledger technologies (blockchain), high-frequency trading, robo-advice, data mining in finance and insurance (InsurTech), RegTech, CyberTech, to online payment systems. Typically, a FinTech application digitizes a specific financial sector function, such as money creation, payment (security), credit generation, risk management, or asset management. FinTech investments have risen sharply since the 2008 crisis, with Venture Capital (VC) funding alone accounting for \$25 billion in 2015 (World FinTech Report, 2017: 25). Savvy to exploit FinTech's potential, both the tech giants (known as the 'GAFAs', that is Google, Apple, Facebook, and Amazon) and a mushrooming FinTech startup scene are determined to transform the financial world. Meanwhile, FinTech is hyped by the world's leading consultancies eager to guide their clients through the announced 'revolution' (The Economist, 2015) or 'paradigm-shift' (World Economic Forum, 2015). These developments have also garnered the attention of actors such as the International Monetary Fund (IMF), which for instance has set up a high-level advisory group to debate the regulatory implications of blockchain (IMF, 2017).

The epigraph from the World Economic Forum suggests that FinTech is more than just the latest technology-driven fad in finance. The inroads of tech firms large and small has raised concerns about the viability of banks' technologically arcane business models. A quick Google search reveals that policy discussions on high-level fora – including central banks and other regulators (e.g. Carney, 2017; EBA, 2017; ECB, 2017) – are centered on the power play between 'disruptors' and 'incumbents', such as big banks, insurers, and asset managers. Disruptors include the GAFAs, but also a growing community of startups, hackers, entrepreneurs, programmers, and VC firms. The GAFAs are particularly eyed with reverence, for their grasp and ownership of digital platform infrastructures is deemed unparalleled, as much as their pecuniary war chests are unrivalled. The GAFAs' digital payment systems (e.g. Apple Pay, Google Wallet) risk disrupting established channels in which banks are the middlemen. Moreover, the GAFAs are increasingly teaming up, for instance in lobby groups such as Financial Innovation Now, to convince regulators to cut the 'red tape' hindering their inroads into the financial sector. The GAFAs are also collaborating in areas like data mining, creating the world's leading artificial intelligence (AI) partnership (Mannes, 2016). As the GAFAs offer their services online (a domain less supervised than traditional banking and finance), level playing field issues emerge, as new entrants are neither bothered by strict data privacy rules like incumbent banks are, nor by the costs of retail networks. At a time when incumbent finance faces a profit-squeeze due to low interest rates and stricter capital requirements, incumbents with their dated ICT infrastructures increasingly feel the competitive pressure from tech firms with leaner, more profitable, business models centered on digital technology.

Hypothetically, incumbent finance could be disrupted in two ways. A first scenario projects the GAFAs having diversified into finance replacing the incumbents, again resulting in a market dominated by a few players. In the second scenario, technologies such as blockchain, which help to process and store information in a decentralized way, cut out middlemen altogether, instead producing an open market for (nearly) free, emancipatory, and more inclusive financial futures. This latter scenario, in which FinTech startups act as drivers of economic change,

washing away the incumbents, chimes with Silicon Valley-style technolibertarian ideology and provides FinTech with a countercultural image in some activist quarters (Golumbia, 2016). Crucially, as both scenarios have little appeal to financial incumbents, the unfolding FinTech 'revolution' places them at a crossroads: do they shield their markets from the inroads of FinTech firms, or do they seek to collaborate with FinTech startups in order to protect their turf vis-à-vis the GAFAs? Distributed ledger technologies, for instance, could indeed offer powerful tools to execute, monitor and secure payment and credit transactions and increase the quality of incumbent finance's offering. Furthermore, financial services generate troves of data, which may be mined and exploited after adjustment of the regulatory environment. And lastly, continuing a path that started in the 1970s, incumbents could intensify their embrace of ICT to cut costs, raise efficiency, and boost return on equity with 2-3 percent (Financial Times, 2016).

Based on a reading of the swelling number of industry publications, consultancy reports, regulatory perspectives and media coverage around FinTech, combined with primary insights derived from our Brussels-based FinTech research, developments in the 'traditional' financial industry suggest that financial incumbents are actively bringing the innovative energy of FinTech startups into their organizations, in order to internalize and ultimately neutralize the threat of disruption. Financial incumbents and tech firms small and large are part of two different organizational fields (Fligstein, 2002; Van Meeteren and Bassens, 2018) – denoted Fin and Tech – which are gradually merging, with processes of organizational mimicry (DiMaggio and Powell, 1983) increasingly prevalent. The rapid digitization of economy and society is spurring the adoption of organizational models and practices based on 'open' and 'networked' conceptions of the firm (Taylor and Oinas, 2006) in the image of the GAFAs, who are spearheading the rise of data-driven 'platform capitalism' (Langley and Leyshon, 2017; Srnicek, 2017). Such models and practices, we argue, are diffusing from tech firms to incumbent finance. This results in financial firms adopting the conceptions of control, which include the cognitive frame and entrepreneurial culture through which firms compete and collaborate within an organizational field (Fligstein, 2002: 18), that we normally associate with the ICT sector. Therefore, 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), and the GAFAs' embrace of financial services (e.g. Chappuis Halder, 2016), it seems pertinent to be sensitive to processes working in the other direction – that is, a 'GAFA approach' to financial services (e.g. Accenture, 2016).

Our *Appleization of finance* thesis proposes that banks are adopting conceptions of control typical for digital/online giants, such as the GAFAs. While parallels with Google, Amazon, and Facebook could be made when tracing the adoption of a set of organizational models and business practices from the tech world, we argue that processes of mimicry become most tangible when drawing the analogy with Apple's idiosyncratic trajectory of becoming and remaining an incumbent in the tech field. Apple has historically distinguished itself from its tech rivals by locking-in a set of key stakeholders whilst creating competitive advantage by combining legacy systems with new technologies and strategies. In doing so, it has been able to survive and thrive upon the waves of technological change. Even though Apple's death has been announced a number of times already, particularly in the 1990s (Linzmayr, 2004), the company eventually grew into the most profitable in the world. Apple did so largely by holding on to business practices that most competitors regarded as old-fashioned, such as coupling hard- and software (Van Meeteren, 2008), but which turned out to be crucial in future rounds of innovation when integrated systems required superior performance. The *Appleization of finance* thus entails seeking combinations of old and new business models, rather than solely focusing on a cannibalizing the old.

