



EBI Working Paper Series

2017 – no. 6

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**From FinTech to TechFin: The Regulatory
Challenges of Data-Driven Finance**

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FROM FINTECH TO TECHFIN: THE REGULATORY CHALLENGES OF DATA-DRIVEN FINANCE

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April 25, 2017

Financial technology ('FinTech') is transforming finance and challenging its regulation at an unprecedented rate. Two major trends stand out in the current period of FinTech development. The first is the speed of change driven by the commoditization of technology, Big Data analytics, machine learning and artificial intelligence. The second is the increasing number and variety of new entrants into the financial sector, including pre-existing technology and e-commerce companies. This paper considers the impact of these new entrants with their typically large pre-existing non-financial services customer bases. These firms (loosely termed 'TechFins') may be characterised by their capacity to leverage the data gathered in their primary business into financial services. In other words, TechFins represent an Uber moment in finance. This shift from financial intermediary (FinTech) to data intermediary (TechFin) raises implications for incumbent financial services firms, FinTech startups and regulators. This seachange calls for analysis to underpin regulatory approaches with a view to balancing the competing interests of innovation, development, financial stability and consumer protection.

Keywords: Big Data, FinTech, TechFin, Financial Regulation, Supervision, Enforcement, Algorithms, RegTech, Protected Factors, SMEs, Lending, Payment Systems, Robot Advice, Crowdlending.

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The authors gratefully acknowledge the financial assistance of the following: the Luxembourg National Research Fund, project "A new law for Fintechs – SMART Regulation", INTER/MOBILITY/16/11406511; the Australian Research Council, project "Regulating a Revolution: A New Regulatory Model for Digital Finance"; and the Hong Kong Research Grants Council Theme-based Research Scheme (Enhancing Hong Kong's Future as a Leading International Financial Centre).

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*There are two big opportunities in [the] future financial industry. One is online banking, all the financial institutions go online; the other one is internet finance, which is purely lead by outsiders ... the financial industry needs spoilers to make a revolution.*¹

Jack Ma, Alibaba, 2013

1. INTRODUCTION

This paper focuses on the trend of non-financial firms (such as technology, e-commerce and telecommunications companies) entering financial services businesses and the associated regulatory and legal challenges which are already arising. China has been at the forefront of this change, with Alibaba raising the profile of its entry in the financial services sector with the creation of Ant Financial in 2016² and with its founder, Jack Ma, often said to have coined the term ‘TechFin’.³

¹ Quoted from People’s Daily (in Chinese), 21 Jun. 2013 by Lydia Guo, “Alibaba: Shaking Up Finance”, Financial Times, 1 July 2013, available at: <https://www.ft.com/content/0cae83c4-c936-367c-9bf8-d5a082c9597e>.

² Alibaba’s financial services activities (including payment services) are now bundled in a separate finance holding company, Ant Financial, of which Alibaba is the controlling shareholder. Ant Financial runs Alipay (<https://intl.alipay.com/>), the largest payments network worldwide, with 400 million customers, and WeBank, which offers short-term loan services to Chinese customers shopping on Alibaba.com: see “Alipay Rolls Credit for Consumers”, available at: <http://www.pymnts.com/news/2015/alipay-rolls-credit-for-consumers/> (5 Jan. 2015) (last accessed 7 March 2017). Ant Financial also runs MyBank, which similarly focuses on micro lending, but tends to take on greater credit risk than Tencent’s WeBank as it lends money from its own balance sheet rather than acting as an intermediary between borrowers and lenders. Further, Ant Financial runs a wealth management platform named Yu’e Bao, which emerged from the eponymous money market fund launched in June 2013 and is now among the world’s five largest money market funds by assets. Alibaba ‘decision’ to separate Ant into a separate licensed financial services holding company – albeit under its continued control – by renaming and subsidiarising Alipay in Oct. 2014 was the direct result of fears over possible systemic risk arising from both Alipay and Yu’e Bao, resulting in a new drive in China to build a regulatory system to address FinTech. See Weihuan Zhou, Douglas Arner & Ross Buckley, “Regulation of Digital Financial Services in China: Last Mover Advantage?”, 8:1 Tsinghua China Law Review 2, 2-39 (2015).

³ Zen Soo, “TechFin: Jack Ma Coins Term to Set Alipay’s Goal to Give Emerging Markets Access to Capital”, South China Morning Post, 2 Dec. 2016, available at: <http://www.scmp.com/tech/article/2051249/techfin-jack-ma-coins-term-set-alipays-goal-give-emerging-markets-access>. While Jack Ma may have built the leading business model and perhaps inspired the term with the quote at the beginning of section 1 of this paper (and significant OpEd in China’s *People’s Daily* in which it appeared), it does not appear that he actually coined the term ‘TechFin’. Moreover, there is no clear consensus in the meaning of the term. See Chris Skinner, “Is It FinTech or TechFin (Part I)”, Digitalist Magazine, 7 January 2016, available at: <http://www.digitalistmag.com/customer-experience/2016/01/07/fintech-or-techfin-03925833> and “Is It FinTech or TechFin (Part II)”, Digitalis Magazine, 11 January 2016, available at: <http://www.digitalistmag.com/resource-optimization/2016/01/11/fintech-or-techfin-2-03926161>. These two pieces appear to be the first published reference to the term and argue – contrary to Jack Ma’s definition – that in fact TechFin is about incumbent financial services firms using technology to transform their businesses. For the first use of TechFin as defined by Ma and also the approach we take in this paper, see Janos Barberis, “From FinTech to TechFin: Data Is the New Oil”, Asian Banker, 16 May 2016, available at: <http://www.theasianbanker.com/updates-and-articles/from-fintech-to-techfin:-data-is-the-new-oil>. For yet another view, see: Ryan Shea, “FinTech versus TechFin: Does Technology Offer Real Innovation or Simply Improve What is Out There?”, Thomson Reuters, 26 July 2016, available at: <https://blogs.thomsonreuters.com/financial-risk/fintech-innovation/fintech-versus-techfin-technology-offer-real-innovation-simply-improve/> (stating that ‘**Fin**tech companies are driven by the desire to apply emerging technologies to radically alter the financial landscape. **Tech**fin companies, in contrast, apply technology to enhance existing financial capabilities. A less disruptive, more incremental approach.’ (emphasis in original)). Thus, TechFin is incremental while FinTech seeks disruption in Shea’s definition (similar to that of Skinner and contrasting to the approach of Ma and the authors of this paper). However there is an Australian company

This trend may be less obvious in other countries (perhaps due to their more developed regulatory or financial systems) but it is nonetheless happening. Amazon (US),⁴ Apple (US),⁵ Facebook (US),⁶ Google (US),⁷ Microsoft (US),⁸ Samsung (Korea), with Kakao⁹ and Samsung

apparently formed in 2013 called Techfin that probably deserves the credit for the term (and whose business actually focuses on financing technology): <http://www.techfin.com.au/> (last accessed 6 April 2017)

- ⁴ Cf. Amazon Lending provided by Amazon Capital Services: see “Amazon offering loans to its online sellers”, available at: <http://www.reuters.com/article/net-us-amazon-lending-idUSBRE88Q1CC20120927> (27 Sep. 2012) (last access 6 March 2017). The practice is described as an outreach service from Amazon to small businesses: see <https://www.fundera.com/blog/amazon-lending> (3 Aug. 2016) (last accessed 6 March 2017). Moreover, Amazon has announced its “Amazon Cash” feature gradually entering into the banking space. See “Amazon’s next customer: Americans who don’t have a bank account”, available at: <http://www.marketwatch.com/story/amazons-next-customer-americans-who-dont-have-a-bank-account-2017-04-04> (5 April 2017) (last accessed 7 April 2017).
- ⁵ Cf. Apple Pay (<http://www.apple.com/au/apple-pay/>).
- ⁶ See on the e-money service provided by Facebook: “Facebook targets financial services”, available at: <https://www.ft.com/content/0e0ef050-c16a-11e3-97b2-00144feabdc0> (14 August 2014); “Why Facebook Is a Dark Horse in the Financial Services Industry”, available at: <https://letstalkpayments.com/why-facebook-is-a-dark-horse-in-the-financial-services-industry/> (21 October 2016) (last accessed 6 March 2014).
- ⁷ Cf. Google Wallet payment services (<https://www.google.com/wallet/>) as well as its foreseen Google-powered financial services hub. At the time of writing, Google offers mortgage comparison and insurance comparison services in the US: “Is Google banking on financial services?”, available at: <http://www.cbronline.com/news/verticals/consumer-markets/is-google-banking-on-financial-services-4785109/> (January 2016) (last accessed 6 March 2017).
- ⁸ Cf. on Microsoft Payments “It’s Official: Microsoft Is Licensed To Do Payments”, available at: <http://www.pymnts.com/news/2015/its-official-microsoft-is-licensed-to-do-payments/> (last accessed 20 March 2017) (stating that “Microsoft was approved for its Idaho (Money Services Business -MSB) license on March 24, 2015, and no other state has yet issued a license, according to mortgage information service NMLS. However, Microsoft told FinCEN that it plans to operate as a money services business in all 50 U.S. states.”). See further the description of Microsoft’s Wallet app (“Pay for your purchases the easy and more secure way with Microsoft Wallet and your Windows phone. Keep your payment cards, rewards and membership cards all in one place, so you have your cards available when and where you need them. It’s easy, convenient, and more secure than using your credit card alone.”), available at: <https://www.microsoft.com/en-us/store/p/microsoft-wallet/9nblggzlm1p> (last accessed 20 March 2017).
- ⁹ Kakao Pay started as a messaging app, Kakao Talk, developing into the first firm to be granted a banking licence for online operations. See “Kakao, KT Surge After South Korea Grants Online Banking Permits”, Bloomberg (29 November 2015) available at: <https://www.bloomberg.com/news/articles/2015-11-29/south-korea-grants-kakao-kt-led-groups-permits-for-online-banks> (last accessed 15 April 2017).

Pay¹⁰, Tencent (China)¹¹, Vodafone (UK, India and Africa),¹² and Uber (US)¹³ all offer various forms of payment, lending and/or other financial services.

As these established tech firms enter the world of finance, important questions arise: how do these firms fit within the framework of financial regulation?¹⁴ To what extent do their activities signal arbitrage opportunities and deficiencies of the current regulatory system?

This paper begins to tackle these questions. Following this introduction, in Part 2, we seek to describe the features that distinguish TechFin companies from other financial sector participants, in particular incumbent financial institutions and FinTech startups. In Parts 3 and 4, we outline the opportunities created by TechFins as well as the reasons for regulatory concern, before in Part 5 analysing the policy options available to regulators in responding to TechFin. Part 6 concludes.

2. FINTECHS AND TECHFINS, DIGITISATION AND DATAFICATION

Six decades into the computer revolution, four decades since the invention of the microprocessor, and two decades into the rise of the modern Internet, all of the technology required to transform industries through software finally works and can be widely delivered at global scale. ... In some industries, particularly those with a heavy real-world component such as oil and gas, the software revolution is primarily an opportunity for incumbents. But in many industries, new software ideas will result in the rise of new Silicon Valley-style start-ups that invade existing industries with impunity. Over the next 10 years, the battles between incumbents and software-powered insurgents will be epic. Joseph Schumpeter, the economist who coined the term “creative destruction,” would be proud.¹⁵

¹⁰ Samsung Pay (<http://www.samsung.com/au/apps/samsungpay/>) is a mobile wallet service (“Samsung Pay launches in Australia, time to ditch your wallet (and your train ticket?)”: available at: <https://www.cnet.com/au/news/samsung-pay-launches-in-australia/> (15 June 2016) (last accessed 6 March 2017).

¹¹ Tencent runs a payment platform (Tenpay, accounting for approximately 20-30% of Chinese online payments) as well as a virtual bank named WeBank (an intermediary between borrowers and lenders) that operates a no-collateral micro lending service called Weilidai. See “Tencent’s WeChat App to Offer Personal Loans in Minutes”, available at: <https://www.wsj.com/articles/tencent-to-add-personal-loan-feature-to-wechat-app-1441952556> (11 September 2015) (last accessed 8 March 2017). Loans do not require collateral or guarantees provided the borrower makes it onto a ‘white list’ put together by the WeBank and WeChat teams. Weilidai has more than 20 million white list users, 660,000 active borrowers and a loan balance of CNY7.5 billion.

¹² Cf. M-Pesa (payment services, for India see <https://www.mpesa.in/portal/>) and M-KESHO (in partnership with Kenya-based Equity Bank, M-KESHO is a product using M-PESA’s platform and agent network that offers expanded banking services like interest-bearing accounts, loans, and insurance. See <http://www.financialaccess.org/blog/2015/7/16/m-kesho-in-kenya-a-new-step-for-m-pesa-and-mobile-banking>) (27 May 2010) (last accessed 6 March 2017).

¹³ Cf. Uber Car Loan Finance, see http://ubercarloans.com.au/?utm_campaign=Uber (last accessed 6 April 2017).

¹⁴ Financial System Inquiry, *Interim Report - Regulation in a digital environment*, Commonwealth of Australia 2017, <http://fsi.gov.au/publications/interim-report/09-technology/regulation-digital-environment/> (last accessed 21 April 2017).

¹⁵ M. Andreessen, “Why Software is Eating the World”, Wall Street Journal, 20 August 2011 (available at: <https://www.wsj.com/articles/SB10001424053111903480904576512250915629460> or <http://a16z.com/2016/08/20/why-software-is-eating-the-world/>).

Marc Andreesen, Andreesen Horowitz, 2011

FEATURES OF FINTECH & REGTECH

‘FinTech’ in its broadest sense¹⁶ refers to the use of technology to deliver financial solutions.¹⁷ It is a long standing process, spanning to date three eras¹⁸, that has recently accelerated.¹⁹ This ever present use of technology in finance is gradually putting pressure to transit from regulations designed to control for human behaviour to a regulator looking at supervising automation processes.²⁰ In other words, FinTech growth has elicited the need for RegTech.²¹ ‘RegTech’ is a contraction of the terms ‘regulatory’ and ‘technology’,²² and describes the use of technology, particularly information technology (‘IT’), in the context of regulation, monitoring, reporting and compliance.²³

Prior to the 2008 Global Financial Crisis, FinTech was driven by incumbent financial institutions and their spending on technology to support their operations, for instance in the context of risk management and internet banking. It often also took place in close partnership with regulators, for instance in the context of development of electronic payment (e.g. SWIFT,²⁴ Visa)²⁵ and securities (e.g. NASDAQ) systems.²⁶ Since 2008, the major catalyst for FinTech development has been a new wave of FinTech startups.²⁷ While the novelty of this

¹⁶ We admit difficulties in defining FinTech with legal certainty. For evidence on the FinTech multiverse of definitions, see P Schueffel, *Taming the Beast: A Scientific Definition of FinTech*, *Journal of Innovation Management* 4,4 (2016) 32-54. The same is true for TechFins. Hence, we prefer the term “TechFin” to be understood more as one describing a perspective rather than serving as a formal definitional concept.

