



The PAYTECH Book

THE PAYMENT TECHNOLOGY
HANDBOOK FOR INVESTORS,
ENTREPRENEURS AND
FINTECH VISIONARIES

SUSANNE CHISHTI
TONY CRADDOCK
ROBERT COURTNEIDGE
MARKOS ZACHARIADIS

WILEY

"Never has the field of payments been more dynamic, nor more exciting. The sheer volume and pace of change and innovation across our industry, reflected in unprecedented levels of investment as well as M&A, is just extraordinary. *The PayTech Book* provides an excellent foundation to help the reader navigate everything that's going on worldwide, and to better understand the drivers for all of that activity."

Jim Wadsworth, SVP, Mastercard

"Technology and payments are yoked together. It is technology that is driving payments forward not only in developed markets but also in emerging markets where it is so important to have solutions that can enable the currently underbanked to have access to digital financial services. *The PayTech Book* provides a fascinating insight from industry thought leaders into how PayTech is powering the digital payments revolution."

John Chaplin, Chairman, Payments Innovation Jury

"Payment is the most fundamental building block of commerce, and technology has always been a part of it. The bronze age gave us tools to hammer out coins. The industrial revolution let us print bank notes en masse. And now, in the 21st Century, the way we pay is being revolutionised by digital technology."

From contactless cards to mobile wallets to cryptocurrencies, technology is making it easier, safer and more convenient to make payments. It's a trend that touches people at all levels of society, and it shows no sign of stopping. Which means there's no better time than now to understand how the world of payments technology works, how it's regulated, and how new innovations will change the way we all do business."

The PayTech Book has a lot to teach us about this payment revolution. More importantly, it will spark debates about the role PayTech plays in our global economy, and which future payment experiences can benefit businesses and customers alike."

Angela Yore, MD, SkyParlour

"Commerce is an essential requirement for societies, communities and families to thrive. Moreover, trusted payment companies fuel commerce and must perpetually evolve and adapt to delight users – or they're replaced. *The PayTech Book* provides invaluable insights in areas such as complex and varied payment paradigms and products, technical considerations including blockchain, compliance and regulatory to enable payments businesses and banks to thrive."

**Gary Palmer, Co-founder, President, CEO, Chairman,
First Performance, Chairman, TECS (tecs.at)**

"*The PayTech Book* explains essential concepts of payments and current worldwide payment infrastructures for anyone to read and understand, offers a brilliant insight into the complex topic of regulation and compliance, including blockchain around the world, and finally provides possible responses to the most pressing payment questions and as how the future system could be shaped. It is a joy to read and I recommend it strongly."

Kamran Hedjri, Board Member, PXP Financial

"Keenly looking forward to *The PayTech Book*, the authors and contents suggest a formidable amount of brainpower and a fascinating read. This will be compulsory reading for the industry itself, but banks, retailers and large businesses ignore this revolution at their peril! I've worked closely with the editors and have the utmost respect for them. Enjoy!"

Mike Smith, Payments NED

"Few people understand the real influence and impact of payments and how they influence and promote economic growth. Few other consumer industries have adopted technology and innovated to the same extent as the payments space since the turn of the millennium and the pace of change over the last decade has been truly astonishing. From speed and ease of transaction and settlement to fraud detection and compliance there is no single discipline within payments that has not been materially and permanently changed for the better by the

application of technology. Regulators consumers and merchants alike demand better, faster, more compliant, accountable, fraud-sure, frictionless and alternative payments. From watches and rings, to phones and fingerprints, the relentless application of technology and the willingness of both the established players and the burgeoning PayTech space to keep pushing the boundaries, the payments industry is undoubtedly answering all the questions posed of it. Who would have thought, just five short years ago that you would no longer need to buy a ticket to travel around London and always get the cheapest possible fare – as I say, astonishing.”

Michael Harty, Founder MD, The Card and Payments Awards

“Payments has become a huge, global subject, with technology at its heart. So *The PayTech Book* is a ‘must read’ for all those involved in delivering or using payments. It very neatly takes the reader into this complex, evolving and interconnected world, drawing on insights from highly regarded industry experts, disruptive new market entrants and established players adopting digital transformation.”

Paul Anning, Partner, Osborne Clarke LLP

“*The PayTech Book* provides context to the use of emergent, technology driven, financial service resources in each of many market sectors. Automated Fare Collection systems in the transport sector are rapidly developing into fully integrated environments leading on to MaaS and Smart Cities. PayTech excels in detailing how the financial services industry is keeping up with this progress.”