We develop this argument first by placing the rise of FinTech within the merging fields of finance and technology. In this realignment and power struggle between Fin and Tech, incumbent finance seeks to roll-out digital ‘open’ platforms that combine ownership of hardware, software and data, typical of a wider trend of ‘platform capitalism’ (Srnicsek, 2017). Accordingly, we highlight key characteristics of Apple’s evolutionary and hybrid business model – with an emphasis on the incorporation of platform elements into an historically-grown and lean-yet-controlled corporate ecology, which is defined by an unrivalled symphony between hard- and software, ‘locking in’ customers, developers and the state – to illuminate the current embrace of FinTech by incumbent finance. By drawing on evidence from a wide array of financial services firms, consultancy reports, regulatory insights and media coverage around FinTech, we subsequently illustrate how the Appleization of finance entails similar lock-in practices into banks’ evolving business models. This occurs through integrating legacy hard- and software systems into novel digital platforms, from which ‘disruptive’ FinTech developers can subsequently harvest data, and upon which they can build all kinds of new applications. The analogy allows us to detect incumbent strategies to defend their position as obligatory passage points (Bassens and van Meeteren, 2015). We conclude by reflecting how these observations feed back into theorizing the rise of platform finance.¹

FinTech and the merging of organizational fields

What happens to the field of finance as it becomes susceptible to digitization? What kind of intermediaries gain prominence? Who are the new entrants? How are incumbent institutions responding? And which new forms of collaboration and competition emerge? In order to broach these questions, we propose to conceptualize the power relations, practices and embryonic market structures at the interface of Fin and Tech through the economic-sociological notion of an *organizational field*. According to Fligstein (2002: 15), organizational fields are cultivated social spaces that “contain collective actors who try to produce a system of domination in that space”, necessitating “the production of a local culture that defines local social relations between actors”. This notion envisages a nuanced structure-agency duality: fields are imbued with cultures, which structure actor relations and positions within them, but the approach stresses the importance of individual skills and institutional entrepreneurship in enacting change (Fligstein, 2001). Fligstein (2002: 16) subsequently applies this theory of organizational fields to markets, which illuminates how markets are stabilized by economic actors beyond the price mechanism. This stabilization comes in the form of a shared ‘conception of control’ between participants. A conception of control is a cognitive frame by which market participants interpret the actions of other organizations. “Markets produce local cultures that define who is an incumbent and who is a challenger and why [...] and also prescribe how competition will work in a given market” (Fligstein, 2002: 18).

Fligstein’s market-as-field perspective counterposes incumbents with challengers, with the former being able to mimic the latter to reproduce their own power during periods of uncertainty. It is evident that the growing inroads of tech firms, propelled by the stellar rise of digital technologies, into the hitherto relatively closed field of financial services generates new forms of uncertainty. So how can we expect incumbents to respond? One prominent strategy is copying the business models of disruptors – that is, adapting to the disruptors’ conception of control. As we will illustrate below, the merging field(s) of finance and tech are marked by organizational mimicry, resulting in a form of institutional isomorphism whereby incumbent Fin increasingly mimicks disruptive Tech. As DiMaggio and Powell (1983: 151) note: “When

organizational technologies are poorly understood, when goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations". This is the process we observe in finance amidst digital transformation: as the fields of finance and technology evolve in a collated FinTech field, financial incumbents seek to maintain their positions by copying the key organizational technologies of their challengers.

Finance's embrace of FinTech in a search for technological rents – or 'superprofits' (Mandel, 1975/1972) – is in itself nothing new. FinTech's rise can be read as a culmination of the use of ICTs in finance since the 'the fifth technological revolution' that started in the 1970s (Castells, 2000/1996; Perez, 2002).² Initially, ICT allowed cost cutting and productivity gains through *hardware* developments, while developments in the 1990s laid emphasis on *software* interoperability (Buzzachi et al., 1995). However, it is only since the crisis of 2008 that financial institutions have sought to build integrated platforms, allowing for the generation, collection and analysis of- and capitalization upon *data*. Novel organizational models centered around 'open' digital platforms that are relatively alien to the traditionally closed world of finance are hereby introduced, allowing incumbents to streamline their (networked) infrastructures in order to gain or defend market share. Recent thinking on platform capitalism (Srnicsek, 2017) proposes that a (new) mode of accumulation, centered on platform-based business models geared toward data extraction and valorization, is emerging. Mackenzie (2017: 2) summarizes several definitions of platforms as "digital infrastructures or environments that have a zero marginal cost of access". He subsequently argues that platforms need to be made through the 'platformizing' of practices. In other words, businesses have to be reshaped according to the logic of the platform, and existing practices have to be reconfigured into these new infrastructures. Platform-operating companies like Google, Facebook, Uber and Airbnb essentially offer digital infrastructures that mediate between different groups of users and in return harvest data from those interactions (Gillespie, 2010; Srnicsek, 2017: 44). These companies capitalize upon data generated on their exclusive platforms, resulting in monopoly rents as the platform becomes an indispensable intermediary in economic activity (Langley and Leyshon, 2017). The indispensability of these data-driven companies results from network effects, as the utility, marketability or value of their platforms expands with each additional contributor or user (Katz and Shapiro, 1994; Rigi, 2013). The result in the field of finance is 'platform finance', most directly emblemized by the emergence of new intermediaries such as crowdfunding platforms or peer-to-peer lending networks which sometimes generate new business activity, but just as easily cannibalize markets dominated by incumbent finance (see Langley and Leyshon, 2017). Yet, whilst generating concern with incumbent financial institutions, the power of integrated platform strategies also explains why FinTech might be interpreted as an incentive for financial incumbents to start mining and commodifying customer data, which have long remained well protected under privacy and data-protection laws.