¹⁷ DW Arner, J Barberis and RP Buckley, ‘The Evolution of FinTech: A New Post-Crisis Paradigm?’ (2016) 47 (4) *Georgetown Journal of International Law*, 1271.

¹⁸ DW Arner, J Barberis and RP Buckley, ‘The Evolution of Fintech: A New Post-Crisis Paradigm?’ (2016) 47 (4) *Georgetown Journal of International Law*, 1271.

¹⁹ *FinTech – reimagining and reinventing financial services* (2015) Ernst & Young <http://www.ey.com/gl/en/industries/financial-services/fso-insights-fintech-reimagining-and-reinventing-financial-services> (last accessed 25 April 2017).

²⁰ See generally Deloitte and Aegis, *Opportunities in Telecom Sector: Arising from Big Data* (November 2015).

²¹ INSTITUTE OF INTERNATIONAL FINANCE, *REGTECH IN FINANCIAL SERVICES: TECHNOLOGY SOLUTIONS FOR COMPLIANCE AND REPORTING* 5-8 (March 2016).

²² *Innovating with RegTech* (2016) Ernst & Young, [http://www.ey.com/Publication/vwLUAssets/EY-Innovating-with-RegTech/\\$FILE/EY-Innovating-with-RegTech.pdf](http://www.ey.com/Publication/vwLUAssets/EY-Innovating-with-RegTech/$FILE/EY-Innovating-with-RegTech.pdf). (last accessed 25 April 2017).

²³ DW Arner, J Barberis and RP Buckley, “FinTech, RegTech and the Reconceptualisation of Financial Regulation”, 37 *Northwestern Journal of International Law and Business* (forthcoming 2017).

²⁴ SWIFT, *SWIFT history*, <https://www.swift.com/about-us/history> (last accessed 21 April 2017).

²⁵ Visa continues to form FinTech partnerships: *Visa hunts Australian and New Zealand fintech start-ups with launch of contest*, Australian Fintech, <https://australianfintech.com.au/visa-hunts-australian-and-new-zealand-fintech-start-ups-with-launch-of-contest/> (21 April 2017).

²⁶ For a history of Nasdaq’s FinTech partnerships see: Nasdaq, *Empowering FinTech Innovation*, <http://business.nasdaq.com/campaigns/fintech> (last accessed 21 April 2017).

²⁷ Laurens Kolkman, *Bank-less future: how FinTech Start-ups might take over the Financial System* (3 March 2016) KPMG, <https://home.kpmg.com/nl/en/home/social/2016/03/bank-less-future-how-fintech-start-ups-might-take-over-the-financial-system.html> (last accessed 21 April 2017); Chris Myers, ‘FinTech’s ‘Third Wave’ Is Coming, And It Will Change Everything’ *Forbes*, 3 October 2016, <https://www.forbes.com/sites/chrismyers/2016/10/03/fintechs-third-wave-is-coming-and-it-will-change-everything/#7903f61c6026> (last accessed 21 April 2017).

trend can be challenged, with previous examples found including Bloomberg in the early 1980s²⁸ and PayPal in the 1990s,²⁹ there is no denying that there has been a dramatic increase in new entrants into financial services in the past ten years.³⁰

The distinctions emerge not as to *what* (i.e. technology in finance) but as to *who* (i.e. type of market participant – startups vs incumbents).³¹ This new wave of FinTech over the last ten years has tended to develop from the bottom up, i.e. it is born mostly in agile startups that seek to disrupt (i.e. BitCoin),³² compete with (i.e. LendingClub),³³ do business with (i.e. Dwolla),³⁴ or be acquired by (i.e. Fidor),³⁵ incumbent financial institutions.³⁶ This new startup trend – combined with post crisis regulatory reforms driving structural change within the industry – is pushing incumbent financial institutions to increasingly focus on technology in order to compete with the threat posed by emerging startups.³⁷

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- ²⁸ Robin Wigglesworth, ‘The Bloomberg terminal: clunky, costly, addictive, ubiquitous’, *The Financial Times*, 8 July 2015, <https://www.ft.com/content/5d6c2d9c-1f61-11e5-ab0f-6bb9974f25d0> (last accessed 25 April 2017); Harry McCracken, *How the Bloomberg Terminal Made History – And Stays Ever Relevant* (6 October 2015) Fast Company <https://www.fastcompany.com/3051883/the-bloomberg-terminal> (last accessed 25 April 2017).
- ²⁹ Michael Chesher, Rukesh Kaura and Peter Linton, *Electronic Business & Commerce* (Springer, 2013) 56.
- ³⁰ Samantha Barnes, ‘Peer-to-Peer Lending – Disruption for the Banking Sector?’ *International Banker*, 9 February 2015, <https://internationalbanker.com/banking/peer-peer-lending-disruption-banking-sector/>.
- ³¹ See Jorge Ruiz, ‘Citi’s Story of Innovation’ in Susanne Chishti and Janos Barberis, *The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries* (John Wiley & Sons, 2016) 203.
- ³² Rainer Böhme, Nicolas Christin, Benjamin Edelman and Tyler Moore, ‘Bitcoin: Economics, Technology, and Governance’ (2015) 29(2) *Journal of Economic Perspectives* 213, 214; Everett Rosenfeld, ‘Forget currency, bitcoin’s tech is the revolution’, *CNBC*, 13 November 2014, <http://www.cnn.com/2014/11/13/forget-currency-bitcoin-tech-could-disrupt-massively.html> (last accessed 25 April 2017); James Eysers, ‘Bitcoin could disrupt banks warns Westpac boss’, *Sydney Morning Herald*, 8 September 2015 <http://www.smh.com.au/business/banking-and-finance/bitcoin-could-disrupt-banks-warns-westpac-boss-20150908-gjhjnk.html> (last accessed 25 April 2017).
- ³³ Sriharsha Reddy and Krishna Gopalaraman, ‘Peer to Peer Lending, Default Prediction-Evidence from Lending Club’ (2016) 21(3) *Journal of Internet Banking and Commerce* 1, 2.
- ³⁴ Jeremy Quittner, ‘Dwolla to Offer Banks Analysis on Mobile Use’ (2011) 176(76) *American Banker* 9.
- ³⁵ ‘Fidor Bank Acquired by France’s BPCE Groupe’, *Let’s Talk Payments*, 29 July 2016, <https://letstalkpayments.com/fidor-bank-acquired-by-frances-bpce-groupe/> (last accessed 25 April 2017).
- ³⁶ Ian Pollari and Jan Reinmueller, *Building effective fintech partnerships ‘the digital future’ for banks*, KPMG, 10 February 2017, <https://home.kpmg.com/au/en/home/insights/2017/02/effective-fintech-partnerships-enable-banks-succeed-digital-innovation-trail-fs.html> (last accessed 21 April 2017); Marika Vilen, ‘The Fintech startups partnership model’, *Thomson Reuters*, 5 January 2017, <https://blogs.thomsonreuters.com/answeron/fintech-startups-partnership-model/> (last accessed 21 April 2017); Rene Lacerte, ‘Is 2017 The Year Bank-Fintech Partnerships Hit Product/Market Fit?’, *Forbes*, 13 February 2017, <https://www.forbes.com/sites/forbesfinancecouncil/2017/02/13/is-2017-the-year-bank-fintech-partnerships-hit-productmarket-fit/#28ef623b3c6e> (last accessed 21 April 2017).
- ³⁷ Nathaniel Popper, ‘Fintech’ Start-Up Boom Said to Threaten Bank Jobs’ *New York Times*, 30 March 2016, https://www.nytimes.com/2016/03/31/business/dealbook/fintech-start-up-boom-said-to-threaten-bank-jobs.html?_r=0 (last accessed 21 April 2017); Emma Dunkley, ‘Fintech start-ups put banks under pressure’ *Financial Times*, 12 September 2016, <https://www.ft.com/content/ce8fa350-737f-11e6-bf48-b372cddb1043a> (21 April 2017); Clara Guibourg, ‘McKinsey warns banks that fintech startups and alternative finance pose threat to traditional banking’s profits’ *City A.M.*, <http://www.cityam.com/225503/mckinsey-warns-banks-fintech-startups-and-alternative-finance-pose-threat-traditional> (last accessed 21 April 2017).

RegTech as a phenomenon likewise has its origins before the 2008 Global Financial Crisis.³⁸ Similar to FinTech, it has received a major impetus in the past ten years as financial institutions have been driven to spend on new risk management and compliance systems.³⁹ However, in contrast to FinTech, RegTech has been more of a top-down phenomenon in which technology providers responding to demand from large incumbent financial institutions and regulators to address respectively the objectives to decrease regulatory and compliance requirements costs as well increase market monitoring capacity.⁴⁰ Given the significant amounts being spent,⁴¹ this process is having a transformational impact on underlying financial institution systems as well as employment.⁴² It is also providing significant opportunities not only for technology (e.g. IBM)⁴³, information (e.g. Thomson Reuters, Bloomberg) and advisory firms but also for startups.⁴⁴ RegTech itself is not limited to the financial sector although this has been where its most important evolution has so far occurred.⁴⁵ The next stage of the evolution of RegTech will likely be in response to demand from regulators seeking to use technology to improve their own regulatory capabilities and enhance regulatory outcomes,⁴⁶ including through the capacity to undertake near real time surveillance of the markets they are charged with supervising.⁴⁷

³⁸ Deloitte, ‘RegTech is the New FinTech: How Agile Regulatory Technology Is Helping Firms Better Understand and Manage Their Risks’, 2015, 2.

³⁹ Elena Mesropyán, ‘RegTech Companies in the US Driving Down Compliance Costs to Enable Innovation’, *Let’s Talk Payments*, 25 February 2017, <https://letstalkpayments.com/regtech-companies-in-us-driving-down-compliance-costs-innovation/> (last accessed 21 April 2017); KPMG, ‘Regulatory Technology Services (RegTech)’, 2016, 1.

⁴⁰ James Eyers, ‘Welcome to the new world of ‘regtech’, *Australian Financial Review*, 20 June 2016, <http://www.afr.com/technology/welcome-to-the-new-world-of-regtech-20160619-gpmj6k> (last accessed 21 April 2017); Beverley Head, ‘ASIC plays in RegTech sandbox’ *InnovationAus.com*, 8 February 2017, <http://www.innovationaus.com/2017/02/ASIC-plays-in-RegTech-sandbox/> (last accessed 21 April 2017); Kevin Petrasic, Benjamin Saul and Helen Lee, *Regtech rising: Automating regulation for financial institutions*, White & Case (26 September 2016) <https://www.whitecase.com/publications/insight/regtech-rising-automating-regulation-financial-institutions> (last accessed 21 April 2017) .

⁴¹ ‘The ever-increasing costs of compliance’, *Thomson Reuters*, 21 May 2015, <https://www.thomsonreuters.com/en/articles/2015/ever-increasing-cost-of-compliance.html> (last accessed 25 April 2017).

⁴² See e.g.: R. Partington, ‘Banks Trimming Compliance Staff as \$321 Billion in Fines Abate’, *Bloomberg*, 23 Mar. 2017 (available at: <https://www.bloomberg.com/news/articles/2017-03-23/banks-trimming-compliance-staff-as-321-billion-in-fines-abate>); C. Chanjaroen, ‘StanChart Says Almost “Over Hump” on Costly Compliance Upgrades’, *Bloomberg*, 24 March 2017 (available at: <https://www.bloomberg.com/news/articles/2017-03-23/stanchart-says-almost-over-hump-on-costly-compliance-upgrades>) (last accessed 5 April 2017).

⁴³ See, “IBM Closes Acquisition of Promontory Financial Group” available at: <http://www.prnewswire.com/news-releases/ibm-closes-acquisition-of-promontory-financial-group-300367181.html> (last accessed 7 April 2017).

⁴⁴ See, “Thomson Reuters Further Strengthens KYC Managed Services and Legal Entity Data Through Clariant and Avox Acquisitions “ available at: <https://www.thomsonreuters.com/en/press-releases/2017/february/thomson-reuters-strengthens-kyc-managed-services-and-legal-entity-data-through-clarient-and-avox-acquisitions.html> (last accessed 7 April 2017).

⁴⁵ Andrew Cornell, *RegTech joins the C-Suite*, ANZ Blue Notes (14 February 2017) <https://bluenotes.anz.com/posts/2017/02/regtech-joins-the-c-suite/> (last accessed 21 April 2017).

⁴⁶ See, “Regtech will extend the long arm of market supervisors” available at: <http://www.afr.com/opinion/columnists/regtech-will-extend-the-long-arm-of-market-supervisors-20170404-gvd31u#ixzz4ddvZyYW0> (last accessed 8 April 2017).

⁴⁷ DW Arner, J Barberis and RP Buckley, “FinTech, RegTech and the Reconceptualisation of Financial Regulation”, forthcoming *Northwestern Journal of International Law and Business*, at *; HTC Hu, Too

The 2008 Global Financial Crisis opened a new era of FinTech, marked by the arrival of waves of new startups delivering either directly (P2P, B2C) or indirectly (B2B) new technologies to be used in finance.⁴⁸ Almost a decade later, RegTech has emerged, representing both a more efficient and more effective way to support compliance and reporting functions but also a totally new approach to understanding regulation as it shifts from supervision by humans to supervision by machines and analysis of data. Both FinTech and RegTech echo the Andreesen Horowitz vision that ‘software is eating our world, with the financial and compliance industry being digitised⁴⁹ but not yet datafied (to use the framework of Viktor Mayer-Schonberger and Martin Kukier⁵⁰).

FEATURES OF TECHFIN

TechFins start with technology and data and add financial services to their value-chain.⁵¹ They need to be approached differently.⁵² They typically start with their data and access to customers. They then move into the world of finance by leveraging their access to data and customers and seek to out-compete incumbent financial firms or FinTech startups.

This is the critical distinction between a TechFin, a FinTech startup and a traditional financial institution. The former begins with relationships with customers in a non-financial services setting, collects massive amounts of data from those relationships, and then seeks to make use of that data initially perhaps by selling the data to financial services providers or by leveraging its customer relationships by serving as a conduit through which its customers can access financial services provided by a separate institution, and later by providing financial services directly itself.

