

The Future History of Payments

How the world is moving away from cash

A report from Kapronasia sponsored by Finastra

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Methodology

The Future History of Payments whitepaper from Kapronasia and sponsored by Finastra is based on both primary and secondary research. Secondary research sources include both internal and external public and private databases. Primary research includes interviews with bankers, financial institutions, technology providers and industry experts involved in the payments industry.

Even as the entire financial industry changes rapidly, nowhere has the change been as evident as in the payments segment. Around the world, banks, consumers, and businesses are making a shift in the way they exchange value.

Technological advances such as more affordable smartphones and the growing footprint and speed of mobile telecommunications networks have enabled this shift as have social-economic factors. In China, digital payments have underpinned the development of lifestyle platforms that are used by hundreds of millions of individuals every day. In Africa, digital payments have created security, transparency and economic empowerment for millions of farmers, merchants, and individuals who often live in remote locations.

It is clear that the world is shifting digital, but how and where it is happening is also critical. There are a unique set of circumstances that have enabled change in China. Could those same factors influence change in the United States? Change in Africa was driven by the need to bank the unbanked. Could the African case-study hold lessons for a well-banked European continent?

These are critical questions for anyone in the financial industry as they consider future strategic business and technology decisions.

To address these issues, we are pleased to bring you a Kapronasia report sponsored by Finastra entitled the Future History of Payments. Based on both primary and secondary research, the report is one of the most comprehensive studies published looking at the future of global payments.

The report starts by taking a look at where payments are today and the key trends, issues, and opportunities that the industry faces. The paper then takes a brief look at the trends that are shaping payments regionally around the world. Finally, we take a look at the future of payments, including the technologies and business models that are likely to dominate the future.

We hope you find this report as enjoyable to read as it was for us to research.



Zennon Kapron
Director

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Key Findings

- **Non-cash payment volumes are growing as the world moves digital.** This shift is driven by increased usage of mobile payments worldwide, especially in developing markets. Non-cash payments will reach 65% of all payments in China and 45% in India by 2020.¹ Despite this growth, cash remains essential for many countries: particularly in Africa and South America, where consumer habits and ongoing infrastructure developments limit mobile payment expansion.
- **Socioeconomic conditions have driven the shift away from cash, specifically in developing markets.** Digital payments can increase the transparency and security of transactions, which can make a huge difference in developing nations. This adds to other benefits including supporting financial inclusion and economic empowerment. Studies in India have shown that moving from cash to digital has dropped benefit payment 'leakage' from 30.7% to 18.5%.²
- **China leads a global rise in mobile payments.** China's mobile payment market is expected to grow at a CAGR of 35.1% from 2016 to 2022, as compared to 33.4% globally.³ Although this trend started in Asia, the international reach of the China's tech giants like Ant Financial continues to grow, challenging incumbents in Europe and the US who must innovate to stay competitive. Alibaba's recent acquisition of 33% of Ant Financial is a further indicator of the company's international ambitions.
- **The global payment industry's business model is becoming data-driven, but will be constrained in places due to regulation.** The payment industry's business model is moving from fee-driven to data-driven, as companies like Tencent create lifestyle platforms with a myriad of products and services on the front end, while payments and big data run seamlessly in the background. This shift in revenue model will be tricky in regions like Europe, where the PSD2 regulation is opening up new business models, but GDPR will strongly constrain the potential uses of data.
- **A.I. and machine learning will further streamline back-end payment processing.** Despite the hype, A.I. and machine learning will be integral to the payments industry, operating mainly in the background to make the payment process more seamless and intuitive. On the other hand, IOT and Augmented Reality will be more apparent as they change the user experience and integrate mobile payments into consumers' lives.
- **Real-time payments will continue to develop globally, but the focus will shift to new value-added services built on top of the basic infrastructure.** An example of this is Singapore and Thailand implementing real-time cross-border payments between the two countries. Both countries have launched real-time payment systems and are now building on top of them to create more value for the customer and open up new revenue opportunities for the organizations.
- **Regulations will create new opportunities, but not without constraints.** New rules and regulations will affect the market in different ways. Governments and regulators are often positive forces behind initiatives like real-time payment systems, yet at the same time, can constrain industry growth, such as global regulations like FATCA and domestic regulations that limit account opening in places like HK and Singapore.