Besides the embrace of platform strategies and technologies, organizational mimicry is also evident in the way financial incumbents are drawn into 'open innovation systems'. The concept of 'open innovation' was pioneered in the tech sector to circumvent the cognitive limits of closed and secretive research and development labs (Dahlander and Gann, 2010). A whole set of organizational practices was devised in the ICT and BioTech sectors to outsource and collectivize risks to startups while retaining the capacity to collect superprofits if innovations were successful. For instance, the notion of VC's nurturing startups in 'incubators' to optimize innovation through interfirm learning and 'accelerators' to take those firms quickly to market to realize superprofits emerged in this sector (Cooke, 2001: 271). Recently, these practices have been described as 'entrepreneurial ecosystems' (Isenberg, 2010; Stam and

Spigel, 2018), whereby innovation is conducted by startups, whose risktaking might eventually be rewarded through a takeover firm or an initial public offering (IPO). This allows for a division of labor where inventions are done through high-risk, high-yield startups, while incumbents take care of the valorization (Birch, 2017; Cooke, 2001; Corea, 2015). However, in the long run, the roles are sometimes reversed. Some innovative small firms that initially specialized in niches – such as Microsoft, in the case of operating systems – became giant corporations of their own, controlling large parts of the activity within their respective entrepreneurial ecosystems.

From the perspective of incumbent finance, the prospect of being a horse-and-cart business in an era of the automobile is not particularly attractive, and the platform model appears to be a useful tool to help resolve the contradictions between innovation and the search for stability. As incumbent financial firms, having to cope with their archaic ICT infrastructures, lack the knowledge to compete with the GAFAs, innovation needs to be insourced, yet preferably in a controlled way. Studying entrepreneurial ecosystems hence draws attention to how new forms of collaboration emerge amongst incumbents and startups to benefit from tech innovations, while neutralizing potential disruptors and stabilizing the FinTech field in favor of the incumbents. Mimicry involves copying the tech field's conception of control, wherein 'open' innovation systems utilizing incubators and accelerators are the dominant form. Summarizing, the notion 'platform' refers to the infrastructural backbone – that is, an integrated hard- and software infrastructure geared toward data generation and extraction – that enables platform finance. The notion (entrepreneurial) 'ecosystem', in turn, refers to a set of actors – entrepreneurs, developers, customers, governments, etcetera – that are (in)directly involved in the valorization of the platform.

Following our hypothesis, visions of the disruptive annihilation of incumbent finance might be premature. Instead, integrated platforms operated by financial incumbents themselves can become the infrastructural backbones of a digitized financial system upon which novel applications can be built and thrive, not least through interacting via Application Programming Interfaces (APIs) provided by the platform.³ If FinTech startups can be seduced into improving and utilizing incumbent ICT infrastructures, transforming those into integrated digital platforms instead of creating new ones, incumbent finance might survive the FinTech revolution, or even come out as the dominant player in a transformed field. Thus the present challenge for incumbents is to cultivate a thriving ecosystem of FinTech startups around their ICT legacy systems-cum-integrated platforms, which are willing to contribute their disruptive energy to the digital transformation of the incumbent organization, rather than the task of overthrowing them. FinTech startups, instead of pioneering their own little patch of capitalist space, must be seduced into working upon and within the established systems of the existing financial sector, a process reminiscent of how Apple has navigated the same challenge.

Apple's conception of control

In this section, we provide a short history of Apple Inc., highlighting those characteristics and features of Apple's conception of control that, we argue, are increasingly being mimicked in the organizational field of finance. We stylize Apple's specific conception of control within the tech field by foregrounding two interconnected developments. First, we discuss how Apple has gradually integrated platform elements in its business model. This follows an older notion about how competition between hardware systems (Apple vs. IBM) and operating/software systems (Mac vs. Windows) defined platformization before data valorization became the

driving force behind platform capitalism (see Gillespie, 2010). Second, we discuss the ways in which Apple has cultivated an ecosystem orbiting around the company's platform, 'locking in' a wider set of stakeholders (customers, developers and the state) into its corporate orbit.

Integrating a platform

Some forty years ago, during the pioneering years of the nascent ICT sector, Apple started its rise to global prominence from a garage box in California. What made Apple originally stand out among tech firms was its democratic appeal, by making computer hardware and software programming accessible (Linzmayr, 2004). Apple branded itself as a countercultural force, merging Californian hippie culture with Silicon Valley's techno-libertarian entrepreneurial spirit (Saxenian, 1994), aiming to disrupt IBM's hardware dominance by casting it as a Big Brother that needed overthrowing. Crucially, however, programming on Apple's early devices required specialized skills, limiting mass consumption to a dedicated subculture. From Apple's Macintosh (1984) onward, empowering users by making interactions simpler and more intuitive was prioritized. After leaving Apple in 1985, Apple founder Steve Jobs started NeXT Computer where the Mac's design philosophies were also applied in the programming environment (Van Meeteren, 2008; Hsu, 2015). This was Jobs' version of techno-libertarianism: freedom under controlled circumstance, offering a simple set of tools enabling creativity without deep knowledge of the underlying infrastructure. When Jobs returned to Apple in the late 1990s, this philosophy was rolled-out through Apple's product portfolio, with OS X (for computers) and later iOS (for mobile devices).

What traditionally differentiates Apple from its competitors is the company's sway over, and unrivalled symphony between, hard- and software components, realized through exercising a specific conception of control over its platform. Although Apple outsources production and assembly to third parties worldwide to focus on its core competencies (R&D, marketing and sales) like any other global corporation (Froud et al., 2012), Apple also offers a peculiar reflection of the postwar conglomerate firm:

Apple, as we say, is vertically integrated. It controls all the major critical parts of the chain used to make and sell products. Apple builds great hardware, owns the core software experience, optimizes its software for that hardware, equips it with web services ... and controls the selling experience. (Bajarin, 2011: n.p.)

The resultant high level of control over the hard- and software package (see Eisenmann et al., 2008) allowed Apple to integrate data-driven 'platform elements' into its pre-existing product offering.⁴ In this regard, the launch in 2007 of what essentially is a mobile computer (Greenfield, 2017), the iPhone, proved revolutionary. Besides offering a handheld harmonious hard- and software interplay operated by a touchscreen, "[t]he iPhone Software Roadmap included a set of entirely new boundary resources including SDK [software development kit], APIs, and a distribution channel [the App Store]" (Ghazawneh and Henfridsson, 2012: 182). Where the OS X operating system had augmented Apple's success as a software-based platform, enabling third parties to write applications with relatively simple and affordable SDKs (Van Meeteren, 2008), iOS (introduced in 2008) took Apple's platformization a step further. "We are excited about creating a vibrant third-party developer community around the iPhone and enabling hundreds of new applications for our users", said Jobs when the iPhone SDK was released (quoted in Ghazawneh and Henfridsson, 2012: 182). With the introduction of the App Store, the exclusive market place for software applications, or apps, modelled after the iTunes music store for the iPod, "our developers are going to be able to reach every iPhone user".