A FinTech is typically a startup that identifies a pain point in financial services,⁵³ something incumbents do badly or not at all (perhaps as a result of regulatory changes or lack of digital customer focus), and seeks to provide a remedy for the pain point, with the goal of selling the

Complex to Depict? Innovation, 'Pure Information,' and the SEC Disclosure Paradigm (May 30, 2012). Texas Law Review, Vol. 90, No. 7, 2012, at *.

⁴⁸ Deutsche Bank, *FinTech 2.0: Creating new opportunities through strategic alliance*, http://www.gtb.db.com/docs_new/GTB_FinTech_Whitepaper_A4_SCREEN.pdf. (21 April 2017) 2.

⁴⁹ Cf. M. Andreesen, “Why Software is Eating the World”, Wall Street Journal, 20 August 2011 (available at: <https://www.wsj.com/articles/SB10001424053111903480904576512250915629460> or <http://a16z.com/2016/08/20/why-software-is-eating-the-world/>) (stating in 2011 that the ‘the financial services industry has been visibly transformed by software over the last 30 years. Practically every financial transaction, from someone buying a cup of coffee to someone trading a trillion dollars of credit default derivatives, is done in software. And many of the leading innovators in financial services are software companies ...’).

⁵⁰ See V. Mayer-Schonberger & M. Kukier, *Big Data: Revolution that Will Transform How We Live, Work and Think* (Houghton Mifflin 2013).

⁵¹ Ryan Shea, *Fintech versus techfin: does technology offer real innovation or simply improve what is out there?*, Thomson Reuters, 26 July 2016, <https://blogs.thomsonreuters.com/financial-risk/fintech-innovation/fintech-versus-techfin-technology-offer-real-innovation-simply-improve/> (last accessed 21 April 2017).

⁵² See Chris Skinner, *Is it fintech or techfin?*, BANKNXT (8 February 2016) <http://banknxt.com/55647/techfin-part-1/> (last accessed 21 April 2017).

⁵³ Matthew Smith, *When technology trumps finance*, Finsia <http://www.finsia.com/insights/news/news-article/2017/04/11/when-technology-trumps-finance> (last accessed 21 April 2017).

solution service directly to customers or to an incumbent or selling itself to an existing financial services firm.⁵⁴

Traditional financial services firms, such as banks, typically start with a banking relationship with customers and have only recently even begun to consider supplementing their risk analysis of customers by using more broadly derived data.⁵⁵

The provider with the most accurate, detailed and extensive digitalised information about a customer is best placed to analyse that information and data to price credit and insurance services for that customer (through datafication: the process of analysing and using data).⁵⁶ Traditionally that provider has been the customer's bank,⁵⁷ initially armed with a detailed questionnaire completed by the customer as to income, expenses, objectives, experience and risk tolerance, and fortified by the bank's knowledge over time of the customer's financial history. However, banks may no longer enjoy this advantage, or at least not for long.⁵⁸

The data superiority of TechFins comes from information obtained from various sources that combined provide a comprehensive, data-based view of their customers' (and given their size, eventually entire economies' and potentially the world's) preferences and behaviours. This data may be generated, for instance, from:

- software companies (Microsoft, Google) aggregating information about users' activities;
- hardware companies (Huawei, Tesla, Apple) and Internet-of-Things ('IoT'⁵⁹) companies utilising sensors continually monitoring usage behaviour and location;
- social media services (Facebook,⁶⁰ Tencent) and search engines (Google,⁶¹ Baidu), providing insight into social preferences and activities;
- e-commerce (Amazon, Alibaba, or major retail chains with large market share e.g. Wal-Mart), providing insight into consumer demand and payment history;⁶² and
- telecommunications services providers (Vodafone), providing data on mobile activities.⁶³

⁵⁴ Imran Gulamhuseinwala, Thomas Bull and Steven Lewis, 'FinTech is gaining traction and young, high income users are the early adopters' (2015) 3(3) *Journal of Financial Perspectives* 16, 18.

⁵⁵ We discuss traditional banking only. Quantitative and algorithmic traders are beyond the scope of our analysis.

⁵⁶ Jens-Erik Mai, 'Big data privacy: The datafication of personal information' (2016) 32(3) *The Information Society* 192, 193.

⁵⁷ 'Using customer data effectively' (2000) 16(3) *Banks in Insurance Report* 6, 6.

⁵⁸ We admit that we do not know how many data points a bank has stored in its database. We speculate banks have access to more and better data than they have traditionally used, and TechFin is likely to push banks to use a greater share of data which they control. Even so, certain data points generated at the front end (client interface) are beyond the bank's influence.

⁵⁹ Leading to the equation 'IoT x FiNTech = FinTernet of Things', see <http://www.fintech.finance/01-news/the-fin-ternet-of-things-how-iot-affects-financial-services/>.

⁶⁰ Steve Lohr, 'The Age of Big Data', *The New York Times*, 11 February 2012; Strategy& PwC, *Benefiting from big data: A new approach for the telecom industry* (2013) 10.

⁶¹ Leonard Kile, 'Apple and Google Yield Control Over Consumer Data' (2016) 20(1) *CRM Magazine* 14.

⁶² Janos Barberis, 'From fintech to techfin: data is the new oil', supra n. 3.

⁶³ Nick McKenzie, 'Your mobile phone records and home address for sale', *Sydney Morning Herald*, 16 November 2016, <http://www.smh.com.au/business/your-mobile-phone-records-and-home-address-for-sale-20161116-gsqkwe.html> (last accessed 25 April 2017).

The data provided by each of these five sources is typically expansive, covers a large proportion of the population of the reference markets, and is often deep in terms of the number of data points that can be gathered with respect to any given individual.⁶⁴

TechFins moving further into financial services, the way analogous Chinese corporations (Baidu, Tencent, Alibaba) have done, can relatively quickly assemble much of the information the customer's bank or asset manager possesses, and supplement it with their very detailed knowledge of many other aspects of the customer's choices and preferences.⁶⁵ These preferences can then be processed through algorithms that have established correlations between certain preferences and credit-worthiness,⁶⁶ so as to provide a much more nuanced assessment of credit-worthiness than anything a bank could do.

The amount of data will be more extensive if sources of data are combined. Facebook, Amazon and Alibaba are now all doing exactly this in the context of payments in India – competition which is likely to be played out in an increasing range of markets around the world.⁶⁷ And one – which as Alibaba's experience has shown – provides the basis for further expansion of related financial services offerings, particularly lending (to consumers and SMEs) as well as cash and investment management (e.g. money market funds to hold cash in between transactions without the need for cash to exit to a traditional financial institution).⁶⁸ Due to the trust generated in the client relationship TechFins can easily expand their service offerings once the client relationship is established.⁶⁹

DELINEATION

In order to draw a line between FinTechs and TechFins, it is helpful to first look for their similarities. For example, both FinTech and TechFin capitalise on the economies of scale and

⁶⁴ The founder of Alibaba, Jack Ma, has stated that Alibaba holds, on average, 20,000 to 25,000 data points on any individual client. Number shared by Jack Woo in a conference. Presentation entitled "China's Financial Innovation" presented on 15 October 2015

⁶⁵ Janos Barberis, 'From fintech to techfin: data is the new oil', supra n. 3.

⁶⁶ Mikella Hurley and Julius Adebayo, 'Credit Scoring in the Era of Big Data' (2016) 18(2) *Yale Journal of Law & Technology* 148.

⁶⁷ The recent announcement of whatsapp (owned by facebook) entering the payment space in India is a confirmation. See, "WhatsApp plans Indian digital payments" available at: <https://www.ft.com/content/5a1623c4-192d-11e7-a53d-df09f373be87> (last accessed 7 April 2017). This echo's Alibaba taking 40% stake in Paytm in India. See, "Alibaba will hold 40% stake in Paytm's e-comm entity" available at: <http://timesofindia.indiatimes.com/business/india-business/alibaba-will-hold-40-stake-in-paytms-e-comm-entity/articleshow/56947046.cms> (last accessed 7 April 2017).

⁶⁸ See S. Mundy, "WhatsApp Plans Indian Digital Payment", Financial Times, 5 April 2017, available at: <https://www.ft.com/content/5a1623c4-192d-11e7-a53d-df09f373be87>

⁶⁹ The fact that Chinese Technology companies have been able to enter financial services spaces faster than its US counterpart can be due to two factors. First, a large regulatory arbitrage whereby interest payable on e-wallets was higher than traditional bank account. Second, the perception that financial secrecy of customers is better kept by a private institutions than a public, state owned bank, especially in context of tax reporting. The perception of trust is changing even in developed economies. A recent Accenture Survey has pointed out that Millennials found Google and Amazon attractive alternatives to traditional financial providers. See, "Financial Providers: Transforming Distribution Model For Evolving Consumer", Accenture (11 January 2017), available at https://www.accenture.com/t20170111T041601_w_us-en/acnmedia/Accenture/next-gen-3/DandM-Global-Research-Study/Accenture-Financial-Services-Global-Distribution-Marketing-Consumer-Study.pdf (last accessed 9 April 2017).

scope offered by technology (including but not limited to network effects).⁷⁰ However, while FinTechs may build or acquire data sets over time (such as peer-to-peer lending platforms) and are frequently focused on data analysis (with algorithms integrating data from various sources⁷¹), FinTechs are focused on finance first and the application of Tech to deliver improved Fin.

Whilst financial institutions have digitised, or are about to digitise themselves, technology companies have been digital and data driven from day one. This extends to business models with banks being interest / fee generating (digitising money) whilst Google and Facebook are selling information (monetising data).⁷² The digitisation of bank processes does not translate into the change of business model that could make them TechFin companies. In short, a FinTech is a financial intermediary whilst a TechFin is data intermediary.

TechFins rely on large-scale data sets and businesses developed in their primary course of business and then put them to use in financial services. They may do so by considering, or even providing, the front-end of financial services, i.e. the link between financial intermediary and client.⁷³ When providing services, they may rely on de-individualised datasets, aggregating huge amounts of data in order to verify assumptions as to the client's solvency, payment behaviour, savings discipline, and other relevant factors. All in all, for TechFins, data accumulation and analytics are key, beginning with self-developed algorithms that look directly for data correlations, and later advancing to machine learning and AI.

TECHFIN STAGES

The push of a TechFin into financial services typically comes in three stages. First, a tech firm takes advantage of its data intensive, front-end (i.e. customer connected) business model, either by licensing out aggregate data to incumbent financial institutions or FinTechs (enabling data analytics e.g. in the context of lending or investment decisions) or, less likely initially, by testing their data sets and selling the results to financial institutions (so that the using institutions can gather information on correlations e.g. Thomson Reuters).

In the second stage, the TechFin uses these datasets to guide its own business decisions, for instance in improving risk management when lending money to small sellers (Amazon) or enabling optimal payments (Alipay⁷⁴).

⁷⁰ Bernardo Nicoletti, *The Future of FinTech: Integrating Finance and Technology in Financial Services* (Springer, 2017) 268; Nav Athwal, 'The Top Five Fintech Marketplaces' *Forbes*, 25 September 2015, <https://www.forbes.com/sites/navathwal/2015/09/25/the-top-five-fintech-marketplaces/#5faf2a2a735c> (last accessed 25 April 2017).

⁷¹ Examples include automatized customer relationship management tools (e.g. Squirro) or market sentiment analyst Amareos.

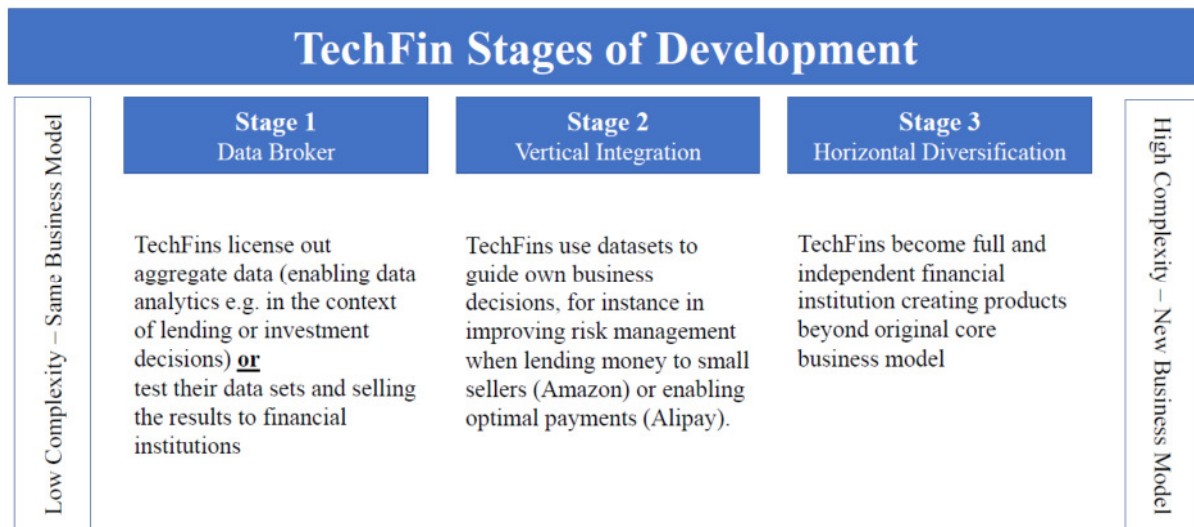
⁷² Puneet Sikka, *How Facebook and other social networks monetize users' data*, Market Realist (26 September 2014) <http://marketrealist.com/2014/09/different-social-networks-making-use-users-data/> (last accessed 21 April 2017).

⁷³ This function has led to their description as 'Financial Services Overlay Providers' or 'Financial over the top providers'.

⁷⁴ See Janos Barberis, 'From FinTech to TechFin: Data is the new Oil', *supra* n. 3.

In the third and final stage, given the superiority of their data, one would expect some of these TechFins to move into offering financial services and thus move into stage three in which they will provide very stiff competition to incumbent banks and other regulated entities.⁷⁵

Figure 1: TechFin Stages of Development



IBM Watson is an example of a tech firm providing its technology to financial services firms but at the same time accessing ever increasing amounts of data which can be used to enhance its own technology and analytics capabilities.⁷⁶

As a tech firm moves from having no involvement in financial services to stage one, or from stage one to stage two, the core issue from a regulator's perspective is **when the tech firm turns into a regulated financial institution**, if not this would leave open risks of regulatory arbitrage and unfair competition. Some activities clearly attract regulation, such as when client funds are taken onto the institution's own balance sheet, when discretion over client money is exercised, or when client assets are pooled. However, formal banking and financial services characteristics may materialise, generally speaking, rather late in the game. Most TechFins will reach the second stage before applying for any authorisation for some type of regulated activity; and depending on the jurisdiction, many may be providing credit or sophisticated payment services to individuals or to small and medium enterprises (SMEs), without having sought any authorisation; although the timing on when authorisation is sought varies widely⁷⁷

⁷⁵ Tech platforms (i.e. Alibaba) are taking a similar approach to supermarkets allowing third party to sell financial services on their own platform. See, "Jack Ma's Ant Financial to build an open marketplace for finance products", Tech in Asia (29 March 2017), available at <https://www.techinasia.com/ant-financial-to-launch-caifu-hao> (last accessed 9 April 2017). In the future we can expect them to monitor best sold products and replace them with a self-branded version, similarly to how discount supermarkets (or e-commerce) in Europe and US have replaced third parties best sellers with their own products.