Alan Leibert, Director, The ALCO Group Limited

“As we all know, ‘PayTech’ is well and truly embedded into the payments industry. ‘FinTech’ became ubiquitous when describing innovations within financial services, while PayTech encapsulates the specific technologies behind digital payment evolutions. It’s these developments – plus the forward thinking companies behind them – that keep adding excitement to the payments ecosystem by innovating and pushing boundaries.

So, the key to staying on top is to keep expanding our knowledge and remain aware of industry issues. *The PayTech Book* offers just that opportunity – not only does it house a wealth of information on the infrastructure which supports payments, but clarifies and explores the regulation that ensures businesses and consumers are kept safe.”

Tessa Unsworth, CCO at PrePay Solutions

The PayTech Book

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The PayTech Book

The Payment Technology Handbook for Investors,
Entrepreneurs and FinTech Visionaries

Edited by

Susanne Chishti

Tony Craddock

Robert Courtneidge

Markos Zachariadis

WILEY

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Preface

Join us on a journey through the fascinating world of payments. If you bring together consumers and businesses demanding change and a better customer experience, regulators enabling competition and technology making change possible, the future of payments is exciting, summarized in the term “PayTech”. We will share our vision for how the digital world will unfold, what this means for cash, plastic cards, digital wallets and mobile money and the financially excluded, and how cooperation will allow the payments industry to satisfy consumers’ and companies’ growing needs for instant, convenient and secure payments.

We will explain the changing role of money in our lives, introduce the concept of programmable money and its adoption in a world of open banking, commonly accepted standards and digital identity. We also cover the impact of the network effect in payments, and how overlaying data-driven insights enables more effective marketing at the point of purchase. Cybersecurity and its importance in a world of increasingly sophisticated criminals is explained, and how data analytics and artificial intelligence can prevent fraud and money laundering.

McKinsey forecasts that **payments** will become a US\$2 trillion business by 2020.¹ Payment transactions are increasing as economic activity grows, and the demand for payments is expected to rise globally as developing countries build their infrastructures and become more financially inclusive and as the emergence of the digital economy allows for more “on-demand” products and services driven by consumer demand. Investments

in the sector have been strong – global PayTech investment reached US\$18 billion across 123 deals in 2018. The record funding was due to Ant Financial’s US\$14 billion deal.²

In summary, the payments and PayTech sector is booming, with FinTech entrepreneurs and investors across the world working on the most cutting-edge solutions. In order to share with our readers the most valuable insights globally, we followed the same approach as with *The FinTech Book*, *The WealthTech Book* (focused on how new business models and technology innovation will change the global asset management and private banking sector) and *The InsurTech Book* (focused on the rapid changes in the global insurance market) – the first globally crowdsourced books on the financial technology revolution, published by Wiley, which have become global bestsellers.

The PayTech Book is the first crowdsourced book globally on the future of payments – a book that provides food for thought to FinTech newbies, pioneers and well-seasoned experts alike. The reason we decided to reach out to the global payment and FinTech community in sourcing the book’s contributors lies in the inherently fragmented nature of the field of payments technology. There was no single author, group of authors or indeed region in the world that could cover all the facets and nuances of PayTech in an exhaustive manner. What is more, by being able to reach out to a truly global contributor base, we not only stayed true to the spirit of FinTech and PayTech – making use of technological channels of communication in reaching out to, selecting and reviewing our

¹ <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Global%20payments%20Expansive%20growth%20targeted%20opportunities/Global-payments-map-2018.ashx>.

² <https://fintech.global/global-paytech-investment-in-2018-set-a-new-record/>.

would-be contributors – we also made sure that every corner of the globe had the chance to have its say. Thus, we aimed to fulfil one of the most important purposes of *The PayTech Book*, namely to give a voice to those who would remain unheard – those who did not belong to a true FinTech and PayTech community in their local areas – and spread that voice to an international audience. We have immensely enjoyed the journey of editing *The PayTech Book* and sincerely hope that you will enjoy reading it at least as much.

More than 148 authors from 30 countries submitted 168 abstracts to be part of the book. We asked our global FinTech and payment communities for their views regarding which abstracts they would like to have fully expanded for *The PayTech Book*. Out of all the contributors, we selected 74 authors who have been asked to write their full chapter, which has now been included in this book. We conducted a questionnaire among all our selected authors to further understand their background and expertise. In summary, our selected authors come from 20+ countries. The majority of our authors have postgraduate university degrees (60%, see Table 1),

Table 1: What is the highest educational qualification of our 74 authors?