Cultivating an ecosystem

As Srnicek (2017: 47) argues, fixed architectures like iOS with their accompanying SDKs are “generative, enabling others to build upon them”. Consequently, this fixed architecture allows Apple to rely extensively on external developers, thereby capitalizing on the disruptive energy of third-party startups working on its platform, reaping network effects and externalizing risk-taking whilst maintaining control. To stimulate the growth of a wider developer ecosystem, Apple’s operating systems, SDKs, and APIs have been subject to ongoing change, creating ever more opportunities to build innovative applications, luring in ever more developers. For example, the iPhone 3GS offered a “radically updated SDK including a multitude of APIs [...] stimulating the increasing diversity of its third-party developers” (Ghazawneh and Henfridsson, 2012: 183). Likewise, the introduction of iOS10 allowed third-party developers more programming leeway than ever before. In other words, Apple’s operating systems and software toolkits that define the level of access to the platform are highly dynamic, and with iOS 10, “Apple is going all in on third-party extensions, and many core parts of the operating system are now expandable” (Dillet, 2016: n.p.). Yet despite ‘opening up’ its operating system, platform control firmly remains with Apple, as all publicly available applications must be approved.

Whereas Apple’s policing of its platform and wider ecosystem ran against its erstwhile rebellious image, to developers this transformation has been acceptable because it resolved a tragedy of the commons, maintaining a coherent platform that optimized user experience. Despite some serious criticism – ‘Who is Big Brother now?’ – eventually most developers found Apple’s behavior legitimate as long as it performed the role of ‘benevolent dictator’ (Van Meeteren, 2008; Hsu, 2015). It is here that a paradox of freedom and control emerges: Apple controls all parameters relevant to the platform, with third-party developers ‘freely’ developing applications within that controlled setting. The notion of a ‘walled garden’ is useful to grasp this aspect of Apple’s cultivation of a developer ecosystem. The walled garden effectively is a barrier or checkpoint through which Apple exclusively decides the extent to which developers can access the operating system, as well as which developers can market their apps via Apple’s platform. Inside this shielded garden, ‘good’ markets are ‘cultivated’ that are deemed beneficial to consumers and the platform. In the case of Apple, the walled garden is policed by determining the specific levels of access by developers into the platform via SDK and API toolboxes, and Apple’s policing of the App Store. The garden intends to block ‘bad capitalism’ at the gate whilst letting ‘good capitalism’ flourish on the inside.

Taken together, Apple’s historically-grown conception of control is one that ‘locks in’ developers and customers, while being supported in a more infrastructural sense by the state. Concerning developers, Apple controls which applications run on the platform. This allows Apple not only to capitalize upon innovative outside developers, “to milk the masses for inspiration” (Bergvall-Kareborn and Howcroft, 2013; 282), but also externalize development costs and risks of failure, and censor the market via the App Store, the obligatory passage point for developers that wish to mass-market their applications. This uneven relationship places developers in a precarious position, whilst Apple controls the platform, taking a 30% cut of the revenues, which added up to revenues of \$20 billion and profits of \$6 billion in 2015 (Keizer, 2016).

Second, Apple lures its customers into the App Store 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. Network effects assure that the more Apple is able to convince developers to build applications on the ‘back-end’ of the platform, the more

attractive the platform becomes to customers interacting at the ‘front-end’, due to a growing variety of applications. The lock-in is reinforced by the fact that Apple content can only be played on Apple hardware devices, requiring customers to buy expensive hardware to access relatively inexpensive Apps. This expensive hardware also implies that iPhone users experience high switching costs. Furthermore, legal-technological fine-tuning assures that customers do not 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 platform. By developing products like the iPod, iPhone and iPad, and by policing the downloadable content through the exclusive App Store, Apple has been able to lock-in a large customer base, transforming itself into a true tech incumbent.

Lastly, also in tension with Apple’s traditional image, platform control and its spoils are enabled by what Mazzucato (2013) has termed ‘the entrepreneurial state’, using its sway to boost, license and reward ‘private sector’ innovation. Much of the hard- and software innovation utilized by Apple can be traced back to developments financed by the US government. It is the state that allowed entrepreneurs to overcome 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 beginning with a tabula rasa, Apple relied on publicly funded inventions, including the integrated circuit, the graphical interface, and the Internet. Moreover, Silicon Valley engineers were typically trained at public universities. In addition, Apple has been savvy in designing tax avoidance strategies (Fernandez and Hendrikse, 2015), limiting its own contribution to public funds, which could enable future investments in technologies, and instead pumping up Apple’s share price and dividend payments to its shareholders (Lazonick et al., 2013). The ways in which Apple has managed to platformize its hard- and software infrastructure – turning ever more into a data-generating platform, thriving upon external inputs reaped from a carefully cultivated and controlled ecosystem – is useful guide to understanding changes currently unfolding in the organizational field of finance, as the following section will illustrate.

Countering by copying: The Appleization of finance

The trend for fintech upstarts to collaborate with the big banks they once sought to challenge is now so well established that the boundaries of their business models are no longer clear. (Lee, 2017: n.p.)

As FinTech innovations such as blockchain, digital payments and automated portfolio management are to remain part of the financial landscape, a key strategy for financial incumbents is to reverse engineer and mimic the strategies and technologies of their tech competitors. We argue that the previously outlined features of Apple’s platformization and conception of control resonates with the emerging practices and strategies of financial incumbents, and that our analogy provides a framework to understand the strategic moves of incumbent finance.