⁷⁶ See IBM Watson, *Watson Financial Services*, <https://www.ibm.com/watson/financial-services/> (last accessed 21 April 2017).

⁷⁷ See examples supra, notes 4 to 13.

Most financial regulation attaches an authorisation requirement for intermediaries to access clients' funds, either in a bank account or a security deposit.⁷⁸ For instance, authorisation requirements for deposit-taking arise because client assets become those of the intermediary while the client receives in return an (unsecured) claim against the intermediary.

Financial regulation also often attaches upon the solicitation of clients, marketing or arranging of financial services.⁷⁹ In the TechFin world, however, clients often voluntarily contact the TechFin provider for certain services; and technically this may not be a solicitation, marketing or arranging, and thus fall outside financial regulatory authorisation requirements.⁸⁰ This is because TechFins do not seek access to the client's assets, but rather to the client's data: from that, all else follows.

For instance, a platform such as Facebook, Amazon or Alibaba functions as an access point for multiple clients to other businesses, some of which may be licensed (payment providers⁸¹, credit institutions), while others such as simple shops are not. This is one of the defining characteristics of TechFins: they derive their influence from **access to data rather than money**.⁸²

However, where TechFins do get direct access to client funds, such as through Alipay's money market funds,⁸³ they then will or at least should usually be subject to mandatory regulation. But even so, with the part of the business that must be licensed quarantined in a subsidiary of the Tech mother company, only a tiny fraction of the overall data set and algorithms will be subject to regulation and supervision. Accordingly, regulators will have access only to tiny portions of the conglomerate that generates the risks.

Development from stage one to three could happen rather rapidly. For instance, Alipay introduced Yu'e Bao and its associated mobile application 'Alipay Wallet' in June 2013.⁸⁴ Yu'e Bao is essentially an online money market fund in which Alipay customers can invest money left in their Alipay accounts and earn interest at rates generally higher than those offered by banks.⁸⁵ Yu'e Bao does not require minimum amounts to invest and allows withdrawals at

⁷⁸ [add sources from US, EU, ASIA, AUS*].

⁷⁹ [add sources from US, EU, ASIA, AUS*].

⁸⁰ From an accelerator standpoint, it was seen in practice how regulators have various understanding of social media platforms and how this works in context of cross-border marketing. If a US registered user shares on his/her Twitter and Facebook account an opportunity to register for a trading account but his/her friend base is international. Is this performing cross-border marketing? How can this be monitored?

⁸¹ For example, see Facebook lists of its payment licenses within 49 US states. See, "Money Transmitter Licence", Facebook, available at: https://www.facebook.com/payments_terms/licenses (last accessed 9th April 2017)

⁸² Janos Barberis, 'From fintech to techfin: data is the new oil', supra n. 3.

⁸³ Tracey Xiang, *Alipay's 10 Years: from Payment Service to Online Finance Pioneer*, Technode (8 December 2014) <http://technode.com/2014/12/08/alipays-ten-years-from-payment-service-to-online-finance-pioneer/> (last accessed 21 April 2017); Alizila, *Alipay Yu'e Bao is Largest Money Market Fund in China*, 28 October 2013 <http://www.alizila.com/alipay-yue-bao-is-largest-money-market-fund-in-china/> (last accessed 21 April 2017).

⁸⁴ Jon Russell, *China's Alipay relaunches its e-payment app as Alipay Wallet with online-to-offline payments*, The Next Web (18 January 2013) https://thenextweb.com/asia/2013/01/18/alipay-wallet/#.tnw_439CO2Jv (last accessed 21 April 2017).

⁸⁵ For a good introduction of Yu'e Bao, see Moran Zhang, "Alibaba's Online Money Market Fund Yu'E Bao: 8 Things You Need To Know", International Business Times (11 March 2014), available at: <http://www.ibtimes.com/alibabas-online-money-market-fund-yue-bao-8-things-you-need-know-1560601>. The official website of Yu'E Bao is here: <https://bao.alipay.com/yeb/index.htm> (in Chinese).

any time.⁸⁶ In addition, as up to 90 percent of Yu'e Bao funds are invested in interbank deposits at 29 large banks, including the big state-owned ones', investment in Yu'e Bao is seen as low risk and secure.⁸⁷ With these advantages compared to conventional financial products, Yu'e Bao quickly became China's largest online money market fund⁸⁸ and the fourth largest worldwide.⁸⁹ After only one year, Yu'e Bao had 100 million investors and RMB 570 billion (or more than US\$90 billion) of assets under management. Amounting to an average investment size per investor of only approximately US\$900-1000, Yu'e Bao offers 'microinvestment' on a very large scale.⁹⁰

Prior to becoming subject to regulation, TechFins often build a data-driven, international market presence, develop their network and gather an enormous amount of data. They may influence financial activity without yet being financial intermediaries by providing data to the intermediaries or by serving as the conduit between their existing customers and a financial services provider.⁹¹

In addition to cultural differences between non-financial entrants into the financial sector, it is also the speed of these developments that provides a particular challenge for regulators. We return to this discussion in more detail in Part 3.

OVER TIME THE DISTINCTION WILL DISAPPEAR

At the moment there are stark differences between traditional financial institutions, FinTech startups and TechFins. However, over time, these differences will progressively diminish as the importance of data analytics in finance and financial institutions increases. For instance, large international banks may buy many more aggregated data sets from various sources than they do currently and factor this data into their business decisions in addition to seeking to better analyse and use their proprietary data. And some TechFins may ultimately apply for full banking and financial services licenses and become global financial conglomerates, in the manner of Ant Financial. Over time, we predict the terms FinTech and TechFin will fall out of use, and these activities will be known simply as 'finance' or 'banking'. The analogy is with 'e-commerce'. Ten years ago buying products on-line was engaging in e-commerce, today, in many countries, it is simply shopping.

We are concerned with what happens in the meantime – in the next 10 to 15 years – and with how regulators will respond to the massive challenges these changes will pose for them.

⁸⁶ *Ibid.* We note that these features may not be unique to Yu'e Bao. FinTechs in the field of money market funds offer services with similar characteristics. For instance Acorn (US) allow you to invest spare change by rounding up you card expenses, see "Acorns: The Company That's Changing The Way Millennials Invest", Nasdaq (31 January 2017) available at: <http://www.nasdaq.com/article/acorns-the-company-thats-changing-the-way-millennials-invest-cm740620> (last accessed 8 April 2017)

⁸⁷ *Ibid.*

⁸⁸ *Ibid.*

⁸⁹ Cf. Tjun Tang, Yue zhang, David He, "The Rise of Digital Finance in China – New Drivers, New Game, New Strategy" (2014), available at: http://www.bcg.com.cn/en/files/publications/reports_pdf/BCG_The_Rise_of_Digital_Finance_in_China_Oct_2014.pdf (last accessed 6 April 2017), at 4.

⁹⁰ *Ibid.*

⁹¹ As mentioned above (note 75), TechFin firms can also act as financial market place to understand most popular product / service, acquiring data and then deciding whether or not to provide this directly.

3. OPPORTUNITIES

In addition to furthering innovation and competition generally,⁹² TechFins provide new opportunities, with at least three are worth considering in more detail.

REDUCING TRANSACTION COSTS

First, the technology and data underlying TechFins facilitate reduction of transaction costs. For financial institutions, the transaction costs for any given financial contract – checks on client background, determining the contract type, relying on and filling out the contract form, ‘signature runs’ to get approval by authorized staff – are fixed costs per contract. If technology can assist in standardising and automating these procedures, after the initial investment in software and server set-up (which are sunk costs), transaction costs per additional contract will be very low. Under these conditions, financial institutions can process a large volume of contracts at very low cost.

Reduction of transaction costs, however, is not unique to TechFins: this is the rationale for most FinTech innovation and for most kinds of IT.⁹³ For instance, these are among the most important underlying rationales for the development of traditional interbank electronic payment systems as well as the argument in favour of distributed ledger technologies.⁹⁴

IMPROVED BUSINESS AND RISK MANAGEMENT

Second, as data matters for business decisions, the big data approach applied by TechFins should improve business decisions. This is because TechFins’ **data sets are typically of better quality** than those of traditional financial institutions in two ways. First, the data sets are more comprehensive. Traditional banks see only the **back-end of the business transactions** – the cash flow processed over its bank accounts, accompanied by some (more or less correct) qualitative statements by the client on their projected income and expenses. The **front-end comprises the client relationship**, including customer product preferences, which other network participants contacted the client for which reasons, which contracts were entered into and terminated, and which goods were returned and why. All of this information, foreclosed to the traditional bank, is vital, as it enables a TechFin to form a far truer picture than can any bank, in close to real time, of the real financial position of the business to which they are considering extending credit or insurance or other financial services. The TechFin will know if certain cash represents a loan from another source or income from customer sales. The TechFin will know if the retailer or manufacturer enjoys low or high rates of product returns, and be able to infer to some extent from this whether its customers are happy and satisfied.

⁹² The usefulness of competition cannot be stated per se, but must be assessed for each market separately in light of systemic risk concerns. While some markets (for instance Germany) are deemed ‘over-banked’ others could benefit from an enhanced level of competition. See on Australia: D. Healey & R Nicholls, *Enhancing Competition: Challenges for Australian Retail Banking*, (2017) 28 JBFLP 48 (holding that an enhanced level of competition could further benefits for consumers).

⁹³ Alan McQuinn, Weining Guo and Daniel Castro, *Policy Principles for Fintech*, Information Technology & Innovation Foundation (October 2016) <http://www2.itif.org/2016-policy-principles-fintech.pdf>. (last accessed 21 April 2017) 5.

⁹⁴ Kim Kaivanto, ‘Risks and Transaction Costs of Distributed-Ledger Fintech: Boundary Effects and Consequences’ (2017) 2.

This access to data from the front-end relationship that TechFins often have with customers, gives TechFins a significant advantage over traditional financial institutions.

Moreover, TechFins' data sets may comprise **a much larger section of society and the economy** than that of traditional financial institutions. This is because TechFins have their origins from a place unrelated to financial services. They leverage data generated from social media and general economic activity into financial services to an extent unavailable to established financial institutions.

For instance, correlations may indicate that people who buy a choker-chain for their dog are less creditworthy than those whose choice of dog lead indicates they own a more gentle animal; so credit premiums for the former may go up. Or the purchase of door stoppers, to prevent one's doors damaging one's walls, may correlate with being house proud and slightly more credit worthy.⁹⁵ Or a telecom provider derives credit scores from the use across time of telecommunication devices⁹⁶ – and will unintentionally and probably unknowingly grant lower credit scores to Orthodox Jews who do not use their phones on Saturdays.

It will be the challenge of the next decade to identify which correlations detected by the data analytics tools are random and which may function as an appropriate basis for prudent business decisions.⁹⁷ Big data analytics are based on correlations rather than causations, but given that correlations hint at the underlying causations, these correlations provide the path for future research.⁹⁸

FINANCIAL INCLUSION

Third, TechFins could facilitate financial inclusion by replacing the need, common in traditional banking, for inter-personal relations.⁹⁹

⁹⁵ Example provided by *Paul Schulte* during the launch of his book "Next Revolution in Our Credit-Driven Economy: The Advent of Financial Technology", Wiley & Sons 2015, on 4 Sept 2015. Event details available at: <https://www.eventbrite.com/e/fintech-book-launch-paul-schulte-on-fintech-tickets-18178201490?aff=es2#> (last accessed 9 April 2017).

⁹⁶ See Olga Kharif, 'No credit history, no problem: Lenders now look at phone data' *Australian Financial Review*, 27 November 2016, available at: <http://www.afr.com/technology/no-credit-history-no-problem-lenders-now-look-at-phone-data-20161127-gsylwf> (last accessed 19 April 2017); Davis Ntwiga, 'Credit Scoring for M-Shwari using Hidden Markov Model' (2016) 12(15) *European Scientific Journal* 176; Tamara Cook and Claudia McKay, *How M-Shwari Works: The Story So Far* (CGAP and FSD Kenya, 2015).

⁹⁷ For example, Facebook has applied for a patent to use friend connection as a metric to derive creditworthiness for the purpose of loan origination by a bank. See, "Could a Bank Deny Your Loan Based on Your Facebook Friends?", *The Atlantic* (25 September 2015) available at <https://www.theatlantic.com/technology/archive/2015/09/facebooks-new-patent-and-digital-redlining/407287/> (last accessed 8 April 2017).

⁹⁸ Gil Press, 'Big Data News Roundup: Correlation vs. Causation' *Forbes*, 19 April 2013, <https://www.forbes.com/sites/gilpress/2013/04/19/big-data-news-roundup-correlation-vs-causation/#68ca6bab5db4> (last accessed 21 April 2017); Ben Rossi, *Causation and correlation: a big (data) headache*, 3 December 2015 <http://www.information-age.com/causation-and-correlation-big-data-headache-123460611/> (last accessed 21 April 2017).

⁹⁹ See Susan Wolfe, *Banks Seek Balance of Interpersonal Relationships, Online Convenience*, Mintel (20 May 2014) <http://www.mintel.com/blog/finance-market-news/banks-seek-balance-of-interpersonal-relationships-online-convenience> (last accessed 21 April 2017).

SME and Consumer Loans

In the past, relationship banking was characterised by a large level of personal trust deriving from a long-standing business relationship between the bank and its clients.¹⁰⁰ In big data terms, the relationship banker located at a branch collected an enormous amount of data points on its clients based on multiple transactions and information gathered (discussions, business lunches, referrals from other clients, etc). These data points were collected, however, in an unsystematic, erratic way and much stayed with the individual banker. Today, for small clients, relationship banking has been replaced by the ‘rule of the quants’. The costs of traditional relationship banking have become too high for small clients. Institutions can either transfer these costs to clients (by asking them to pay fees) or internalise them. Yet retail clients are reluctant to pay fees, and banks are very reluctant to undertake unprofitable business. The result is that institutions stop offering services to small clients. Financial institutions focus relationship services on large clients with either large volumes or sizes of transactions and large portfolios. Small businesses and consumers are left with either standardised services, without personal support and advice, or excluded altogether from financial services.