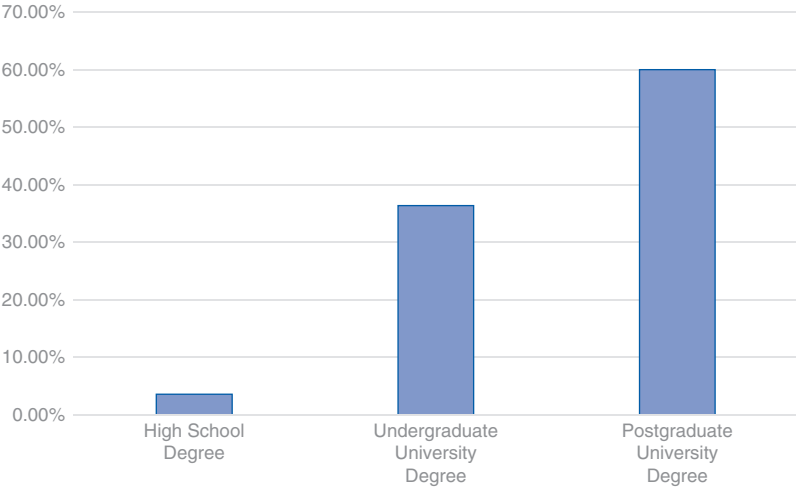
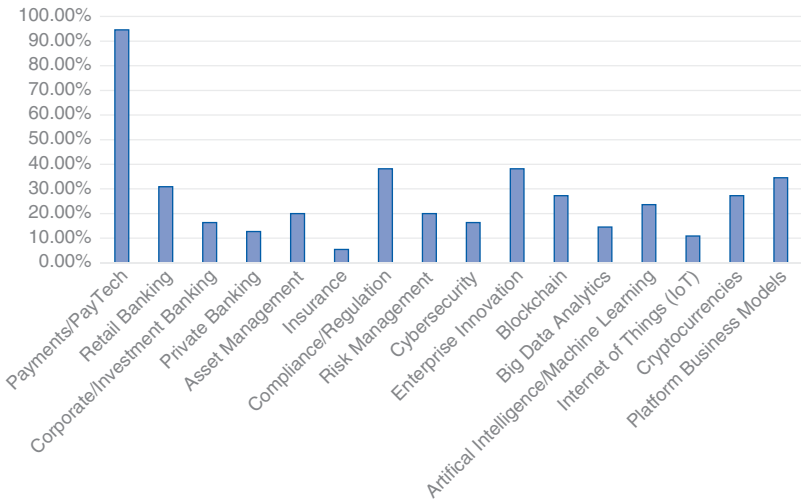


Table 2: List all areas in which our authors have domain expertise, multiple choices were possible



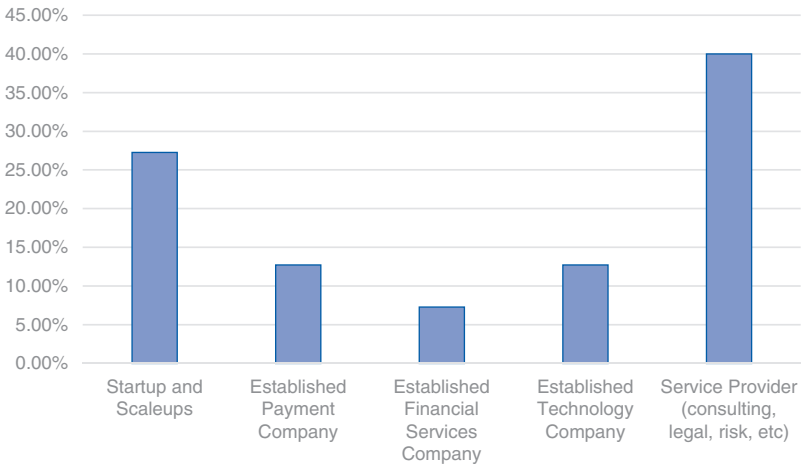
strong domain expertise across many fields (see Table 2) and over 87% of our finalist authors have had their articles published before.

Tables 3 and 4 show that almost half our finalist authors are entrepreneurs working for FinTech startups (many of them part of the founding team), a quarter come from established financial and technology companies and another quarter from service providers such as consulting firms or law firms servicing the FinTech and payments sectors.

A quarter of our authors work for startups with up to 10 people and another 40% for startups/small and medium enterprises (SMEs) of up to 100 people. A third of our authors are employed by a large organization of more than 100 employees.