Like Apple, many financial incumbents effectively operate hybrid business models. In the second half of the twentieth century, the most profitable business for financial incumbents has differed per conjuncture. Whereas in the 1960s and 1970s retail banking was regarded as the basis of a sound financial institution, from the 1980s into the 2000s diversification into insurance, merchant, investment and private banking, amidst offshoring and outsourcing back-office functions, was viewed as the way to go (Van Meeteren and Bassens, 2018). This resulted in globally operating conglomerate or ‘universal’ banks, combining diverse products

and services with varying costs structures, risks, and rewards, whereby cross-selling and financing between market segments are important to maintain profitability. FinTech firms nibble at these portfolios in uneven ways, ideally competing on high-reward/low-cost submarkets, destabilizing the balance in incumbent portfolios. This provides a clear rationale why incumbent finance needs to collaborate with FinTech firms. Like Apple, this collaboration involves a strategy where old and new business practices are combined. Specifically, by bringing integrated digital platforms into their organizations, incumbents want the best of both worlds: an open-yet-controlled environment wherein you let loose the disruptive energy of outside developers. This requires updating and integrating ICT legacy systems, optimizing synergies between hard- and software at the back-end, culminating in an integrated digital platform from/upon which a wider ecosystem of developers can harvest data and build, plug-in, and play ever more FinTech applications to improve customer service at the front-end.

Instead of simply cannibalizing the old, this strategy of transforming legacy systems and recombining them with platform elements in a quest to lock-in customers, developers, and the state is what we call 'the Appleization of finance'. In what follows, we identify three interrelated instances of Appleization. First, we identify processes of platformization, where incumbents are collating their systems and businesses to supply new services to clients based on the interoperability of these services on their platform, a strategy ultimately aimed at locking-in customers. Second, we show how incumbent finance cultivates a wider ecosystem to draw in the necessary disruptive innovations and innovators to build, run and expand their platforms, a strategy primarily aimed at locking-in developers. This form of Appleization takes place at the level of individual firms, but also in incumbent collectives and regional clusters. In both cases, conceptions of control historically associated with tech firms are becoming commonplace in finance. Finally, Appleization at the level of the organizational field refers to wider individual and collective incumbent strategies to internalize and neutralize the outside threat of FinTech, particularly the GAFAs, thereby seeking ways to lock-in the state. Appleization here ranges from local efforts unfolding in specific financial clusters, to jurisdictional initiatives employed by financial actors/sectors at national or European scales, up to global initiatives.

Platformizing finance, cultivating ecosystems

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? Established financial institutions are transforming themselves into a digital platform-based banking ecosystem. (Dapp, 2015: 5)

Ever since the beginning of the ICT revolution, financial incumbents have adopted a range of hard- and software systems. Programmed hardware systems initially stood alone, then gradually became interoperable within the firm, powered by software developments. Under the logics of platform capitalism, these legacy systems, having accumulated troves of data, are today being transformed into integrated digital platforms, which accordingly can be 'opened up' to outside developers to 'plug and play' their applications. As noted in a study on the digitization of finance by PricewaterhouseCoopers, incumbents are increasingly becoming 'self-disruptors', as the majority of financial-sector respondents put disruption at the heart of their strategy (PwC 2017a: 6). In particular, large banks are devoting big amounts of capital to tech innovation, with JP Morgan spending \$9.5 billion, or 16 percent of its 2017 budget: "[t]he company has more than 40,000 technologists, and roughly 18,000 of them are developers creating intellectual property" (Macheel, 2017: n.p.). Incumbents across the globe have set up

FinTech incubators and accelerators, more or less ‘open’ labs bringing outside developers into their organizations. Under the guise of the incumbents, these start- and scale-ups either develop stand-alone applications to better connect with customers at the front-end, or build solutions to streamline the existing hard- and software infrastructure at the back-end, which typically represents “a curious mixture of the old and rickety and the sleek and modern” (The Economist, 2017: n.p.).

As a Deutsche Bank report argues, a general aim is to generate a “harmonious interplay between implemented hardware and software” within the bank, and between the bank and its customers by developing novel “monetization strategies” (Dapp, 2015: 1). Reminiscent of Apple’s App Store, which is accessible through Apple’s hardware devices, banks aim to build integrated digital platforms to lock-in customers. This is done by offering customers new services, optimized through customer data, and by expanding their fee-based business. The Deutsche Bank example captures a wider trend in (retail) banking, where issues of cost reduction through automation and digitization are appealing, as well as the use of FinTech to avoid disintermediation and even open up new digital markets. To realize the harmonization of hardware and software, “financial institutions are concentrating on updating their legacy systems with a strong focus on data analytics and mobile technology” (PwC, 2017a: 9) – i.e., the key drivers of platform capitalism. Building proofs-of-concept is a key focus, and executives from the sponsoring incumbent are typically closely involved in the process. Take JP Morgan’s ‘in-residence’ incubator/accelerator program, where startups ‘co-create’ solutions with incumbent employees and executives:

True innovation in wholesale banking and capital markets requires deep access, open collaboration, and iterative proofing. Combining innovators who are exploring the edges of what is possible with the unique resources of a global bank can accomplish this innovation. This is what In-Residence does. (JP Morgan, 2018: n.p.)

Hence incumbents ‘open up’ their organization to outsiders, but only after having been carefully brought in, with startups typically having to sign confidentiality agreements to adhere to the codes of conduct or ‘operating system’ of the sponsoring incumbent. Crucially, however, the aim of bringing in disruptive outsiders is to update the incumbent’s cultural and organizational setup. As the head of innovation and FinTech at BNP Paribas argues: “Intrapreneurship, the act of behaving like an entrepreneur while working within a large organisation, is a golden nugget for every large financial institution” (Nunes, quoted in Swift, 2017). Resultantly, change is being realized by bringing the innovative energy of FinTech startups into incumbent organizations (PwC, 2017b).

The exact process varies from firm to firm, reflective of respective legacy cultures and ICT systems, resulting in tailor-made FinTech accelerators and incubators. Moreover, financial incumbents operate multiple ‘in house’ accelerators and incubators throughout the various financial centers in which they are active, each unique in setup and specialties. For instance, the ING incubators in Amsterdam and Brussels are respectively specialized in business-to-customer (B2C) and business-to-business (B2B) solutions. Such incubators are often backed by a web of dedicated business services intermediaries including accountancy, consultancy, and law firms. Typically incumbent incubators take a slice of equity in or give seed financing to their startups. Angel investors and VCs (operating independently, yet often with incumbent funding) lubricate linkages within the accelerators or incubators, i.e. between financial incumbents and disruptors. In so doing, in similar fashion to Apple, developments costs and financial exposure/risk are externalized.