The origins of this development towards one-size-fits-all financial services for individual clients are twofold: **transaction costs** and **risk**. As outlined above, both transaction costs and risk will be driven down by TechFins. In particular, the costs for an automated contract are more or less the same regardless of volume. Once automated (and in the absence of costly regulation), it will be the risks associated with the transaction which determine intermediaries’ business strategies and decisions.

On the risk side, the big data approach should also drive change. For instance, the general assumption (embedded for instance in the Basel III framework)¹⁰¹ is that lending to small firms is high risk.¹⁰² While small firms employ most people in most economies, generally speaking small firms are more likely to fail given a lack of an equity cushion and little interest from both business partners and the state in keeping the firm alive in troubled times. We may also see a lack of professionalism in management. In turn, we have seen credit extension to small firms reduced to low levels,¹⁰³ promoting regulatory responses in some countries.¹⁰⁴ In a similar vein,

¹⁰⁰ RP Buckley, "The Changing Nature of Banking and Why It Matters", in Buckley, Avgouleas & Arner (eds), *Reconceptualising Global Finance and Its Regulation* (New York: Cambridge University Press, 2016), 9-27.

¹⁰¹ See Bank of International Settlement, Basel III: international regulatory framework for banks, available at: <http://www.bis.org/bcbs/basel3.htm> (last accessed 7 April 2017).

¹⁰² See, eg, *Small- and medium-sized enterprises* (7 December 2014) Financial System Inquiry, <http://fsi.gov.au/publications/interim-report/03-funding/small-med-enterprises/> (last accessed 25 April 2017).

¹⁰³ See European Banking Authority (EBA), Report on SMEs and SME Supporting Factor, EBA/OP/2016/04, 23 March 2016, at p. 66, available at: <https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04++Report+on+SMEs+and+SME+supporting+factor.pdf> (last accessed 7 April 2017) (stating that ‘Following the financial crisis, SME bank lending has suffered a significant backdrop in volume, from a peak of EUR 95 billion in mid-2008 to approximately EUR 54 billion in 2013/2014’). [SOURCES for US, AUS, ASIA?*].

¹⁰⁴ European legislature added to the European legislation implementing Basel III, the Capital Requirements Regulation (EU) No. 575/2013, a SME Supporting Factor, by introducing a deduction in capital requirements for exposures to SMEs by applying the SME SF of 0.7619 to capital requirements calculated under the Basel III accord. See on the SF impact European Banking Authority (EBA), Report on SMEs and SME Supporting Factor, EBA/OP/2016/04, 23 March 2016, available at: <https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04++Report+on+SMEs+and+SME+supporting+factor.pdf> (last accessed 7 April 2017).

credit to consumers is restricted based on rough broad categories. For instance, retirees may have difficulties getting loans, given that many banks impose age caps on certain loans.¹⁰⁵

Based on better data sets and data analytics as described above, TechFins may be able to better adjust credit rates to the risk (i.e. the client) at hand, and **‘re-personalise’ the financial relationship** via algorithms. Data-based finance could be simultaneously more personal and more inclusive: more attuned to individuals’ real risk profiles (if the data-based methodology is sound, which of course is a sizable ‘if’), and more inclusive as it could affordably provide ‘personalised’ financial services at a much lower cost per client.¹⁰⁶

This rationale of big data finance underlies Amazon’s lending programme to small business sellers and Alipay’s consumer loan offerings.¹⁰⁷ We assume that, as with most TechFin businesses, Amazon and Alipay are pursuing a trial and error approach, training their algorithms ‘on the job’ rather than looking for a perfect first time approach.¹⁰⁸ While this approach facilitates change, it also provides reason for concern. We discuss this further in Part 4.

Developing countries

Both aspects discussed above – lower transaction costs and better access to risk-related data – also explain the remarkable tech-based financial inclusion prompted by TechFins in developing countries, such as through M-PESA and M-KESHO.¹⁰⁹ While the details are beyond the focus of this paper,¹¹⁰ we note that technology tried and proven in an environment of (more or less)

¹⁰⁵ See <http://www.news.com.au/finance/older-australians-into-their-eighties-approved-for-home-loans/news-story/9fd4e014da30760dc3a93916e58aca75> (citing RateCity’s database stating that the number of lenders with *no* maximum age restriction has fallen from 88 per cent last year to 76 per cent this year, and citing the Australian Bankers’ Association’s chief executive officer Steven Munchenberg emphasizing responsibility lending restrictions apply before approving loans to customers to ensure they can meet repayments, with serviceability being a key consideration); some mortgage specialists require that debtors can repay the loan before your retirement age, see <http://www.guarantorhomeloan.com.au/lending-guidelines/> (last accessed 7 April 2017); Lorna Bourke, ‘Too old for a mortgage’, *CityWire Asia*, 9 June 2010, <http://citywireasia.com/news/too-old-for-a-mortgage/a403797?section=money> (last accessed 20 April 2017) contra some mortgage lenders in the United Kingdom and United States: Esther Shaw, ‘Mortgage lenders lift upper limits to help solve an age-old problem’ *The Guardian*, 17 October 2016, <https://www.theguardian.com/money/2016/oct/17/mortgage-lenders-lift-upper-age-limits-solve-problem> (last accessed 20 April 2017); Marcie Geffner, ‘You’re never too old for a mortgage’ *Bankrate*, <http://www.bankrate.com/finance/mortgages/never-old-mortgage-1.aspx> (last accessed 20 April 2017).

¹⁰⁶ However if a TechFin were to only focus on too-narrow subset of customer base (i.e. retired people, thin credit files) it may over-expose itself to the risk of that specific demographic in case of a change not captured in algorithm. Regulators would consider this a concentration risk and may require higher capital to be set aside to reflect the non-diversify nature of the loan-book.

¹⁰⁷ Nandita Bose, ‘Amazon is going to start offering business loans to seller in China’, *Thomson Reuters*, 29 June 2015, <http://www.businessinsider.com/r-exclusive-amazon-to-offer-loans-to-sellers-in-china-7-other-countries-2015-6?IR=T> (last accessed 21 April 2017).

¹⁰⁸ For example Amazon has stopped after only 6 weeks of operation its loan program targeting students. See, “Amazon and Wells Fargo Terminate Student Loan Partnership” Bloomberg (1 Sept 2016), available at: <https://www.bloomberg.com/news/articles/2016-08-31/amazon-and-wells-fargo-terminate-student-loan-partnership> (last accessed 9 April 2017).

¹⁰⁹ See African Development Bank Group, *Financial Inclusion and Integration through Mobile Payments and Transfer* (March 2012) ; Financial Access Initiative, *M-KESHO in Kenya: A new step for M-PESA and mobile banking* (27 May 2010) <http://www.financialaccess.org/blog/2015/7/16/m-kesho-in-kenya-a-new-step-for-m-pesa-and-mobile-banking> (last accessed 21 April 2017).

¹¹⁰ Cf. RP Buckley and S Webster, “FinTech in Developing Countries: Charting New Customer Journeys”, Vol 44 *Journal of Financial Transformation*, 151-159; J Greenacre, RP Buckley and L Malady, “The Regulation

weak public institutions should also work in Western countries. Examples include the pure mobile phone-based M-PESA operations offered in societies where a large share of the population cannot read and write.¹¹¹ While we note that the costs of these services reflect the less-competitive environment in which they operate, by advancing financial inclusion these TechFins provide a valuable contribution by allowing a far broader range of people to enjoy the benefits of access to financial services.

of Mobile Money: A Case Study of Malawi", (2015) 14 *Global Studies Law Review*, 435-497. DA Zetzsche, RW Buckley & DW Arner, "Digital Inclusive Finance" (*forthcoming* 2017).

¹¹¹ Janet Kamana, *M-PESA: How Kenya took the lead in mobile money*, Mobile Transaction (7 April 2014) <https://www.mobiletransaction.org/m-pesa-kenya-the-lead-in-mobile-money/> (last accessed 21 April 2017).

4. FINANCIAL LAW AND REGULATION CHALLENGES

As a result of their continuing evolution, TechFins create a number of challenges for society and regulators alike. The impact of artificial intelligence and data analytics on individuals and the financial system is uncertain and, from a financial regulatory perspective, a potential source of risk.

SYSTEMIC ISSUES

False Predictions

Data correlations, if not tested for causation, raise the risk of **false predictions**.¹¹² If the algorithm is wrong at a systematic level¹¹³ the data advantage of TechFin firms may be at risk. Furthermore, as soon as the TechFin firm has reached a certain size, the insolvency of the TechFin may impair firms linked to it. For instance, if a TechFin provides the website that links its customers to an authorised financial services provider, the bank or financial services firm's prospects may be simultaneously adversely affected with those of the TechFin.

If TechFins were licensed, regulators would seek to mitigate infection risks. The systemic dimension of algorithms is covered by what financial lawyers refer to as 'model risk'.¹¹⁴ Financial regulation asks the licensed entity to review its models regularly and justify model assumptions unique to the authorised firm vis-à-vis the regulator.¹¹⁵ Furthermore, if TechFins were licensed, regulators would require diversification in order to undo concentration risk. This would counter, for instance, a business model focusing on servicing only very narrowly selection parts of society. While the regulation would not be foolproof, some safeguards are installed; so that at least in times of crisis, regulators have some idea as to the origin and underlying activity of the regulated entity.

Protected Factors

TechFins should be held to similar standards to licensed entities to avoid discriminatory practices towards the public. Indeed, within the financial services industry, the law often protects certain values by disallowing discrimination based on certain factors, which we term

¹¹² Hector Zenil, Algorithmic Data Analytics, Small Data Matters and Correlation Versus Causation, *Cornell University Library*, (5 September 2013) 16.

¹¹³ Cf. Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson & Harlan Yu, "Accountable Algorithms", 165 U Pa. L. Rev. 633, 683 (2017) (analysing 'techniques that formalize fairness' and 'constrain the machine learning process so that learned decision rules have specific well-defined fairness properties.').

¹¹⁴ Ignacio Crespo, Pankaj Kumar, Peter Noteboom and Marc Taymans, *The evolution of model risk management*, McKinsey & Company (February 2017) <http://www.mckinsey.com/business-functions/risk/our-insights/the-evolution-of-model-risk-management> (last accessed 21 April 2017).

¹¹⁵ For instance, for US nationally chartered banks the OCC's Preopening Examination 'may be broad in scope and include an evaluation of the bank's final plans to identify, measure, monitor, and control all relevant risks.' For IT risks, in particular, the bank is subject to the Uniform Rating System for Information Technology (URSIT), designed to uniformly assess financial institution and service provider risks introduced by information technology, see US Office of the Comptroller of the Currency (OCC), Comptroller's Handbook: Bank Supervision Process, Appendix B, pp. 57 et seq., available at: <https://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-ep-bsp.pdf>; for Europe see ESMA/EBA/EIOPA – Joint Committee of the European Supervisory Authorities, Joint Committee Discussion Paper on the use of Big Data by Financial Institutions, JC 2016 86 (12_2016), p. 28 et seq.

protected factors.¹¹⁶ Yet the efficiency of these stipulations may be threatened by data analytics. For instance, if data analytics show a certain race or gender generally has a better credit score, that better score could derive from existing biases against other races or genders. There are also studies arguing that analytics-based booking systems discriminate on the basis of race or other protected factors.¹¹⁷ Algorithms can certainly discriminate wrongfully against certain groups of people.¹¹⁸

Combining this data lead discrimination with automation decision ‘may simultaneously systematize and conceal discrimination.’¹¹⁹ The more data analytics substitute for human judgement, the more important it will be to shield protected factors from abuse and enforce anti-discrimination laws, in order to avoid a new type of racial or other profiling which could result in denial of credit and services for certain demographics.¹²⁰

While banking and discrimination based on income and wealth go hand in hand, regulators have imposed safeguards to ensure that protected factors are upheld. For instance, in some jurisdictions financial institutions must provide an affordable payments account; in others the institutions are required to serve all parts of society. The way in which protected factors are enforced varies from country to country. However, most efforts attach these duties to entities which meet the traditional definition of a financial services provider – which TechFins will typically only do in the latter stages of their development (discussed above in Part 2) – and

¹¹⁶ The US federal law provides for two fair lending statutes, the *Equal Credit Opportunity Act (ECOA)*, 15 U.S.C. 1691, and the *Fair Housing Act*, 42 U.S.C. 3601. See US Office of the Comptroller of the Currency (OCC), Comptroller’s Licensing Manual (September 2016), Appendix E, at p. 99, available at: <https://www.occ.gov/publications/publications-by-type/licensing-manuals/charters.pdf> (‘The ECOA prohibits discrimination in any part of a credit transaction. The ECOA applies to any extension of credit, including extensions of credit to persons, small businesses, corporations, partnerships, and trusts. The Fair Housing Act applies to residential real estate-related transactions. Both of these acts prohibit discrimination based on race, colour, religion, sex, or national origin. The ECOA also prohibits discrimination based on gender, marital status, receipt of public assistance, or the exercise of a right under the Consumer Credit Protection Act. The Fair Housing Act also prohibits discrimination based on disability or familial status. Generally, discrimination in a credit transaction against persons because they are (or are not) members of a group previously categorized violates the ECOA and, if the transaction is related to residential real estate, violates the Fair Housing Act.’). [Examples EU, ASIA, AUS*]

¹¹⁷ Ge, Yanbo and Knittel, Christopher R. and MacKenzie, Don and Zoepf, Stephen, Racial and Gender Discrimination in Transportation Network Companies (October 2016). NBER Working Paper No. w22776. Available at SSRN: <https://ssrn.com/abstract=2861708> (arguing that drivers for Uber Technologies Inc. in Boston canceled rides for men with black-sounding names more than twice as often as for other men. Black people in Seattle using Uber and Lyft Inc. faced notably longer wait times to get paired with drivers than white customers.).

¹¹⁸ Cf. “Credit scores in America perpetuate racial injustice. Here's how”, available at: <https://www.theguardian.com/commentisfree/2015/oct/13/your-credit-score-is-racist-heres-why> (14 October 2015) (last accessed March 7, 2017). In the context of TechFin Uber’s algorithm has been qualified as discriminatory. See, “Uber and Lyft Are Failing Black Riders”, *The Atlantic* (31 October 2016) available at <https://www.theatlantic.com/business/archive/2016/10/uber-lyft-and-the-false-promise-of-fair-rides/506000/> (last accessed 8 April 2017).

¹¹⁹ Cf. Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson & Harlan Yu, “Accountable Algorithms”, 165 U Pa. L. Rev. 633, 642, 680 (2017) (exploring the opportunities that algorithms further discrimination); Solon Barocas & Andrew D. Selbst, “Big Data’s Disparate Impact”, 104 Calif. L. Rev. 671, 677 (2016) (“[D]ata mining holds the potential to unduly discount members of legally protected classes and to place them at systematic relative disadvantage.”).