We are very proud of our highly qualified authors, their strong expertise and passion for payments, PayTech and FinTech – either

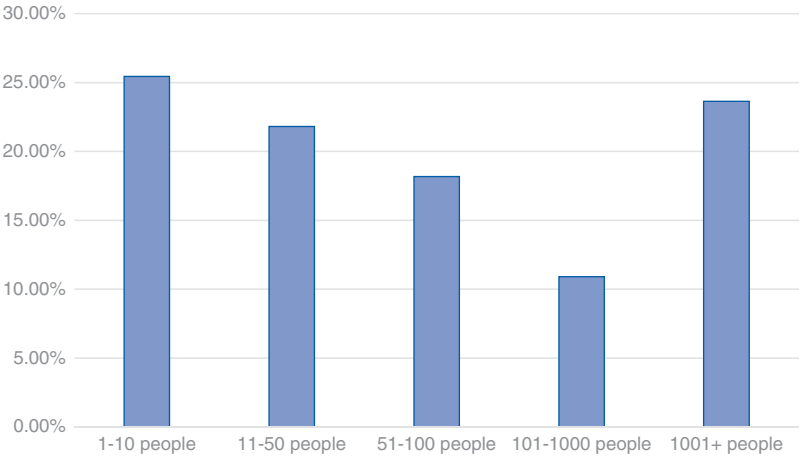
Table 3: Authors selected the type of company they work in



through being entrepreneurs or often “intrapreneurs” in large established organizations, all of whom are committed to playing a significant role in the global FinTech and PayTech revolution. These remarkable people are willing to share their insights with all of us over the next pages.

This book would not have been possible without the dedication and efforts of all contributors to *The PayTech Book* (both those who submitted their initial abstracts for consideration by the global FinTech community, as well as the final authors whose insights you will be reading shortly). In addition, we would like to thank our editors at Wiley, whose guidance and help made sure that what started off as an idea, you are now holding in your hands.

Table 4: Size of companies our authors work for



Finally, I would like to thank my fantastic co-editors Tony Craddock, Director General of the Emerging Payments Association, Robert Courtneidge, CEO Moorwand and Markos Zachariadis, Professor at Alliance Manchester Business School. Editing a crowdsourced book naturally takes several months and Tony, Robert and Markos were always a pleasure to work with, given their strong domain expertise and vision for the future of payments!

Susanne Chishti
 Bestselling Co-Editor, The FINTECH Book Series
 CEO FINTECH Circle & FINTECH Circle Institute

About the Editors

Susanne Chishti (Editor in Chief)

Susanne Chishti is the CEO of FINTECH Circle, Europe's first angel network focused on FinTech opportunities and founder of the FINTECH Circle Institute, the leading FinTech learning and innovation platform offering corporate innovation workshops to C-level executives and online FinTech courses. She is also the bestselling co-editor of *The FinTech Book*, *The WealthTech Book* and *The InsurTech Book* (published by Wiley). Awards:

- FinTech Champion of the Year 2019 (Women in Finance Awards)
- Social Media Influencer of the Year 2018 (*Investment Week*)
- Top 7 Crypto Experts Globally 2018 (*Inc Magazine*)
- City Innovator – Inspirational Woman in 2016
- European Digital Financial Services “Power 50”, an independent ranking of the most influential people in digital financial services in Europe (2015)

After completing her MBA, she started her career working for a FinTech company (before the term “FinTech” had been invented) in Silicon Valley some 20 years ago. She then worked for more than 15 years across Deutsche Bank, Lloyds Banking Group, Morgan Stanley and Accenture in London and Hong Kong. Susanne is an award-winning entrepreneur and investor with strong FinTech expertise. She is a judge and coach at global FinTech events and competitions and a conference keynote speaker. Susanne leads a global community of more than 130,000 FinTech entrepreneurs, investors and financial services professionals globally (www.fintechcircle.com).

Tony Craddock

An enthusiastic leader of the world's most influential association in payments, a lively public speaker and avid networker, Tony is passionate about payments and the difference they can make to lives everywhere.

Tony shares his deep payments knowledge born from 15 years' experience, and his evangelical zeal for innovation, when speaking and chairing conferences; publishing books and white papers; or enrolling leaders to join the Emerging Payments Association (EPA)'s collaboration network.

His role at the EPA is also to help shape projects that drive lasting change. These cover areas such as financial exclusion, open banking, financial crime, diversity, international trade and banking access.

Tony conceived and launched the EPA in 2012 and is its Director General. The EPA promotes the UK as a global hub for payments innovation and the interests of the EPA's 150+ members, which include banks, card schemes, payments service providers, issuers, processors and acquirers, who all come together to drive collective industry change.

Tony also leads the communities of EPA Asia, EPA EU, EPA USA and EPA Africa. His vision is that this global network of interconnected capabilities, people and knowledge will prove to be truly transformational in how the world works, for the benefit of everyone.

Robert Courtneidge

Robert Courtneidge was appointed CEO of international payments specialist Moorwand in 2018, following a distinguished career in the card and payments industry dating back nearly 30 years. He has been named amongst the Payments Power 10, a highly competitive ranking of the most influential payments industry contributors, for six consecutive years and was voted No. 1 in 2015.