¹ Kapronasia Analysis

² Sanjeeb Mukherjee, "Smart cards cut fund leakage in MGNREGA by 12%: Study", Business Standard, published 3 April 2014, accessed 16 January 2018, http://www.business-standard.com/article/economy-policy/smart-cards-cut-fund-leakage-in-mgnrega-by-12-study-114040201339_1.htm

³ Allied Market Research, "Mobile payment market by mode of Transaction, Types of Mobile Payment, and Application", Allied Market Research, published January 2017, accessed 16 January 2018, <https://www.alliedmarketresearch.com/mobile-payments-market>

Every organization, institution, and company is on their own journey of payment innovation and development, thus there is no one set of recommendations all organizations. However, this study identifies some vital overall recommendations:

Cross-border expansion – We are increasingly watching domestic champions expanding internationally, in particular, China's tech giants Ant Financial and Tencent. Although most of their international development has focused on payment acceptance, Alipay and WeChat Pay are launching local-currency wallets which will pose a competitive challenge to incumbents. Although Asia may seem geographically far away, paying attention to the expansion of China's tech players is critical.

Public-private partnerships are essential – Examples abound around the world of how relationships between governments and the private sector have aided or hindered the development of payment innovation. Developing working relationships between governments and the private sector is crucial for continued payment innovation, especially as many new projects are state-driven.

Technology for technology's sake – Twenty years ago, the idea of the Chief Information Officer having a seat in senior management meetings would have been hard to imagine. Today, technology has become an essential enabler for business growth, but organizations need to balance innovation with the sensible use of technology. Blockchain technology may be elegant but is not a solution to every problem. Augmented reality might be the new frontier but is meaningless if customers do not use it. Understanding the applicability and proper usage of new technology is critical.

Socio-economic factors – A critical driver of the uptake in digital payments are social economic factors within different countries. These can be financial inclusion indices, customer habits, or historical industry development. These vary significantly by country, but understanding them and accounting for them is critical for being able to understand customers and potential market opportunities better.

Open banking – A move that has been termed API banking, banking-as-a-service or open banking, this shift to open banking standards is happening around the world. In Europe, this is being driven by the PSD2 and through individual country efforts in other geographies. The shift is inevitable, and it is crucial that every bank and player in the payment space consider their strategy for how to deal with open banking.

A Brief Timeline of Payments

2000-Today

2017 IBM launches a cross-border payment system on blockchain technology.
2017 Mastercard issues blockchain payment system for B2B transactions.
2015 EU Parliament adopts Payment Service Directive 2 (PSD2).
2011 Google launches Google Wallet, a mobile wallet.
2008 Satoshi Nakamoto publishes the Bitcoin whitepaper.
2007 Mastercard introduces RFID based PayPass payments.
2007 IOS and Android mobile operating systems launch.
2007 EU Parliament adopts Payment Service Directive (PSD).
2004 Alibaba launches Alipay.

1975-1999

1999 The Euro currency is introduced.
1998 PayPal is founded.
1997 First mobile payment is sent via SMS to a Coca-Cola vending machine.
1994 The first online purchase is made to buy a Pizza Hut pizza.
1994 Amazon launches.
1980s POS RTGS launches in many countries.

1950-1974

1974 French engineer invents the first Integrated Circuit (IC) card.
1974 Electronic credit-card terminals start to replace paper-based systems.
1974 SWIFT launches cross-border payment messaging.
1973 Japan implements real-time payments.
1973 SWIFT is set up by 239 banks in 15 countries.
1958 Bank of America issues first credit card, later becomes VISA.
1950 The Diners Club Card appears in America.