¹²⁰ Cf. Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson & Harlan Yu, “Accountable Algorithms”, 165 U Pa. L. Rev. 633, 683 (2017) (analysing ‘techniques that formalize fairness’ and and ‘constrain the machine learning process so that learned decision rules have specific well-defined fairness properties.’).

most of these efforts limit discriminatory decisions taken by individuals – their applicability to the unforeseen consequences of algorithms and machine learning is as yet very unclear.

REAL POWER, UNREAL RESPONSIBILITY

Denial of Services

TechFin also makes an impact at the individual level. For instance, let us assume that in fact the people that buy a choker chain (in the example above) do not intend to use it for their own dog but give it as a gift to another. Using the chain as a proxy would result in incorrect pricing of credit or insurance. Algorithms can of course be much more sophisticated. For instance, algorithms may also consider whether the same customer purchases dog food and sanitary articles for dogs and is shown on pictures uploaded on social media with dogs as the basis for the conclusion that this purchaser warrants a higher cost of credit or insurance premium.

However, this example could be easily turned around. Let us assume that the housemaid is in charge of purchasing items for the dog, and likes to display pictures of herself walking the dog. The maid would be penalised by the higher premium while the dog owner would not. While on a system-wide basis these statistical outliers will be evened out – there are not many people employing housemaids that use their personal account for job-related shopping – the credit and insurance pricing for those individuals who do will be inaccurate. This is a somewhat trivial example, but it is easy to imagine more severe interference with human lives, perhaps resulting in the denial of credit and service.

Further, we may see non-users suffer from financial and other forms of exclusion. This also means that in a data-driven world, opting to not share personal data may make you *de facto* a second class, digital, citizen: Because the best products, prices and opportunities will only be provided to the one consenting to share their data with the predictive algorithm of the TechFin.

If big data applications are used for background checks, the front-end interactions could rectify the problem. If big data is used at the front-end, however, rectification will be unavailable given the data-driven approach of the TechFin business model: the factors considered for calculating the premium will not be revealed and there will be no one to whom clients can turn for a remedy. TechFins could accordingly substantially impact people and yet bear little responsibility for that impact, and with little recourse available to customers.

If TechFins were licensed, these problems would be mitigated. The impact of business decisions on clients is covered by a multitude of customer, client and investor protection laws which require, at least, (a) transparency of terms, and (b) a contact point for recourse and customer complaints.¹²¹ And last, but not least, a regulator will be standing ready to step in.¹²²

¹²¹ Cf. ESMA/EBA/EIOPA – Joint Committee of the European Supervisory Authorities, Joint Committee Discussion Paper on the use of Big Data by Financial Institutions, JC 2016 86 (12_2016), p. 27 et seq.

¹²² Cf. The OCC runs the website '[HelpWithMyBank.gov](https://www.helpwithmybank.gov/)' for that purpose, ensuring easy access to the regulators. On the OCC's mandate see OCC, Consumer Protection, available at: <https://www.occ.gov/topics/consumer-protection/index-consumer-protection.html> ('Ensuring fair access and equal treatment to national bank customers is a fundamental part of the OCC's mission. OCC bank examiners evaluate compliance with consumer laws and regulations, and the agency takes enforcement actions when necessary. OCC customer service representatives assist national bank customers with questions and complaints, and the agency provides advisories and public service announcements to help consumers understand their rights, banking rules, and the risks associated with products and practices.'). The mandate of European financial regulators has been broadened recently to include consumer protection, prompting the European Banking Authority (EBA) to issue a number of standards in this field, see EBA, Consumer protection and financial innovation, available

While these solutions are far from perfect, financial regulation can provide some safeguards, particularly for vulnerable consumers.

Pay for Display

Given that TechFins may dominate the front-end customer relationship and their marketing-fee driven business models, ‘pay for display’ schemes often predominate rather than selection of services or products for display based on quality or price. For instance, in many countries, the paid announcements in Google’s search function dominate the top positions. We can expect that similar priorities exist in other TechFin models apparently provided for free to customers, although in fact these customers pay by providing access to themselves and data about them, to commercial firms. Linking this tech-based strategy with financial services creates serious concerns for consumer choice and market efficiency.

For instance, imagine a TechFin presenting its investment fund selection based on the fees the fund pays to the TechFin rather than on merits or customer demand (as determined by big data analytics) or of social media data being used to target less educated and financially savvy people for high-cost predatory loans and risky financial products.¹²³ Financial regulation is designed to mitigate those abuses. For instance, the issues associated with shelf fees for mutual funds in the US are well known and have prompted regulatory responses including mandatory disclosure and outright bans,¹²⁴ while in the EU financial services firms must disclose whether their preselection of financial products is independent and neutral (or dependent and potentially biased by kickbacks paid from third parties).¹²⁵ Fees received by the investment firms must not impair compliance with the investment firm’s duty to act honestly, fairly and professionally in accordance with the best interests of its clients.¹²⁶ As to predatory lending, financial law often imposes fair lending policies, and charges regulators with enforcing these duties against lenders.¹²⁷ While, again, this financial regulation is not perfect, it does at least seek to counter misbehaviour. None of this occurs as yet in the world of unlicensed tech firms.

at: <https://www.eba.europa.eu/regulation-and-policy/consumer-protection-and-financial-innovation> (all websites last accessed 7 April 2017).

¹²³ For example Facebook data could allow people to target ad on the basis of the sexual orientation of people, without them consenting to reveal it. See, *Marketers Can Glean Private Data on Facebook*, *The New York Times* (22 Oct 2010) available at: <http://www.nytimes.com/2010/10/23/technology/23facebook.html> (last accessed 9 April 2017).

¹²⁴ See on regulation of shelf-fees dating back to the 1970s, Joe Seligman, *Transformation of Wall Street*, (Aspen, 3rd ed., 2003), at *: see also Jason Zweig, *Mutual Fund Fees: A Bad Incentive Fades Away - Revenue sharing payments from asset managers to brokerages are likely to become a thing of the past*, *The Wall Street Journal Online*, 26 February 2016, available at: <http://blogs.wsj.com/moneybeat/2016/02/26/mutual-fund-fees-a-bad-incentive-fades-away/> (last accessed 7 April 2017).

¹²⁵ Cf. Art. 24 (7) Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments, OJ L173/349 of 12.6.2014 (‘MiFID II’).

¹²⁶ Cf. Art. 24 (9) Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments, OJ L173/349 of 12.6.2014 (‘MiFID II’).

¹²⁷ Cf. US Office of the Comptroller of the Currency (OCC), *Comptroller’s Licensing Manual* (September 2016), Appendix A: *Directors’ Duties and Responsibilities*, at p. 78, available at: <https://www.occ.gov/publications/publications-by-type/licensing-manuals/charters.pdf> (stating that ‘[e]ach bank that lends has a responsibility to help meet the credit needs of its communities, consistent with safe and

Fiduciary Status

The conceptual legal question of to whom TechFins owe duties matters. Financial law assigns to financial advisers, asset and fund managers the status of a fiduciary, which means all their business activities must be aligned with the interests of their clients.¹²⁸ Similar safeguards will typically be missing for customers, clients and investors when dealing with TechFins in their early stages of development – as at this stage TechFins often only supply data or function merely as conduit between the supply (i.e. financial institutions) and the demand side.

Whether the institution is subject to fiduciary obligations matters. To the same extent that TechFins may tailor products to the customer's needs, data-driven micro-segmentation could unlock income-generating insights drawing on customer weaknesses. For instance, TechFins can adjust prices upward for customers insensitive to price, or unwilling to switch products and providers, respectively. While exploitation of brand loyalty, inertia or ability and willingness to pay more would violate financial law requirements to treat customers fairly, honestly and in a non-discriminatory manner,¹²⁹ the inapplicability of financial law grants TechFins undesirable opportunities.

SOME MORE ISSUES

The list of potentially troublesome issues above is not comprehensive. For instance, given the network effects and economies of scale of both information and software markets that underpin TechFins, oligopoly risk is significant, and requires an **antitrust/competition law** response. This is because the quality of algorithms fuelled by data, and access to that data (not the financial licence and its related minimum capital and legal requirements) will operate as the barrier to entry.

Another issue not addressed here relates to the **taxation of TechFins**. Where are TechFin services to be subject to tax? In addition to traditional tax criteria such as head office location, people employed and productive operations, alternatives include the location of (1) servers, (2) software design, (3) software programming (code writing), (4) clients whose data are gathered, and (5) clients targeted by TechFin algorithms. Further issues stem from **data protection**: Who

sound lending practices, and has an obligation to ensure fair access and equal treatment to all bank customers.’).

¹²⁸ Indeed, the SEC in the US is currently reviewing if automated investment advisors (or robot-advisor) have a fiduciary duty. See *SEC Staff Issues Guidance Update and Investor Bulletin on “Robo-Advisers”*, JDSupra (15 March 2017) available at: <http://www.jdsupra.com/legalnews/sec-staff-issues-guidance-update-and-31449/> (last access 9 April 2017). Similarly there is still debate as to whether or not, “code is law”, following the DAO hack, where the structure of a smart-contract has been maliciously exploited. The question being whether the participant legally or wrongfully gained US\$50 million. See, “Code is Law? Not Quite Yet” CoinDesk (27 August 2016) available at: <http://www.coindesk.com/code-is-law-not-quite-yet/> (last accessed 9 April 2017).

¹²⁹ In the US, it is the OCC's mission to ensure that national banks and federal savings associations operate in a safe and sound manner, provide fair access to financial services, treat customers fairly, and comply with applicable laws and regulations. See 12 USC 1 § 1 (a) (“There is established in the Department of the Treasury a bureau to be known as the “Office of the Comptroller of the Currency” which is charged with assuring the safety and soundness of, and compliance with laws and regulations, fair access to financial services, and fair treatment of customers by, the institutions and other persons subject to its jurisdiction.’). For Europe, see ESMA/EBA/EIOPA – Joint Committee of the European Supervisory Authorities, Joint Committee Discussion Paper on the use of Big Data by Financial Institutions, JC 2016 86 (12_2016), p. 22 [add Asia, Australia*].

owns the data?¹³⁰ Is there a ‘right to be forgotten’,¹³¹ and if so, who can enforce this right and where can it be enforced? We also see issues of contract law and private international and civil procedure law: what type of contracts will users and TechFins engage in, which country’s laws (i.e. which minimum consumer protection standards) will apply, which courts will have jurisdiction, and how will clients’ recourse be ensured?

Finally, the data points on a person create a fully commercialised **digital identity**.¹³² Who owns the property rights in this identity? Is there a right to provide access to one’s digital identity to other service providers?

Since this paper focuses on financial regulation (at the conjunction of financial regulation and data management), these questions are left for further research. Suffice it to say, however, that as regulators learn more about the activities of TechFins, they will be able to better respond to the above challenges, and they will learn even more if TechFins are regulated, at the minimum initially by the imposition of reporting requirements.

WHY DO WE CARE

To make a long story short: while financial regulation may address several shortcomings arising from improper use of financial data, TechFins in their early stages of development will often be outside the scope of this regulation. For instance, existing financial laws may provide for exemptions for SME lending on which TechFins could rely. Further, functioning as a mere conduit (‘a web page’) between clients and financial institutions does not submit the conduit to the laws applicable to financial institutions, even if the institution comes to depend upon the conduit and the collapse of the latter may imperil the former.

Although TechFins control access to clients they are not subject to the ‘solicitation’, ‘marketing’ or ‘arranging’ rules originally written for those who control access to clients. Further, data delivery to financial institutions is a regulated activity only in some countries, and even there only under strictly defined conditions, typically limited to rating agencies and market data providers.¹³³ In turn, the shortcomings of TechFin activity may well not be

¹³⁰ See Barb Darrow, ‘The Question of Who Owns the Data is About to Get a Lot Trickier’ *Fortune* (6 April 2016) <http://fortune.com/2016/04/06/who-owns-the-data/> (last accessed 21 April 2017); Schumpeter, ‘Who owns your personal data?: The incorporated woman’, *The Economist* (27 June 2014) <http://www.economist.com/blogs/schumpeter/2014/06/who-owns-your-personal-data> (last accessed 21 April 2017).

¹³¹ See European Commission, *Factsheet on the “Right to be Forgotten” ruling*, ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf (last accessed 21 April 2017); Charles Arthur, ‘Explaining the ‘right to be forgotten’ – the newest cultural shibboleth’ *The Guardian* (15 May 2014) <https://www.theguardian.com/technology/2014/may/14/explainer-right-to-be-forgotten-the-newest-cultural-shibboleth> (last accessed 21 April 2017).

¹³² See generally Ian Grayson, ‘Establishing digital identity causing problems as users giving away too much’, *Australian Financial Review* (4 October 2016) <http://www.afr.com/news/special-reports/digital-identity/establishing-digital-identity-causing-problems-as-users-giving-away-too-much-20161003-grtom7> (last accessed 21 April 2017).

¹³³ [For Australia, see ___. For Asia, see ___.] For US, see generally on credit rating agencies *Dodd-Frank Wall Street Reform and Consumer Protection Act* requiring form disclosure of data for credit rating agencies; note recent attempts to modernise data delivery from investment companies to the SEC <https://www.sec.gov/news/pressrelease/2016-215.html> (last accessed 20 April 2017); For Europe, see on rating agencies European Regulation (EC) No 1060/2009 on credit rating agencies, OJ L302/2009, on data reporting providers Title V of Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments, OJ L173/349 of 12.6.2014 (‘MiFID II’), governing approved

addressed, which will leave clients, investors and potentially significant participants in the financial system exposed to the impact and risk of unregulated big data analytics.

Financial intermediaries should be experts in processing financial information so as to channel cash flows to their most efficient use, in terms of expected risk-return ratios. This is challenged by TechFins. If TechFins have better data than traditional financial institutions, TechFins may provide the financial intermediary function more effectively. However, TechFins, at least today, operate for the most part in an unregulated environment. Until the third stage when they adopt financial services licenses (as discussed above in Part 2), TechFins are neither subject to client/customer/investor protection rules nor subject to measures that ensure the functioning of financial markets and prevent the build-up of systemic risk – these being the three pillars of modern financial regulation.¹³⁴

Moreover, from the perspective of licensed intermediaries, TechFins provide unbalanced, and arguably unfair, competition. The fixed costs of an initial license and the ongoing costs of supervision and related reviews by accountants etc., will mean licensed intermediaries bear higher costs than unlicensed ones. In the long run, licensed intermediaries are doomed to lose in such contest, given their higher cost-base and limited flexibility to respond to competitive challenges.