During his career working across the entire payments ecosystem, Robert has developed a deep expertise in e-money, having supported projects for major financial institutions and well known technology providers globally. Robert is highly skilled in all aspects of consumer finance issues, including consumer protection, banking regulation and compliance and data protection.

Previously, Robert achieved success as a senior legal professional specializing in matters related to the cards and payments industry, and has been recognized in the Legal 500 for Corporate and Commercial – Financial Services.

Robert is a frequent spokesperson on current issues facing the European payments industry, including the second Payment Services Directive, fourth Anti-Money Laundering Directive and the laws relating to blockchain, cryptocurrencies and initial coin offerings. He travels globally to speak about card payments and financial technology. He is a regular writer in a number of key payments industry publications, and co-presenter of the Fintech Unplugged podcast.

Markos Zachariadis

Markos Zachariadis is Professor and Chair in Financial Technology and Information Systems at the Alliance Manchester Business School, University of Manchester, and a FinTech Research Fellow at the University of Cambridge. Markos's research sits at the cross-section of economics and strategy of digital innovation, financial technology studies and network economics, and he has studied extensively the economic impact of information and communication technology adoption on bank performance, the diffusion of payment networks and the role of data and standards in financial infrastructures and markets. His research has been published in top academic journals and books, and he has been awarded the NET Institute award for his study on the economics of payment networks and the SWIFT Institute and GRI awards for his research on open application programming interfaces and digital transformation in banking.

A board advisor, mentor and international keynote speaker, Markos has been invited to present his research insights to various international conferences, governments and global organizations. He was also the organizer of an international PayTech conference at WBS, funded by the Gates Foundation and Mastercard.

In the past, Markos has been a Professor of Information Systems Management and Digital Innovation at Warwick Business School, a Visiting Professor in FinTech at Ivey Business School, Western University, a Research Associate at Judge Business School, University of Cambridge and a Visiting Scholar at London Business School. He holds an MSc and PhD from the London School of Economics.

Acknowledgements

After the global book launch events of *The FinTech Book*, *The WealthTech Book* and *The InsurTech Book*, we met thousands of FinTech entrepreneurs, investors and financial services and technology professionals who all loved the books and wanted to learn more about how payment technology will change not only financial services, but our world overall.

We came up with the idea for *The PayTech Book* and spoke to our payment friends globally. Payment entrepreneurs across all continents were eager to share their powerful insights. They wanted to explain the new business models and technologies they were working on to change the world of sending and receiving payments to individuals and organizations globally. FinTech investors, “intrapreneurs”, innovation leaders at leading financial and technology institutions and thought leaders were keen to describe their embrace of the payment revolution. Payments are part of our lives, every day.

The global effort of crowdsourcing such insights was born with *The FinTech Book*, which became a global bestseller across 107 countries in 10 languages. We continued this success with *The WealthTech Book* and *The InsurTech Book*. We hope we can satisfy the appetite for knowledge and insights about the future of payments with this book.

We are aware that this would not have been possible without the global FINTECH Circle community, the Emerging Payment Association, the Fintech Unplugged Podcast and our own personal networks. We are very grateful to more than 130,000 members of FINTECH Circle for joining us daily across our website (www.FINTECHCircle.com) and our Twitter accounts and LinkedIn groups. Without the public support and engagement of our global FinTech and payment communities, this book would not have been possible.

The authors you will read have been chosen by our global payment community purely on merit: thus no matter how big or small their organization, no matter in which country they work, no matter if they are well known or still undiscovered, everybody had the same chance to apply and be part of *The PayTech Book*. We are proud of that, as we believe payments are at the centre of the world of finance. The global payment and PayTech communities are made up of the smartest, most innovative and nicest people we know. Thank you for being part of our journey. It is difficult to name you all here, but you are all listed in the directory at the end of the book.

Wiley, our publisher, has been a great partner for The FinTech Book Series and we are delighted that they will again publish

The PayTech Book in paperback and e-book formats globally. Special thanks go to our fantastic editor Gemma Valler. Thank you and your team – we could not have done it without your amazing support!

We look forward to hearing from you. Please visit our website (www.paytechbook.com) for additional bonus content from our global payment community! Please send us your comments on

The PayTech Book and let us know how you wish to be engaged by dropping us a line at info@FINTECHCircle.com.

Susanne Chishti
Twitter: @SusanneChishti

Tony Craddock
Twitter: @TonyCraddock

Robert Courtneidge
Twitter: @PrepaidRobert

Prof. Markos Zachariadis
Twitter: @MarkosZach

Twitter: @FINTECHCircle
@FTC_Institute
@FTCInnovate
@PayTechBook

Instagram: @FINTECHCircle
@PayTechBook

Payments Explained



PAYMENTS 101

What are payments?