1900-1949

1949 International Monetary Fund launches; form of gold standard effectively resumes.
1933 Suffering from the Great Depression, US gives up on gold standard, USD depreciates 33%.
1930 The Bank of International Settlements is established in Basel Switzerland.
1929 Start of Great Depression
1914 U.S. Federal Reserve System setup as central bank of the United States.

1800s

1891 American Express launches the Traveler's Check.
1873 The United States formally moves onto the gold standard.
1834 The United States informally starts to use the gold standard.

History

1717 The United Kingdom adopts the gold standard.
1575 French copper coins become the first true minted coins in the West.
1408 Casa delle compere e dei banchi di San Giorgio becomes Europe's first modern bank.
960 First Paper Currency Appears in China.

The Present History of Payments

Payments, in their most basic form, are a way of transferring value from one person to another. Millennia ago, in a less developed world, bartering was a critical form of trade. Payments, in those days, would have consisted of actual products like grain or fish. You sold a fish, and your payment was grain.

As the world became more interconnected, and as trade increased, the need for commonly agreed sources of value arose. This change shifted us as a society away from barter, to a system of payments based on instruments of value, like stones, beads, or gold, and eventually the coins and notes that characterize physical payments today.

Paying with cash is simple as it typically involves the exchange of physical currency in a face-to-face transaction. However, there are some downsides to this oldest form of payment.

Firstly, carrying around large amounts of money can be physically challenging and is not always safe. In particular countries, such as Venezuela, the currency has devalued so much that a simple US\$5 equivalent ATM transaction will result in a fistful of bills, which is not very inconspicuous nor safe.

Secondly, printing, moving, and handling money is costly. The cost of cash across a typical retail value chain - including the government, banks, merchants, and consumers - is approximately 13.2% of the total value of the physical currency on average.⁴ For governments, this cost includes printing money, distributing it and replacing it. To manage physical currency, banks need vaults, teller windows, ATMs, and all the related expenses. Merchants incur security, transport costs and potential lost interest when money is not in the bank. For the end consumer, physical cash can be stolen or lost.

Finally, cash is often impractical for both large value transactions and transactions across distances, again, because of the challenge of moving significant sums of physical currency.

Thus, although cash is nearly universally accepted, these challenges prompted economies to develop alternatives such as the check.

The Rise and Demise of Checks

Similar to many other forms of payment, there is no clear consensus on when the first checks were used. According to most history textbooks, the first extensive use of checks was in Holland in the early 1500s. Then, Amsterdam was a major international shipping and trading center, and merchants and traders began depositing it with “cashiers,” who operated similarly to a bank and would take and hold cash for a fee. This was the first use of a ‘written instrument’ to transfer value, and the payment method was soon used in other countries including England in 1780.

A few decades ago, checks were an essential instrument of payment, but today they are rapidly declining in use, to the point that few in the younger generation know what they are. The use of checks in the US peaked in 1995 with 49.5 billion