There are three ways to respond. First, we can **remove some or all parts of regulation** for financial institutions. While there are some aspects of regulation which may be overly burdensome and hinder innovation and arguably should be removed,¹³⁵ it is not the purpose of this paper to analyse each and every rule imposed by financial regulation. Moreover, de-regulation would not solve the underlying problem as long as *some* regulation remains for financial institutions and in light of the experience of the Global Financial Crisis, that some regulation will remain is, even on the most extreme view, a very likely outcome.

Second, we could consider **combining the strengths of financial institutions and TechFins**. Potential solutions include that (1) authorized institutions could rely on TechFin data in addition to their own (insourcing rules), and (2) TechFins could be allowed to acquire licensed institutions (merger model). However, in the absence of proper regulation, TechFins are unlikely to forego opportunities. As to solution (1), authorised institutions cannot be sure that they will get all, or, in particular, the most valuable, data. As to solution (2), if TechFins are seriously interested in buying authorized entities, depending on the laws of the individual jurisdiction concerned, they may be able to do so, but for the most part they have so far refrained from such acquisitions, perhaps due to legacy issues and (more likely) the negative impact of regulation on their business model.

Third, we could analyse in detail where TechFins threaten the fundamentals of financial regulation and ensure that these are safeguarded by some regulatory response to TechFins. This is what we pursue in the remainder of this paper.

publication arrangements (APA), consolidated tape providers (CTPs) and approved reporting mechanisms (ARMs).

¹³⁴ Cf. DA Zetzsche ‘Investment Law as Financial Law: From Fund Governance over Market Governance to Stakeholder Governance?’ in Hanne S. Birkmose, Mette Neville, and Karsten Engsig Sørensen (eds), *The European Financial Market in Transition* (Kluwer Law International, 2012), 339, 343.

¹³⁵ See DA Zetzsche, RW Buckley & DW Arner, “FinTech, RegTech and Smart Regulation? Of Deregulation, Leniency, Piloting and Regulatory Sandboxes” (*forthcoming* 2017).

Difference to FinTech?

From a regulatory point of view to what extent do TechFins differ from FinTechs? We have seen FinTechs seeking regulatory niches. For instance, crowdlending has relied on the peer-to-peer lending exemption in many European countries,¹³⁶ while German crowdfunding platforms, in the beginning, utilized the fact that certain debt contracts were not deemed ‘securities’ or ‘deposits’ under German law.¹³⁷

TechFins and most FinTechs share the propensity to avoid the regulatory system as long as they can,¹³⁸ something they have in common with traditional financial sector participants as well, as witnessed in the context of ‘shadow banking’ and regulatory arbitrage to minimise regulatory constraints and costs. TechFins and FinTechs are different animals, however. In particular, we see two main differences between TechFins and FinTechs in terms of the client/investor and systemic risk dimensions of regulation discussed above.

First, as to the client protection dimension of financial regulation: the first and foremost asset of financial services providers is their clients’ trust. Without trust, clients will not place their money with the provider.¹³⁹ TechFins start with the client relationship and then add the financial dimension. TechFins create trust in a world unrelated to financial services and leverage this trust in the financial sphere. Due to the trust created in a non-financial setting, clients may be less cautious when exposed to the TechFin’s additional financial services. The fact that a client has experience with the technology or e-commerce services of a TechFin and is comfortable with these provides the basis for the transition into financial services.¹⁴⁰ Even more so, due to the TechFin’s grip on its client data, the TechFin may select clients on the basis of loyalty and comfort with data-driven contact, and build their business from there.

Second, as to the systemic risk dimension: size creates systemic risk.¹⁴¹ FinTechs as problem-driven firms, and though trying to become big, tend to start small.¹⁴² As such, indirect

¹³⁶ Financial Conduct Authority, *A review of the regulatory regime for crowdfunding and the promotion of non-readily realisable securities by other media* (February 2015) <https://www.fca.org.uk/publication/thematic-reviews/crowdfunding-review.pdf> (last accessed 21 April 2017).

¹³⁷ For Australia, see Leigh Schultz and Domenic Mollica, ‘The regulation of crowdfunding in Australia: where are we and what’s to come?’ (August 2015) *Australian Banking & Finance Law Bulletin* 136.

¹³⁸ Larry D Wall, *Avoiding Regulation: FinTech versus the Sharing Economy*, Federal Reserve Bank of Atlanta (September 2016) <https://frbatlanta.org/cenfis/publications/notesfromthevault/09-avoiding-regulation-fintech-versus-the-sharing-economy-2016-09-29> (last accessed 21 April 2017).

¹³⁹ Torben Hansen, ‘Understanding Trust in Financial Services: The Influence of Financial Healthiness Knowledge, and Satisfaction’ (2012) 15(3) *Journal of Service Research* 280, 280; Katherine Tyler et al., ‘The role of trust in financial services business relationships’ (2007) 21(5) *Journal of Services Marketing* 334.

¹⁴⁰ The perception of trust is changing even in developed economies. A recent Accenture Survey has pointed that Millennials found Google and Amazon attractive alternatives to traditional financial providers. See, ‘Financial Providers: Transforming Distribution Model For Evolving Consumer’, Accenture (11 Jan 2017), available at https://www.accenture.com/t20170111T041601_w_us-en/acnmedia/Accenture/next-gen-3/DandM-Global-Research-Study/Accenture-Financial-Services-Global-Distribution-Marketing-Consumer-Study.pdf (last accessed 9 April 2017).

¹⁴¹ Luc Laeven, Lev Ratnovski, and Hui Tong, *Bank Size and Systemic Risk*, IMF Staff Discussion Note (May 2014) <https://www.imf.org/external/pubs/ft/sdn/2014/sdn1404.pdf> (last accessed 21 April 2017).

¹⁴² Daniel Drummer et al., *Fintech – Challenges and Opportunities*, McKinsey & Company (May 2016) https://www.mckinsey.de/files/160525_fintech_english.pdf (last accessed 21 April 2017) 2.

regulation by licensed entities may suffice to address systemic risks.¹⁴³ In contrast, TechFins are often very significant firms outside of financial services prior to stepping into the financial sector. Due to their sheer size TechFins are connected to many institutions from the moment they engage in stage 1, such as when the TechFin functions as a conduit to licensed institutions. Moreover, due to their data power, TechFins exercise influence over connected financial institutions from the moment they engage in stage 1, and often tend to control whole market segments when entering stage 3.

The result of trust and control over important market participants in financial services being in the hands of the few has led to major financial crises. As examples, we point to the early-2000s accounting frauds¹⁴⁴ and the infamous role of rating agencies¹⁴⁵ and systemically important financial institutions (SIFIs) in the Global Financial Crisis.¹⁴⁶ Note that accounting firms and rating agencies are mere data providers linked to the system (like TechFins in stage 1), while SIFIs are typically very large (like TechFins in their stage 3).¹⁴⁷ Both types are strictly regulated today.¹⁴⁸ The more TechFins move into financial services, the more it will be necessary to consider how to protect society from their failures –in terms of service quality or financial stability.

5. POLICY CONSIDERATIONS

Many businesses today do not want to be financial institutions because of the associated regulatory burdens,¹⁴⁹ but do want to tap into their profits. Put simply, in the present common regulatory environment, Techfins often will not ‘pay’ for the concerns and risks they generate. They will not suffer from reduced business space within which to operate, nor have to pay regulatory fees, and, frankly, will often also manage to avoid national taxes. Nonetheless, TechFins may increasingly aim to take the most attractive and easily accessible portions of financial services business. Our concern is not for the banks’ well-being; as market actors they need to face market realities and adapt to competition provided by technology. However, if the competition from these unregulated entities destabilizes the *regulated* financial institutions, the

¹⁴³ See generally, *The evolving Fintech regulatory environment*, Deloitte (2017)

<https://www2.deloitte.com/content/dam/Deloitte/us/Documents/regulatory/us-aers-the-evolving-fintech-regulatory-environment.pdf>. (last accessed 21 April 2017) 2.

¹⁴⁴ See, eg, Sean Farrell, ‘The world’s biggest accounting scandals’, *The Guardian* (22 July 2015)

<https://www.theguardian.com/business/2015/jul/21/the-worlds-biggest-accounting-scandals-toshiba-enron-olympus> (last accessed 21 April 2017); C. William Thomas, ‘The Rise and Fall of Enron’ (2002) *Journal of Accountancy* <http://www.journalofaccountancy.com/issues/2002/apr/theriseandfallofenron.html> (last accessed 21 April 2017).

¹⁴⁵ Amanda J Bahena, ‘What Role Did Credit Rating Agencies Play in the Credit Crisis?’ (March 2010)

www.colorado.edu/AmStudies/lewis/ecology/rolecreditagencies.pdf (last accessed 21 April 2017).

¹⁴⁶ *Too-big-to-fail and moral hazard*, Financial System Inquiry (7 December 2014)

<http://fsi.gov.au/publications/interim-report/05-stability/too-big-to-fail/> (last accessed 21 April 2017).

¹⁴⁷ Mustafa Yuksel, *Identifying Global Systemically Important Financial Institutions* (2014) Reserve Bank of Australia 63 <https://www.rba.gov.au/publications/bulletin/2014/dec/pdf/bu-1214-8.pdf> (last accessed 25 April 2017).

¹⁴⁸ See, eg, Siegfried Utzig, ‘The Financial Crisis and the Regulation of Credit Rating Agencies: A European Banking Perspective’ (Working Paper No. 188, Asian Development Bank Institute, January 2010).

¹⁴⁹ Robert M. Adams and Jacob Gramlich, ‘Where Are All the New Banks? The Role of Regulatory Burden in New Bank Formation’ (2016) 48(2) *Review of Industrial Organization* 181; Sean M. Hoskins and Marc Labonte, *An Analysis of the Regulatory Burden on Small Banks*, Congressional Research Service (22 April 2015) <https://fas.org/sgp/crs/misc/R43999.pdf> (last accessed 21 April 2017).

rise of TechFins may well reduce client protection and promote systemic risks. *This* is our concern.

COSTS OF DOING NOTHING

We have already defined as a core issue that TechFins in their early stages do not meet the definition of financial activity, or it is unclear whether they are financial institutions as opposed to mere data providers.

If we do nothing, the uneven playing field will persist – authorised intermediaries will lose business, the level of compliance will be gradually undermined, and the role of enforcement agencies will be weakened as their mandates will be too narrow. Potential systemic risk may build up unobserved, unmitigated and uncontrolled, and, looking longer-term, the next global financial crisis may well come from TechFins rather than authorised financial institutions.

This poses a significant risk to society. There is already some evidence for the systemic dimension of TechFins. For instance, in ten months Yu’e bao became the fourth largest money market fund in the world, leading to a hasty response from Chinese regulators.¹⁵⁰ When Amazon’s cloud computing data centre in Hong Kong failed, the website of the US SEC, plus many consumer oriented services, such as NetFlix, went down.¹⁵¹ And we can safely assume the systemic importance of Amazon and Alibaba in their SME niche markets and M-PESA for consumers in some African countries,¹⁵² so that the TechFins existence is a precondition for the well-being of many individuals and enterprises in those countries.

One could respond that the early stage TechFin conduit function is merely one of data delivery; and data delivery is not a special activity warranting regulation. Yet data provision in a highly concentrated market has prompted regulators to require financial institutions to diversify their data sources. The difference with TechFin is that data delivery is a back-end function, while TechFins also provide front-end, overlay services to the financial institutions (as discussed above in Part 2). TechFins’ conduit function cannot be addressed by diversification requirements since the financial institution cannot readily change the ‘service provider’ as it can a back-end relationship – terminating the cooperation with the TechFin would cost the financial institution the link to its most precious asset: its clients.

COSTS OF CATCH-ALL MANDATORY LICENSING

On the other hand, catch-all mandatory licensing for data analytics is likely to stifle innovation. We have highlighted the potential social benefits of TechFin. TechFin has the ability to fill gaps in financial services provision, such as Ant Financial’s targeting of Tier 2 cities and the provision of SME finance, an area in which the traditional Chinese financial services industry

¹⁵⁰ W Zhou, D Arner and RP Buckley, “Regulation of Digital Financial Services in China: Last Mover Advantage” (2015) 8 (1) *Tsinghua China Law Review* 25

¹⁵¹ Elaine Ou, “Can’t Stream Netflix: The Cloud May Be to Blame”, Bloomberg View, March 2, 2017, available at <https://www.bloomberg.com/view/articles/2017-03-02/can-t-stream-netflix-the-cloud-may-be-to-blame> (last accessed 6 April 2017).

¹⁵² See, eg, Kiarie Njoroge, ‘Report: This is What Would Happen to Kenya’s Economy if M-Pesa was to Collapse’, *Nairobi News* (30 November 2016) <http://nairobi.news.nation.co.ke/news/treasury-report-reveals-fears-m-pesas-critical-role-economy/> (last accessed 21 April 2017); Frank Jacob, ‘The Role of M-Pesa in Kenya’s Economic and Political Development’ in *African Histories and Modernities* (2016, Palgrave MacMillan) 89.

has performed poorly and in fact one of the motivations for initially light touch regulation of TechFin activities in China,¹⁵³ so regulators would be ill-advised to interfere too early.

OTHER REGULATORY OPTIONS

Stretching Existing Definitions

We could make rules made for the analogue era fit by stretching existing definitions, such as ‘solicitation’, ‘marketing’ and ‘arranging’. Regulators pursuing this path, however, will face protracted court cases. They may win some cases, but uncertainty will prevail for years. Moreover, a general stretching of definitions may prove overly burdensome for innovative firms and stifle innovation. For instance, if we re-read ‘solicitation’ etc. to include websites, regulation could extend to include all website providers. In turn, to the extent we discuss stretching definitions we would need to discuss exemptions as otherwise enforcements will be impossible (too many to supervise) or powerless. However, the established reference mechanisms for carve outs (assets on the balance sheets or under management etc.) do not fit, so an entirely new approach would be required to tackle TechFin issues.

A variant of this approach lies in delegation rules. This hints at the core of the underlying problem which is that the legal nature of the relationship between conduit (TechFin) and intermediary is uncertain. If it was a service agreement, delegation rules could apply and indirect supervision presents itself as solution. However, in a delegation relationship the control is (and should be) vested in the delegating entity rather than the delegate. As such the rules on delegation would seem unfit to deal with TechFins where the control often lies in the delegate.

Private Law Alternatives

As a private law alternative we could consider imposing joint liability for damages on the back-end financial institution and the TechFin at the front-end. This is similarly insufficient. First, private law disregards the systemic risk dimension. Second, the segments of society financial law seeks to protect are particularly vulnerable, but non-litigious: the poor rarely sue. Moreover, in the absence of additional legislation plaintiffs face significant challenges in court, given the difficulties of gathering evidence and the costs of civil procedure. If we legislate, however, we best get it right.