- How do they work?
- Where are they going?

How Automated Clearing House (ACH) and Real-time Cross Settlement (RTGS) systems work?

What is “payments as a service”?



New emerging banks and their role in payments



The evolution of payments



Competing means of Payments:
“The Race”



“Payments are getting political again”

Payments regulation trends:

- Nationalism
- Compliance Innovation
- Interoperability
- Competition
- Cybersecurity

Executive Summary

From banknotes and coins, to plastic cards and mobile devices, payments have evolved over the centuries to include a number of instruments and means that help financial transactions to take place in the real economy. By nature, payment transactions are increasing as economic activity grows; the demand for payments is expected to rise globally as developing countries build their infrastructures and become more financially inclusive, and as the emergence of the digital economy allows for more “on-demand” products and services driven by consumer demand. But what exactly is in a payment and how are these cleared and settled in a modern financial system? What are the different technologies and infrastructures involved, and which elements are necessary in order to facilitate a payment?

This part looks at the broader question of *what's in a payment?* and provides explanations and descriptions of the various stages and elements of payment systems, as well as how automated clearing houses and real-time settlement systems work. It looks at these from historical as well as technological, procedural, socio-political and regulatory perspectives. It goes on to put this in the context of modern and emerging economies around the world. Special focus is put on the evolution of money and payments that look at the material representations of money, the establishment of electronic transactions and payment institutions, and the emergence of cashless societies. Case studies from emerging infrastructures and regulatory trends are used in order to illustrate progress in the field, and examples of new business model approaches – such as “payments as a service” – are highlighted to demonstrate how many of these technologies can introduce new business opportunities.

Payments are Getting Political Again

By Bill Maurer

Dean of the School of Social Sciences, University of California, Irvine, CA

In the USA, more and more retailers are adopting a “no cash” policy, only accepting payments by card or mobile phone. Sweden has long been touted as a country on an inexorable march towards becoming a “cashless society”. In both countries, however, policy-makers are starting to worry about the impact of cashlessness on the public good. Some states and municipalities have even taken up the cause of cash, arguing that refusing cash unfairly excludes the un- and underbanked from everyday commerce, and disproportionately impacts the elderly and recent immigrants. Some of them even see Indian Prime Minister Narendra Modi’s demonetization of high-denomination rupee notes as a cautionary tale. It sparked panic across the country during November and December of 2016, as people sought to exchange old notes for new, while the existing digital payment infrastructure was unprepared for an influx of new users.

Meanwhile, mobile app-based payments have swept through China. Alipay and WeChat Pay provide all-in-one suites of services, allowing users to purchase short-term bicycle rentals, order food delivery, buy movie tickets and even get fashion advice, and pay within the app or via QR codes scanned by the phone’s camera. These companies have pioneered new ways to bridge the divide between the physical world and online or mobile interactions. Alipay can send near-instant push messages for shoppers in physical world stores containing digital offers and coupons, pegged to products customers have picked up and scanned with their phones while walking the aisles. WeChat and Alipay are going abroad, too, setting up across the world from the USA to Finland to provide payment options for Chinese tourists. Only those with Chinese bank accounts have access to these services, however, creating a sort of distributed, virtual zone of Chinese

state sovereignty created through payment, whether in Helsinki or Hanoi. In response, some countries have put restrictions on these companies, with Vietnamese authorities sanctioning store owners who set up WeChat and Alipay services without going through a Vietnamese intermediary.

Why Payments are Political

Payments are political in that they are a function of state sovereignty, and also an extension of it. This is old news, of course: money itself emanates from state sovereignty. But digital payments, obviating the anonymity of cash transactions and generating vast quantities of data in their wake, provide new opportunities for states to extend their reach. It goes without saying that the Chinese government is able to garner vast troves of information on its citizens in-country and overseas by tapping into the data streams of mobile payment services. Much is being made of the partnership between Alibaba, the parent company of Alipay, and the Chinese government around various “social credit” scoring schemes. But I think the more mundane practice of state surveillance via machine learning algorithms, which are learning to spot shopping behaviour in which the government believes it has an interest, is more chilling because it is so banal.

Payments in the World’s Largest Economy

These politics of payments are not, of course, limited to authoritarian regimes. Payment providers have been enlisted into government service almost since their inception, whether in the tracking of cash to hamper criminal activities or in the regulations around customer due diligence and identification for cross-boundary payments of all kinds.

One of my colleagues once joked to me: “The [US] Bank Secrecy Act is the most moronically named law on the books.