FinTech firms typically plug into incumbent systems via dedicated APIs, enabling a controlled interaction between the two systems. In contrast to Apple, the hard- and software legacy systems operated by financial incumbents are of different ages, brands, capacities, programming languages, and so forth. Crucially, however, the aim is to turn this “spaghetti of systems” into one platform (Claerhout and Lijense, 2015: n.p.), as if commanded by a single operating system. Typically, this is done by creating an integrated middle layer, bringing together back-end systems via a set of internal APIs onto a single platform, which subsequently can be accessed by third parties via a set of external APIs (Ingels and De Waele, 2017). The more a bank has upgraded its legacy systems for data harvesting, the easier it becomes for third-party developers to plug into the bank’s platform via a simple SDK-like toolbox (comprised of external APIs) and build applications, making the platform more attractive for customers on the digital front-end, and less attractive for customers to switch to other financial services providers.

In opening up their digital infrastructures, financial incumbents need to decide on the extent to which outside developers can get into the incumbents’ core digital platforms, where issues like cybersecurity and profitability are major issues. Put differently, incumbents need to think about the ways in which they will lock-in a larger ecosystem of developers and customers around their integrated platforms. Similar to Apple, degrees of ‘closed- and openness’ of the incumbent’s platform are variable and dynamic. For example, Barclays offers “two broad classifications” for the API gateways to its platform: “open versus restricted”, denoting “the nature of the API function”, as well as “self-registration and invitation required”. These levels of access allow Barclays “to carefully control access to APIs and their different aspects, which is prudent given the nature of the work we do here as a regulated financial institution”.⁵ Nevertheless, managing levels of access resembles a walled garden-like mechanism, allowing trusted entrepreneurial ventures to experiment with new innovative ways to do finance.

PricewaterhouseCoopers (2017b) recently identified a set of strategies which incumbent banks might pursue, ranging from ‘closed’ to ‘open’ strategies when it comes to the degree in which FinTech outsiders are allowed on their platforms. Besides reasons of efficiency, customer service, and data security, banks also need to think carefully about the ways in which they can (in)directly capitalize upon their Appleization strategies. A Deutsche Bank research team, for example, argues that capitalizing upon digital transformations is easier realized in closed rather than ‘open corporate structures’ (Dapp, 2015: 8). Yet other incumbents view open structures as the way to go, allowing the mushrooming of a wider ecosystem of third parties to develop applications on their platforms, in the expectation that this will improve customer service, hence locking in the customer:

BBVA is kickstarting the launch of its open banking program by making eight of its APIs commercially available ... The launch of BBVA API Market comes after the Spanish bank spent more than a year working with developers and businesses to optimize the way the Open API service would be delivered. In opening up with APIs like this, BBVA has become one of the first major banks in the world to deliver open banking – a move which is intended to lead to significantly increased products and services for customers and clients. (Semple and Fernandez, 2017: n.p.)

At present, most banks are still at a beta or sandboxing stage, testing the extent to which, ways by which, and to whom, they will ‘open up’ their platforms. Yet however closed or open the respective strategies of the incumbents will eventually become, the general aim is, like Apple, to maintain optimal control over the process. This being the case, financial incumbents are also collaborating to maintain control of the FinTech ‘revolution’.

Appleizing the organizational field

In London, Berlin and San Francisco, many FinTech innovators are betting against the big banks. Singapore, typically, is trying to play both sides of that bet. It wants a thriving FinTech industry that supports, rather than undermines, incumbent big banks ... The idea is to combine the cost-effective nimbleness of FinTech with the trust, solidity and customer base of mainstream banks. (The Economist, 2017: n.p.)

To navigate the rapidly changing organizational field of finance, financial incumbents not only compete with one another, they also collaborate to deter the threat posed by FinTech. Incumbent finance collectively tries to recompose the rules of the game and conditions for being an 'insider' in the organizational field. The result is that incumbent finance's way of engaging with FinTech opportunities is legitimate, while actors that flaunt these collectively defined rules of the game are held at bay (Fligstein, 2002: 18). Resultantly, a walled garden of sorts is also erected at a sectoral level, something which historically defines finance due to its reliance on state regulators, as well as the role of central banks in defining exclusive membership. Here too, we observe that incumbents seek to collectively 'enclose' or lock-in FinTech firms and developments by bringing them into their orbits. Incumbent finance is collectively searching for new digital standards – a set of shared codes, innovations and tools to optimize network effects. It is not the first time banks have come together to collectively develop new technologies; the emergence of Swift as an interbank joint venture is a case in point (Scott and Zachariadis, 2012). Concerning our research, we observe that certain FinTech incubators operated by individual banks like ING are, in turn, located, clustered, and nested in larger joint ventures setup by multiple financial institutions, with the aim to formalize connections between startups and incumbents, and bring emerging FinTech ecosystems into incumbent orbits.⁶ Joint ventures set up by incumbent financial institutions are typically setup to explore, cultivate, and pursue common interests. The collaborative FinTech company B-Hive adjacent to Brussels Airport, for example, rents out office spaces to FinTech startups, offers a space within which financial incumbents like ING can setup their incubators, and organizes FinTech events and meetups – all in anticipation of network effects.

Crucially, some of these collective efforts, in and of themselves, do not function as incubators or accelerators, but are better viewed as 'industry initiatives' through which incumbent financial actors create spaces within which they maintain contact with one another, with FinTech firms, and with different entrepreneurial ecosystems. Through collective efforts incumbent finance seeks to gain insight from- and control over the growing field of FinTech startups, aiming to lock-in developers and other stakeholders like state representatives around their digitizing business models. Financial infrastructure firms such as Swift, 'lubricating' VCs, and business services firms are also involved in cultivating collective efforts, creating a larger networked corporate community. Mirroring the setup and anticipating the premises of platform capitalism, these collective office spaces breath an air of 'openness', which is crucial for cross-fertilization and network effects, tying together a mushrooming FinTech field that is ultimately cultivated and controlled by incumbent finance itself.