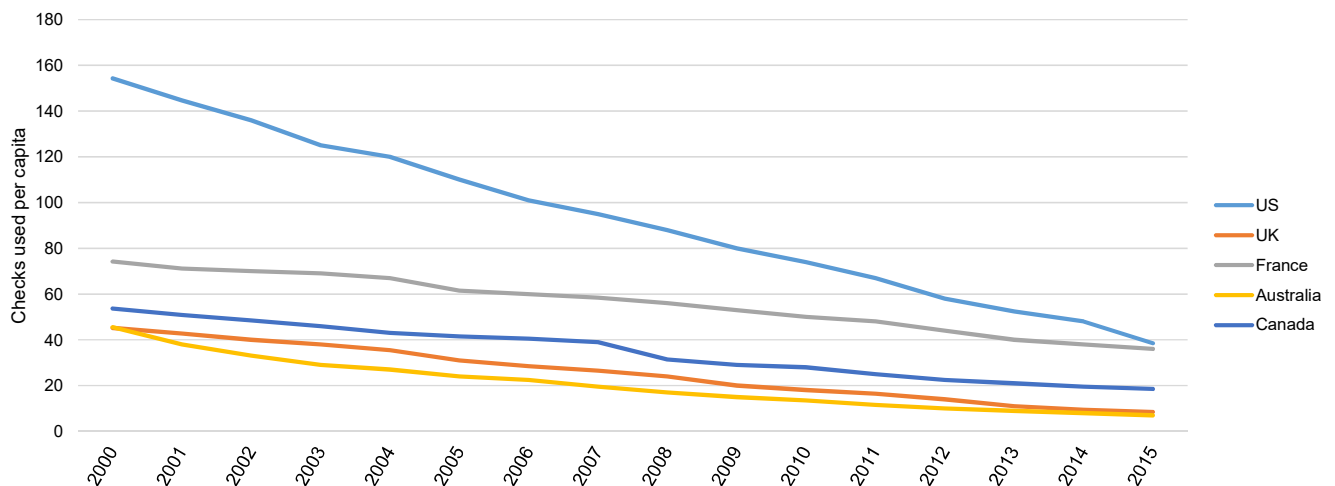
⁴ Kapronasia Analysis

check payments, and has since declined to 40 billion in 2000 and 17 billion in 2015.⁵ Checks are still used in certain nations and scenarios. The US maintains its love of checks: each American wrote an average of 40 checks in 2015.⁶ Certain countries, including China, still use checks for commercial transactions.

Given the prevalence of digital payment methods, it's no wonder that checks are losing favor. The original idea of transferring money via a paper-based instrument has long been surpassed by technology that achieves the same result, but in a fraction of the time. One of the first forms of these payments were credit cards.

Figure 1: The fall of checks worldwide

The US has always been, and remains, the world's biggest user of checks.



Source: Bank of International Settlements, European Central Bank, Reserve Bank of Australia

The Introduction of Plastic

Although credit cards today mostly run across digital networks, the original concept was similarly paper-based. According to the accepted industry explanation, the idea for a charge card was conceived in 1949 by Frank McNamara. McNamara was having dinner with clients in New York City and when it came time to pay, he realized that he had left his wallet at home which meant that his wife had to pay. McNamara returned to the same restaurant a few months later in 1950 and paid for the meal using a cardboard "charge card" and a signature, which is considered to be the first 'card' transaction.

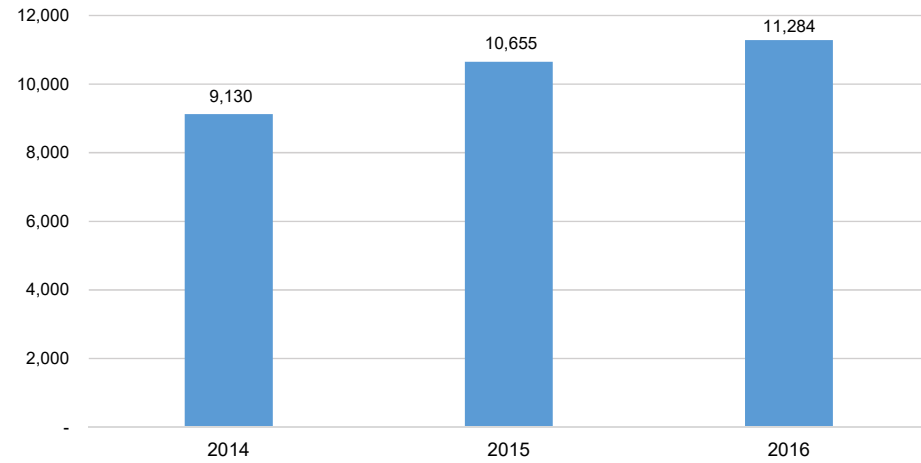
In 1951, American Express launched the first credit card, and acceptance across the US increased as its usage spread to other geographies. In 2014, global credit card penetration reached 17.8% as compared to 16.8% in 2011, which represents over 50 million new global cardholders.⁷

⁵ Federal Reserve System, "The Federal Reserve Payments Study 2016", United States Federal Reserve System, published 22 December 2016, accessed 16 January 2018, <https://www.federalreserve.gov/newsevents/press/other/2016-payments-study-20161222.pdf>