It means the bank can keep no secrets from the government.” When the card networks and PayPal froze donations via their networks to WikiLeaks in 2010, they inserted themselves into a debate over information security and freedom. They also created one of those moments when the politics of payments were made explicit: in the ability of payments infrastructure to serve political ends.

Operation Choke Point followed: the US Department of Justice in 2013 mandated that banks conduct additional scrutiny of transactions over the automated clearing house (ACH) marked with a set of codes for merchants deemed “high risk” for criminal activity and money laundering (firearms dealers, payday lenders, dating services and other businesses). This was suspended due to a political pushback from the right wing in 2017, which saw it as targeting businesses associated with their constituencies (such as the gun lobby). Most American legislators – to say nothing of the general public – probably didn’t even know what the ACH was before this.

Payments Across a World in Turmoil

Recent geopolitical turmoil has put the spotlight on the politics of payments, too: it appears that Russian conspirators during the 2016 US Presidential election accepted payment in the cryptocurrency Bitcoin, in order to avoid the scrutiny of banking authorities. In February 2018, when there were rumours online that Chase Bank had been summarily closing the accounts of prominent figures of the white nationalist movement in the USA, there was renewed attention on Bitcoin among the far right. This underscored the origins of the cryptocurrency in libertarian philosophies about the relationship between so-called sound money and “liberty”.

But this is also an old phenomenon. Payments are getting political, *again*.

In the USA, the abolition of interchange on cheques was one of the first important achievements of the Federal Reserve. It not only smoothed interstate commerce, but also represented a new extension of federal power over the states of the union. That the majority of non-par banking states were historically members of the Confederacy only underscores the politics of payment and, specifically, their inflection by histories of American racism. One can trace a lineage from those in Congress who argued against par clearance of cheques to today’s white nationalists. At the time, the establishment of the Federal Reserve was seen as akin to the coming of the industrial railroads from the North: an affront to Southern sovereignty and to the hierarchies of race and value manifest, for Southern elites, in sound money and deposit banking.

Northern elites, it was argued, supported “greenbacks” (cash) and credit money, denaturing value in ways Southern elites likened to miscegenation (meaning “the interbreeding of people considered to be of different racial types”).¹ Southern bankers established the National and State Bankers’ Protective Association to fight the Fed’s mandate of par clearance of cheques and Southern lawmakers fiercely defended non-par banks. As one pronounced on the floor of the US House of Representatives:

The country bank needs no eulogy, its money has cleared the forest, made the countryside livable, and the city possible. As a rule, its life has been honestly spent with one object in view, and that objective was the preservation of the physical values and character values of its community. It should not die, for with it will go the last bastion of States’ rights, and freedom should shriek at its fall. (quoted in Miller 1949: 144)²

¹ M. O’Malley, *Face Value: The Entwined Histories of Money and Race in America* (Chicago, IL: University of Chicago Press, 2012).

² M.C. Miller, *The Par Check Collection and Absorption of Exchange Controversies* (Cambridge, MA: The Bankers Publishing Company, 1949).

Payments and their Relevance in Society

For physical values and character values, read whiteness. For State's rights, read segregation.

Federal Reserve agents travelling the country to enforce par clearance of cheques had to arm themselves (Medley 2014: 55).³ The chairman of the National and State Bankers' Protective Association compared them to socialists (Medley 2014: 62). On the Great Plains, similarly situated with regard to monopoly country banks and driven by its agricultural sector (a sector enabled by federal extension of railroads, which were, nonetheless, resented as land grabs by an overreaching government), a local paper opined, in a column liberally laced with anti-Semitic reference: "The Federal Reserve System is the visible hand of the Invisible Empire picking the pockets of the producers of real wealth" (quoted in O'Malley 2012: 178).

We read this today as payments scholars and professionals and think "Wow! Really? Payments created *that* kind of passion?"

Again, though, this should not be a surprise. Dee Hock, the visionary behind Visa, proclaimed payments to be the business of the electronic transit of value. As transit systems, infrastructures or "rails" as those in the business call them, payments systems are agnostic about the source or origin of the value they carry. Know Your Customer policies demand that banks curate data on the individual or personal source of that value. But the state itself actually animates it in the first place: in today's world, states are still the dominant issuer and guarantor of the standard of value. The state sets the standard and literally makes the money. Even

though bank credit expands the money supply and the world revolves around the hyper-financialization of everything, that the money is denominated by the state speaks volumes about the state's continued monopoly over the standard of value and the means of exchange.