Open Data Policy?

Proponents of open data could suggest that one way of dealing with TechFins is to reduce the value of data by providing access to the data to everyone, so that all entities could build algorithms. However, this solves only one side of the problem: data access. The algorithms used may well be profoundly misleading and harm protected factors. Next, the creation of an open data world itself runs into legal barriers such as data protection issues and will, if it ever happens, take years.

Fight Fire with Fire: Independent Data Banks

Another market based solution is reliance on Data Banks. These would act as data repository that are controlled by end users instead of the FinTech or the TechFin. This would support the

¹⁵³ See, D Arner and J Barberis, “FinTech in China: From The Shadows” E&Y Journal of Financial Perspective (Winter 2015, page 83). Available at [http://www.ey.com/Publication/vwLUAssets/ey-the-journal-of-financial-perspectives-fintech-winter-2015/\\$FILE/ey-the-journal-of-financial-perspectives-fintech-winter-2015.pdf](http://www.ey.com/Publication/vwLUAssets/ey-the-journal-of-financial-perspectives-fintech-winter-2015/$FILE/ey-the-journal-of-financial-perspectives-fintech-winter-2015.pdf) (last accessed 9 April 2017).

current move towards data sovereignty and digital identity. The user would grant various access rights of their data depending on products or service sought. The selected provider would then adjust their offer and service combined the user's issued data and the proprietary algorithm of the firm. The customer could then better compare providers and which products & services is the most competitive. However, this model still suffers from initial data collection and certification as well as differentiation between data ownership and control. Additionally, the market price for raw data creates little economic incentives for customer to care about data sovereignty. Finally, the reprivatisation of data which is underlying this concept requires a cross-border data access regime which will require years of coordination among regulators across the globe which is unlikely to come in the next decade with which we are concerned.

A BALANCED RISK ANALYSIS

We thus argue in favour of a moderate regulatory intervention.

A balanced risk analysis follows the evolution of any business from (1) too small to care, to (2) too large to ignore and then to (3) too big to fail (TBTF).¹⁵⁴ As TechFins often do not seek access to client funds directly, many established financial regulatory thresholds will fail to be triggered. Yet TechFins can be much more influential than they would seem. In order to set appropriate thresholds, regulators must develop new criteria. These could include an overall number of data points, or holding data on a significant share of a population in the reference market, as both figures reflect a substantial data set.

From there, traditional risk analysis would look at both the systemic and client perspectives. Systemic risk measures should apply as soon as TechFins become essential to financial stability. Whether this is the case depends on the TBTF or too complex to fail (TCTF) tests. If a TechFin is an essential facility for one important bank (e.g., it is its main data analytics provider), we could apply an infrastructure analogy and require diversification of data delivery channels. This is, however, old news, given the analogies provided by rating service agencies. If the TechFin is, however, the main client channel for one important bank or for many banks which together are of systemic importance, we would rather compare the TechFin to the importance of a new CEO and a new business model rather than infrastructure. To the same extent that a new bank CEO and other key staff would be subject to regulatory scrutiny, we would ask the TechFin to meet the 'fit and proper' requirement, and ask for adequate resources to maintain that function on the side of the TechFin. This is where the systemic risk perspective indicates a case for regulation of TechFin.

The need for regulation is confirmed when looking at the customer/client/investor protection dimension: if TechFins can impact individuals, regulators should care. However, regulation cannot correct all faults in a society – it can only focus on the important ones. Thus, once the impact of the TechFin passes a certain threshold, regulators should step in in order to ensure appropriate gathering and processing of client data.

TOWARDS A MIDDLE GROUND

Licensing Requirement for Data Gathering and Analytics

It follows from the above that regulators should require authorisation for data gathering and analytics when used for financial services, either directly as a financial services provider or

¹⁵⁴ Arner, Barberis, Buckley, op cit n 15.

indirectly as a conduit for data delivery or access to customers. This policy proposal is subject to some qualifications.

We recommend first to **impose information rights for regulators linked to data gathering and analytics** only. In order to support enforcement, the TechFin should be asked to **declare its jurisdictional scope by reporting on** (a) its data gathering, (b) the location of its clients and (c) its data delivery (if any) to intermediaries upon market entry as well as periodically thereafter. If a TechFin refuses to cooperate by disclosing its jurisdictional scope, regulators could enforce their laws by imposing a variant of geoblocking, which is ‘datablocking’ (i.e. no data from that jurisdiction may be used).

In order to exempt most insignificant business, in terms of data gathering and data analytics, a generous **exemption threshold** is in order. For instance, if a deep data analysis on a single person amounts to 25,000 data points,¹⁵⁵ a company that processes the data of 400,000 people in a deep fashion (i.e. manages 10 billion data points) in one market may be unlikely to generate systemic risk (unless the market is tiny). So ‘ordinary’ firms could be given the choice of generating and analyzing fewer client specific data points for more than 400,000 clients, or over 25,000 data points on correspondingly fewer than 400,000 clients. This threshold should exclude almost all non-data businesses, although obviously this is only an example and these figures would have to be adjusted to market size.¹⁵⁶

Once the TechFin reaches a certain size that indicates it is reaching the ‘too large to ignore’ threshold, regulators should have access to the TechFin’s data-based business models and algorithms in order to ensure sound methods and adherence to protected factors relevant to that reference market. For instance, regulators should be empowered to require data analytics to demonstrate process regularity, including the upholding of protected factors, and to review the specifications underlying the algorithms as well as the commitments embedded in its code.¹⁵⁷ In addition to enforcing fair treatment and protected factors for TechFins above this threshold, the review requirement will assist in reducing undue processes in sub-threshold TechFins. In light of the expectation that successful firms will be subject to a process regularity review, venture capitalists and other institutional investors will require evidence for process regularity prior to financing TechFins.

Once regulators come to the conclusion that the TechFin is of **systemic importance**, for instance since TechFin data is essential for a systemically significant financial institution, or the TechFin provides the main client access for several financial institutions which together are of systemic significance, we recommend measures to control and limit systemic risk. In the first case this could require the significant financial institution to diversify its data sources. In the second case we recommend (a) structural requirements for TechFins (quarantine provisions as to ‘Fin’ with respect to entity, IT, capital; minimum capital for maintenance and clean-up; and country-by-country segregation of activities) and (b) empowering regulators to shut down

¹⁵⁵ Note that this figure is taken arbitrarily. It is inspired by Jack Ma’s statement on how much data Alibaba generates on one single customer. The real number may be higher or lower, respectively. The figures in our example be adjusted accordingly.

¹⁵⁶ For instance, thresholds appropriate for tiny Luxembourg or Liechtenstein are unfit for giant China. However, given that both Luxembourg or Liechtenstein are part of the European Single Market, a market definition including all EU/EEA countries is suitable.

¹⁵⁷ Computer systems review and testing is an art in itself. See Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson & Harlan Yu, “Accountable Algorithms”, 165 U Pa. L. Rev. 633 (2017) (suggesting ex ante system design requirements, including commitments, as a precondition of effective systems monitoring). Technology in this field is rapidly evolving, however, and so does regulatory expertise.

the activity (while preserving customer data), or to appoint a commissioner to run the quarantined TechFin part of the business in the public interest.

Impact on FinTech?

In addition to regulating TechFins our proposed approaches could affect some FinTech firms. We note, however, that our indicated generous size-based exemption will likely not affect FinTech firms until they have reached a significant size.

If our proposed threshold is passed a FinTech firm is likely to meet the two requirements set out for TechFins – trust and control. While we are far from arguing that all Fintech firms shall be subject to regulation¹⁵⁸ we see no reason to exempt FinTechs from our authorisation requirement. This would be unwieldy given that the line between FinTechs and TechFins is one of perspective rather than content. As a side effect, rendering data gathering and analytics for financial services subject to licensing would also respond effectively to calls of licensed entities for equal treatment. However, rather than entering a regulatory arm's race, with innovation which both regulators and society likely to lose given the speed of innovation, our proposal addresses the core of the issue which is the trust and control which a typical TechFin business model entails and which if not addressed could prove damaging to customers and the financial system.

6. CONCLUSION

*We need banking but we don't need banks anymore.*¹⁵⁹

Usually, and probably incorrectly, attributed to Bill Gates, 1994.

In the same way as Andreesen suggests that technology has now caught up the potential in the internet context, much the same may now be able to be said about technology and finance. Whether Bill Gates ever said words to the effect of those above, whoever did first say them was definitely ahead of their time in the 1990s.¹⁶⁰ Perhaps today technological reality has

¹⁵⁸ Such a call would be ill-advised in light of the openness to innovation a financial system requires.

¹⁵⁹ Edward Neumann, 'Banking's Role in Tomorrow's Payments Systems: Insuring a Role for Banks' (Paper presented at Bankers' Roundtable, Washington D.C., June 1994) 17 cited in Eli M Noam, 'Electronics and the Dim Future of Banks' (Paper presented at Conference on Electronic Banking of the Fujitsu Research Institute, January 1996). Bill Gates is frequently cited as having said this: See Dan Schatt, *Virtual Banking: A Guide to Innovation and Partnering* (John Wiley & Sons, 2014) ch 2; Brett King, *Bank 3.0: Why banking is no longer somewhere you go, but something you do* (Marshall Cavendish International Asia Pte Ltd, 2012) 56; Andrew Grant and Gaia Grant, *The Innovation Race: How to Change a Culture to Change the Game* (John Wiley & Sons, 2016) 14; Tim Price, *Investing Through the Looking Glass: A rational guide to irrational financial markets* (Harriman House Limited, 2016); Jessica Xiaotong Zhang, 'Bill Gates Said That 'Banking Is Necessary, Banks are Not' But Banks Are Still Around Today', *LinkedIn Pulse*, 4 January 2017, available at: <https://www.linkedin.com/pulse/bill-gates-said-banking-necessary-banks-still-around-today-zhang> (last accessed 19 April 2017); Ravi Venkatesan 'Banking is Necessary. Banks are not.' *LinkedIn Pulse*, 14 February 2016, available at: <https://www.linkedin.com/pulse/banking-necessary-banks-ravi-venkatesan> (last accessed 19 April 2017); R Gandhi (Deputy Governor of the Reserve Bank of India), *New paradigm in banking: banking is necessary, not banks - really?*, Bank for International Settlements (17 August 2016), available at: <http://www.bis.org/review/r160822b.htm> (last accessed 19 April 2017).

¹⁶⁰ See Amy Cortese & Kelley Holland, "Bill Gates Is Rattling the Teller's Window", Bloomberg, 31 Oct. 1994, available at: <https://www.bloomberg.com/news/articles/1994-10-30/bill-gates-is-rattling-the-tellers-window>. See also Bill & Melinda Gates 2015 letter, sub 'Three: Banking Mobile banking will help the poor transform

caught up to their vision. As we have suggested throughout this paper, TechFin may be the single most important development in financial services going forward, as digitisation enables datafication.¹⁶¹

First, TechFins are not simply a progression of FinTechs but instead represent a brand new type of market participant. They have their origin in Tech or e-commerce environments which are typically connected to a multitude of clients (both consumers and/or small businesses) and a very deep well of data. As TechFins reach a significant size, they often do so having established an international network, and having gathered a very meaningful dataset. This data gives them a real advantage in the provision of financial services. TechFins may first enter the world of finance by providing their data, either raw or processed, to established financial services firms and/or FinTech startups, but over time the likelihood is that many will start providing financial services directly to their customers.

Second, TechFins may be able to provide far more efficient financial services for society. In particular, they may reduce transaction costs and improve decision-making by using/providing a more comprehensive dataset than that to which established financial intermediaries have access. Both together could result in an increased level of financial inclusion for SMEs, consumers and the underprivileged in developing and developed parts of the world.

Third, established thresholds for the imposition of financial regulation such as the solicitation of customers, deposit-taking, pooling of assets, or discretion over client assets may often fail to subject TechFins to regulation. In turn, regulators will be unable to enforce customer protection measures and monitor and mitigate systemic risk. Moreover, protected factors in society may often be put at risk, at times unwittingly, by TechFins.

Fourth, if financial regulation matters in furthering market efficiency¹⁶² and customer protection,¹⁶³ TechFins should be subjected to it when offering financial services. Moreover, TechFins will provide uneven competition to established licensed intermediaries if they are unrestricted by risk and compliance considerations in the build-up phase of their business model, and they do not bear the minimum costs of a regulated entity in terms of compliance and capital costs.

Fifth, in the world of TechFin, most customers give their data away for free, looking for some side service, so ‘following the money’ (as traditional financial law does) is likely to fail. ‘Following the data’ may provide an alternative, however. This alternative is not a mere policy choice, it is a necessity in a world where the value of data exceeds the value of traditional production if measured by market valuation. In a world where data is the new currency and where special legislation regulates intermediaries managing financial assets owed to and owned by others (as banks and asset managers do), it is a pressing need to adequately regulate ‘data

their lives’, available at: <https://www.gatesnotes.com/2015-annual-letter?page=3&lang=en> (last accessed 6 April 2017).

¹⁶¹ *The Impact of Datafication on Strategic Landscapes*, Ericsson (2014) <https://www.ericsson.com/res/docs/2014/the-impact-of-datafication-on-strategic-landscapes.pdf>. (last accessed 21 April 2017) 4-5 ; Viktor Mayer-Schonberger and Kenneth Cukier, *Big Data: A Revolution that will Transform How We Live, Work and Think* (Hachette UK, 2013).

¹⁶² See Randall Dodd, *The Economic Rationale for Financial Market Regulation*, Financial Policy Forum Derivatives Study Center (December 2002) www.financialpolicy.org/fpfspr12.pdf (last accessed 21 April 2017).

¹⁶³ See *Consumer protection framework in financial services*, Financial System Inquiry (2017) <http://fsi.gov.au/publications/interim-report/06-consumer-outcomes/consumer-protection-framework-in-financial-services/> (last accessed 21 April 2017).

intermediaries' in addition to financial intermediaries given that both pose similar risk to individuals and society.

Regulators should consider defining financial data gathering and analytics as a regulated activity, if the activity exceeds certain size thresholds. A threshold set as coverage of a percentage (perhaps 1-5%) of the overall population in the reference market may reflect the segregating line between 'too small to care' and 'too large to ignore'. Above this threshold, TechFin regulation should focus on information gathering and ensuring regulatory access to data-based business models in order to ensure sound analytical methods and adherence to protected factors relevant to that reference market. If the risk analysis arising from the regulatory inquiry reveals systemic risk – for instance, because TechFin data is essential for one significant financial institution, or the TechFin provides the main client access for several financial institutions which together are of systemic relevance – systemic risk prevention measures should apply.



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