⁶ Committee on Payments and Market Infrastructures, "Statistics on payment, clearing and settlement systems in the CPMI countries", Bank for International Settlements, published December 2016, accessed 16 January 2018, <https://www.bis.org/cpmi/publ/d155.htm>

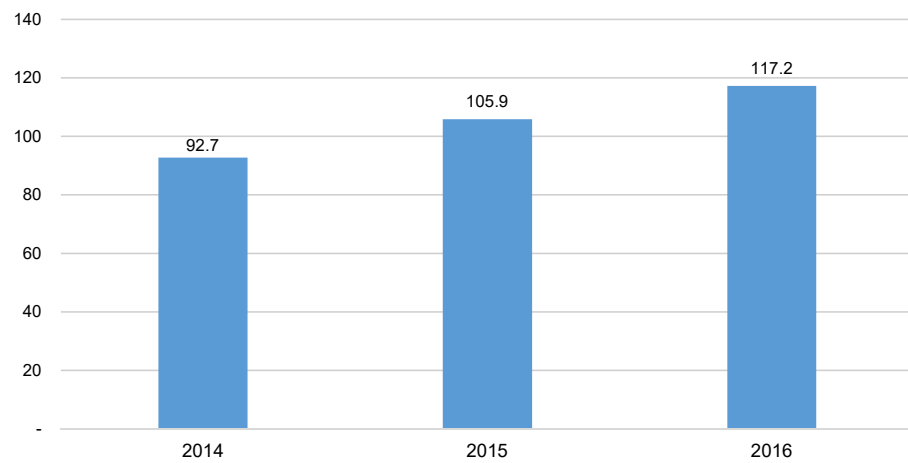
⁷ Worldbank Findex

Figure 2: Credit card usage is still growing but slower than before
Global credit card transaction value (USD billion)



Source: Nilson Report, Kapronasia Analysis

Figure 3: Transaction volume also slowing
Global credit card transaction volume (billions)

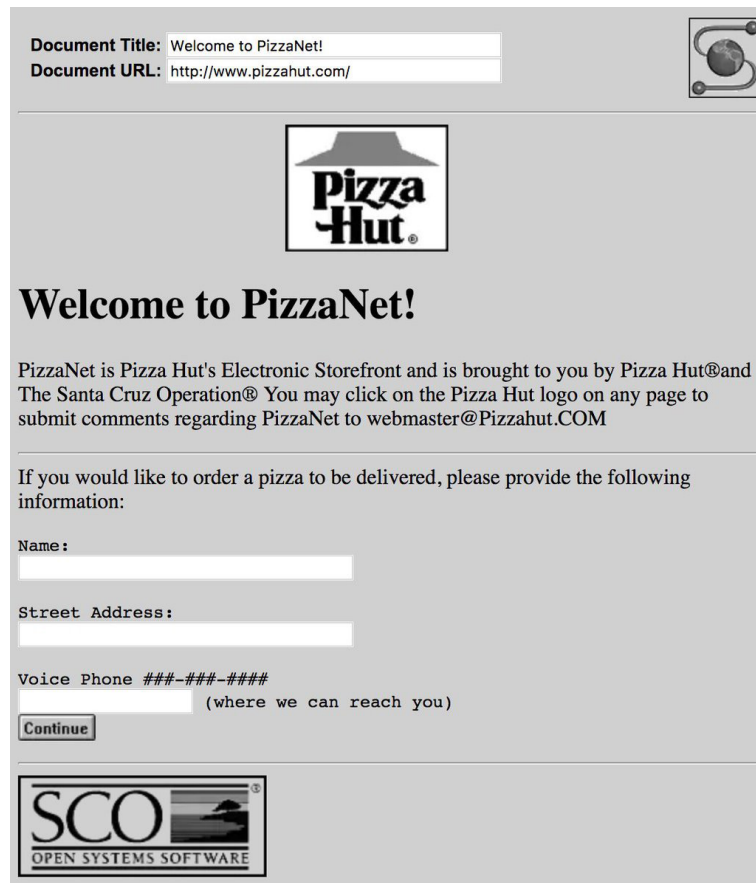


Source: Nilson Report, Kapronasia Analysis

Credit cards removed friction in card-present transactions, but e-commerce prompted the need for online transactions.