The ways in which such industry initiatives are set up differ considerably. There exist both top-down and bottom-up initiatives, yet financial incumbents tend to join both (Ginsel, 2016). We might also tentatively include project-based initiatives, both nationally (e.g., the creation of the IDEAL payments system, built by Dutch banking incumbents) and globally (e.g., the R3 project centered on distributed ledger technologies [blockchain], involving a growing list of globally operating incumbents).⁷ Furthermore, where certain initiatives are defined by a more strategic nature of aligning interests of the organizational field as a whole, there also exist

more operational hands-on collective co-working spaces, of which Level39 in the London Docklands – the “largest technology accelerator for finance, retail, cyber-security and future cities technology companies” – is a well-known example.

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. (Level39, 2013: n.p.)

Canary Wharf is comprised of large office towers, leased by incumbents such as Barclays, Citi, HSBC and JPMorgan. Likewise, the real-estate firm Canary Wharf Group is owned by incumbent financial players. Similar initiatives exist or are being rolled out throughout the world's leading financial centers. While some collective initiatives were initially setup for strategic reasons – to cultivate relations, articulate common goals, and represent the industry as a whole – some of these are evolving into operational hubs not unlike Level39 (see Ginsel, 2016, on the case of Amsterdam). These location-bound joint ventures, seeking to cultivate FinTech developer ecosystems servicing incumbents instead of challenging them, are set up to revamp existing financial centers as FinTech hubs – i.e., as key nodes in global networks of financial innovative practices (Amin and Thrift, 1992; Van Meeteren and Bassens, 2016). As there is competition among financial centers, so there is competition among clustered joint ventures that seek to represent the organizational field or sector as a whole – all seeking to capitalize upon anticipated network effects – and often incumbents sponsor a multitude of these initiatives.

Lastly, FinTech collectives also reach out to one other across borders, some of which having signed bilateral memorandums to enhance cooperation, augmenting their respective reach whilst effectively creating a giant ‘network of networks’ through which financial incumbents aim to bring FinTech ecosystems into their orbits.⁸ In fact, there now exists a Global FinTech Hubs Federation, bringing together FinTech hubs and networks worldwide. Interestingly, the aforementioned Swift is the main driver behind this global initiative which, amongst other things, aims to ‘standardize knowledge (Global FinTech Hubs Federation, 2016). Having brought interbank communication and payments from the telex onto computers in 1973, and having developed hard- and software to streamline its services ever since, Swift now monitors data-driven developments, not least the rise of distributed ledger technologies like blockchain, which theoretically could make ‘the old Swift’ redundant. Again, the goal here is to maximize control over innovation, and ultimately set new global standards which reconfirm rather than undercut the sway of incumbent finance. Like Apple, incumbent finance does not want to be absorbed by a Silicon Valley-based meta-platform. Ideally, incumbent finance wants to become the world's leading financial meta-platform itself.

To this end, some field cultivation occurs beyond cluster or hub level, instead taking place at a jurisdictional level. For there are financial interests which are best defended together vis-à-vis the state at different scales. The Appleization of finance, therefore, also signifies the grooming of- and capitalization upon a broad regulatory environment conducive to the financial industry's incumbent-yet-evolving business models. As we recall, besides locking-in customers and developers, Apple has also proven very capable of locking the state into its orbit. We see a similar trend unfolding regarding incumbent finance's embrace of FinTech, for they too are enjoying/seeking public support to advance the enclosure of FinTech firms to maintain incumbent positions, whilst in parallel seeking to minimize their fiscal duties.

The MAS [Monetary Authority Singapore, added] has vowed to invest S\$225m (\$158m) in FinTech by the end of 2020. Sopnendu Mohanty, its FinTech guru, says he wants to attract fewer 'disrupters' than 'enablers'. He hopes FinTech can help banks by cutting expenses and opening up new sources of revenue, through products that can slot into banks' front- or back-office systems. (The Economist, 2017: n.p.)

Around the globe, financial incumbents are pushing politicians and regulators to make way for FinTech through fiscal policy and regulatory changes, aiming to create a level playing field with the lightly-regulated GAFAs. In practice, this includes calls to allow the set-up of 'regulatory sandboxes' to create a state-approved 'beta setting' to test one's applications.⁹ Some regulators prove more willing to create and experiment with sandboxes than others (see Deloitte, 2017), thereby 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: 42). At the same time, financial incumbents are pushing state actors to maintain regulations as barriers of entry to keep the GAFAs and larger FinTech threat at bay. Banks are particularly obsessed with maintaining barriers to obtain banking licenses, which prevents GAFAs from taking on deposits, enjoying deposit insurance and accessing central bank liquidity. In short, financial incumbents ideally want regulators to create the freedoms that tech firms enjoy in areas like data privacy and product testing, whilst at the same time protecting their turf by pushing regulators to maintain strict regulations. While FinTech firms will be allowed to offer their services based on banking data, provided that these firms are licensed by regulators and customers give their consent – see Second Payment Services Directive (PSD2) (European Commission, 2015) – they are not allowed to offer basic bank accounts, which remain highly regulated domains. The implication is that, as of writing, FinTech has made significant inroads into the realm of payments (43% of business, see McKinsey and Company, 2015: 2), but much less so the deposit, credit or asset management functions. Nevertheless, the introduction of regulations like PSD2 will accelerate if not force incumbent finance's evolution towards 'open' digital platforms: to keep the outside threat of FinTech at bay, incumbent's better self-disrupt and transform, cultivate developer ecosystems and nurture their preferred FinTech applications themselves, sooner rather than later.

Like Apple, financial institutions have geographically organized their activities to minimize tax (Fernandez and Hendrikse, forthcoming). Where jurisdictions like Ireland and Jersey effectively function as Apple's tax shelter (Fernandez and Hendrikse, 2015; Drucker and Bowers, 2017), financial incumbents are similarly pushing governments to setup tax shelters to bring FinTech startups into their jurisdictional orbits. For example, the 'Digital Belgium' plan involves a tax shelter for FinTech start-ups, novel conditions for crowdfunding, employment subsidies, and fiscal benefits for FinTech investors (Fintech Belgium, 2015). 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: 46). Meanwhile, EU regulations like PSD2 stimulate (self-) disruption (Brunsdon, 2016) as part of building a single market for digital services (Milne, 2015). The debate on this scale also relates to the wider geo-economic positioning of the EU vis-à-vis the inroads of US tech giants, coinciding with an explosive political collision over the fiscal responsibilities of Apple (Barker and Beesley, 2016). Ultimately, the battle for state support entails a discursive struggle over which types of institutions are to be trusted with the responsibilities associated with 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, European

financial incumbents are managing to take the higher moral ground even though they were deeply embroiled in the questionable activities that led to the 2008 crisis.