Yet there are challenges to state dominance, not least because the state allows non-state providers to handle much of the business of payment. Historically, it has granted this licence to the banks. Today, the tech industry's interest in money and payments means there are countless non-bank parties coming onto the scene. The iPhone, M-Pesa and the 2008 financial crisis all fed into the hype and eventual traction of new FinTech startups promising new ways to pay and value-added services riding the rails of payment.

What this Means for the Future of Payments

All of this means that it's difficult to figure out exactly what payments might be becoming.

While some worry about payments as a means of state surveillance, more and more people are becoming conscious of the extent to which the most intimate details of their lives are known by Google, Amazon, Apple, Facebook and other such digital platforms.

These platforms themselves have variously dipped their toes into the payments industry, adding to the "Wild West" character that payments have taken on in the past 10 years. There are new entrants, new business models and often, frankly, imaginary business models built on dreams of data, or blockchain, or artificial intelligence, or a world of always-on, interconnected smart devices, which have to be able to transact with each other somehow...even dreams of payments in outer space, for if and when Earth becomes uninhabitable and people have to pay for stuff *somehow* out there in the solar system.

³B. Medley, *Highways of Commerce: Central Banking and the US Payments System* (Kansas City, KS: Federal Reserve Bank of Kansas City, 2014).

Several years ago it was common to imagine that payments would become a branch of marketing. By digitizing more and more payments and integrating payment data with physical world and online purchase data, as well as physical world geolocation, online browser, social media, text and voice, and even ambient sound monitoring via mobile phone, payments would become a piece in the puzzle allowing companies to anticipate or fill users' desires with just the right touch of personalization.

Payments Shaped for People, by People

What has always interested me, however, is those pesky users themselves. They have their own agendas, their own microlevel politics, as well as their own aspirational macropolitical relations too. Consider how Venmo and PayPal each generate unique constituencies or loyalties among groups of users, new social groups based on how, when and with whom you pay. For example, Venmo for friends sharing a dinner or renting an apartment, and PayPal for more distant relations or strangers over eBay, or in strictly online relationships.

With more attention to payments, and payment data, we can also hear the rumblings of another politics. Data activism has emerged as a potential social movement and political force. While users might haphazardly clear their browser histories or deny permission for mobile apps to access their digital photo collections or contact lists, signs of organized efforts to seize more control from platform companies over data are ever apparent:

- Information studies scholars point to and promote various efforts to obscure one's digital traces by generating more and more data rather than trying to embark on the hopeless task of cleansing one's data trails.⁴

⁴ F. Brunton and H. Nissenbaum, *Obfuscation: A User's Guide for Privacy and Protest* (Cambridge, MA: MIT Press, 2015).

- Sociologists and activists suggest alternative, cooperative data economies or means of data sharing or custodianship.⁵
- Some organized groups build new infrastructures by creatively adapting and rearranging the existing ones.⁶

One can discern in all this the rise of a new technological imaginary, one attuned to the centrality of data, its storage, ownership and use in everyday life. The EU's General Data Protection Regulation represents an obvious political response.

The Old Questions in Our New Digital World

What will all of this mean for payments? Leaving aside the scholars and industry professionals who work on and in payments and are probably hyperconscious about how they pay, it's difficult to say how intentional people's payment practices are outside of their quest for loyalty points or rewards. Will the politics of payments lead people to express political decisions in their choice of payment – that is, not in what they pay for, but in how they choose to complete the act of payment itself?

Again, though, these are in fact old questions. During prior periods of political upheaval around the world, people would overstamp state-issued banknotes or strike slogans on coins as an act of political assertion, and even the assertion of their own claim to sovereignty. What would be the latter-day analogue of this practice

⁵ Y. Milner, "An Open Letter to Facebook from the Data for Black Lives Movement" (2018), available at <https://medium.com/@YESHICAN/an-open-letter-to-facebook-from-the-data-for-black-lives-movement-81e693c6b46c> (accessed on 2 March 2019). N. Schneider, *Everything for Everyone: The Radical Tradition that is Shaping the Next Economy* (New York: Nation Books, 2018).

⁶ T. Lehtiniemi and M. Ruckenstein, "The Social Imaginaries of Data Activism" (2019), *Big Data and Society*, Jan/Jun, 1–12.

where corporate-controlled data economies are concerned? How can we countermark our Facebook data in an effort to reground our relationship to it, whether that be a relationship of ownership or something else? How can payments themselves mobilize alternative imaginaries of these relationships, given that they are among the most intimate, and most frequent, and most consequential actions a contemporary human being makes that bridge the physical and digital worlds while connecting us to one another?

If payments have always been political, and if payment politics are coming to the fore again, how can the payment technologies and relationships we design point towards a new politics, adequate to this data-saturated, rapidly warming and politically unstable world?

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