Conclusions: Towards platform finance?

This article has offered a conceptual take on the proclaimed revolutionary character of the impact FinTech is having on incumbent finance. We argue that conceiving the rise of FinTech as the gradual merging of two organizational fields, whilst paying attention to processes of organizational mimicry, allows for an appreciation of the diffusion of conceptions of control, business practices, and models from Tech to Fin. Resultantly, platform-based conceptions of control, pioneered in the Tech world, make inroads into finance. However, while the 'platform capitalism' literature offers insights into the way leading digital platforms realize superprofits from data harvesting and valorization, this literature remains economical in debating their impact on sectors beyond the realm of tech firms proper. Put differently, the debate on platform capitalism primarily focuses on *avant garde* platform companies like Google and Uber, and with good reason, but has had little to say about the ways in which other organizational fields are playing catch up. This article has sought to fill this lacuna.

Since the 1970s, the global economy has been incrementally interlaced with ICTs, and few tech firms have integrated hard-, software and data-driven platform elements into a coherent business proposition more seamlessly than Apple. It is this evolutionary, hybrid and superprofitable business formula that is now being mimicked elsewhere. 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. It is important to recall here that Apple started as tech disruptor, yet has managed to become an incumbent as the ICT revolution unfolded. 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. Financial firms, individually and collectively, are extending their sway over FinTech developments, aiming to enclose disruptive FinTech developers and customers around their emerging digital platforms and accompanying ecosystems, whilst pushing the state to guard their privileged positions.

The Appleization analogy raises many empirical questions about strategies at play when the organizational fields of Fin and Tech merge, which we deem productive in formulating future research questions. Without doubt, our heuristic has its limits. For one, financial incumbents are behaving like VC firms, adhering to- and investing in a range of digitization strategies, in the hope that one or two of these will prove successful. Yet despite such disclaimers, the ways in which unfolding developments across the financial sector resonate with some of the key practices and strategies pioneered and perfected by Apple are hard to ignore. Having said this, our Appleization thesis also speaks to a particular moment in time, in which legacy systems and strategies are updated to the platformed logics of today. In other words, although reverberating with 'timeless' capitalist dynamics like enclosure and exclusion, the notion of Appleization is perishable, as it captures the historical point at which incumbent finance is transmuting into incumbent platform finance, trying to catch up with developments spearheaded by Silicon Valley.

To conclude, although we do not neglect or reject the revolutionary potential of FinTech as such, for the time being our findings suggest that the latest technological wave, as before, is being enclosed by incumbent financial capital, by encircling outside threats and internalizing their logics. Despite the promise of techno-libertarian disruption prevalent in FinTech

communities, the reality is that the prime playground of the Tech field proper, i.e., the Internet itself, is marked by rampant digital enclosure, with the GAFA's monopolizing their respective fields of business. If the analogy holds, 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 its lucrative position as an obligatory passage point, whilst realizing cost reductions at a time when regulations are viewed as burdensome. For financial centers, in turn, this is a strategy to remain relevant under digital modes of intermediation. Somewhat ironically, outside challenges by platform capitalists have laid bare the intrinsic platform-based nature of finance, which can now be completed by drawing in financial technologies. The consequence would be that digitization will not lead to a radical process of disintermediation, resulting in a more decentralized and democratic form of finance, as techno-libertarian prophets would preach. Instead, it would produce an ever-more concentrated organizational field of tech-savvy financial institutions locking-in customers, developers, and the state. Not discounting the GAFA threat, it appears that incumbent finance, countering-whilst-embracing the disruptive forces of FinTech, might maintain pole position in the field of tech-driven finance. The question of whether this will lead to more just and stable financial futures should concern us all.

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Notes

1. The value of conceptualizing current ICT-related developments in finance through this notion was also debated in a number of eponymous sessions organized by Desiree Fields and Chris Muellerleile at the annual RGS-IBG geography conference in London, August 2017.
2. We follow Perez (2002) in her sequential naming of technological revolutions. Others call the current moment 'the fourth industrial revolution' (e.g. Srnicek, 2017).
3. An Application Program Interface (API) offers a set of routines, protocols and tools to build software applications which access the features or data of an operating system, application, or other service. In essence, an API specifies how different software components interact. Most operating environments provide APIs, for example bundled in a Software Development Kit (SDK), allowing programmers to write applications consistent with the operating environment.
4. Interestingly, Srnicek (2017: 134) explicitly excludes Apple from his exposé on platform capitalism. He argues that although Apple "has some platform elements to its business", the "consumer electronics producer" generates the vast majority of its revenues through iPhone sales, realized through production outsourcing. Consequently, "Apple is more akin to the 1990s Nike business model than the 2010s Google business model". Nevertheless, for us the very introduction of platform elements into existing hard- and software environments is crucial to what we are calling the Appleization of finance.
5. See: <<https://developer.barclays.com/bdn/#/home/landing>>. Accessed 6 July 2017.
6. This research takes places in Brussels, investigating the (spatial) makeup and organization of business services, including finance, in the metropolitan area. The joint venture set up by

- Belgium's financial incumbents is known as B-Hive, formerly Eggsplora, and ING operates its individual incubator ING FinTech Village from these premises. See: <<https://b-hive.eu>>.
7. See: <<https://www.ideal.nl/>> and <<http://r3members.com/>>. Accessed 6 July 2017.
 8. For instance, B-Hive in Brussels, next to opening its own satellite offices in London, New York and Tel Aviv, has also established formal relations with FinTech 'collectives' in Amsterdam, London and Luxemburg. See: <<https://b-hive.eu/news-full/2016/12/14/belgium-and-the-netherlands-the-fintech-hubs-of-the-future>>.
 9. 'Sandboxing' in computer security terms means that applications are restricted in accessing the wider functionality of the computer system if that is not necessary for the application to function. Apple championed mandatory sandboxing for its developers, and this discursive spillover to FinTech developments is remarkable. For context, see: <<https://developer.apple.com/library/content/documentation/Security/Conceptual/AppSandboxDesignGuide/AboutAppSandbox/AboutAppSandbox.html>>. Accessed 12 February 2018.

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