Moving Online

Although there were initial forays into online payments by companies that were using ‘electronic cash alternatives’, such as e-money, digital cash or tokens, the real breakthrough came in 1994 when the first transaction was made through a online food ordering system that Pizza Hut had launched in 1994.⁸ Customers could fill out a simple HTML form online and when they clicked send, the order printed out at the store they were ordering from.



The screenshot shows the PizzaNet website interface. At the top, there is a header section with a 'Document Title' field containing 'Welcome to PizzaNet!' and a 'Document URL' field containing 'http://www.pizzahut.com/'. To the right of these fields is a small icon of a globe with a network of lines. Below the header is the Pizza Hut logo, which consists of a stylized pizza hut shape above the words 'Pizza Hut'. Underneath the logo is the heading 'Welcome to PizzaNet!'. The main body of the page contains a paragraph of text: 'PizzaNet is Pizza Hut's Electronic Storefront and is brought to you by Pizza Hut® and The Santa Cruz Operation®. You may click on the Pizza Hut logo on any page to submit comments regarding PizzaNet to webmaster@Pizzahut.COM'. Below this text is a section titled 'If you would like to order a pizza to be delivered, please provide the following information:'. This section contains three input fields: 'Name:', 'Street Address:', and 'Voice Phone ###-###-####'. The 'Voice Phone' field has a placeholder '(where we can reach you)'. Below the input fields is a 'Continue' button. At the bottom of the page is the SCO logo, which stands for 'OPEN SYSTEMS SOFTWARE'.

In 1998, Confinity, a company that developed security software for portable devices, launched. In 1999, Confinity introduced a money transfer service called PayPal, which today is a publicly listed company that processed US\$114 billion payments in Q3 2017.⁹ A significant amount of their business also comes from China cross-border online payments.

Although online payments have proved incredibly popular and have helped drive the growth of the e-commerce industry, the real game changer was mobile.

⁸ Pizza Hut, "Pizza Hut Celebrates 20th Anniversary of World's First Online Purchase with 50 Percent Off Online Deal for Hut Lovers Members", PR Newswire, published 2 January 2014, accessed 16 January 2018, <https://www.prnewswire.com/news-releases/pizza-hut-celebrates-20th-anniversary-of-worlds-first-online-purchase-with-50-percent-off-online-deal-for-hut-lovers-members-238428021.html>

⁹ PayPal, "PayPal Reports Third Quarter 2017 Results", PayPal, published 19 October 2017, accessed 16 January 2018, <https://investor.paypal-corp.com/releasedetail.cfm?releaseid=1044634>

Payments in Your Pocket

The first mobile payment was, oddly enough, facilitated by Coca-Cola. In 1997, a customer could send a text message to specific Coca-Cola vending machines to pay for their drinks. The machine would receive a signal when the SMS was sent, and the can of soda would be released with the charge then showing up on the user's mobile phone statement – also one of the first uses of carrier billing. SMS continued to be used sporadically but struggled due to their high-cost, lack of security, slow speed and poor reliability.¹⁰

As phone technology improved, 'remote' mobile payments started in the early 2000s, enabling users to purchase goods and services on their mobile phone, using a mobile browser or mobile wallet. Remote mobile payments solved many of the challenges of SMS payments, but were principally limited in their application to m-commerce transactions.

Despite the continued growth of remote mobile payments, 'proximity' mobile payments struggled to take off. One of the main challenges was the hardware communication standard.

Alipay and Tenpay (Tencent's online payment platform) were making inroads in online payments, they had yet to break into offline proximity payments because of the monopolistic control of China UnionPay and the mobile operators. QR codes however, offered a viable solution. The codes were secure, easy to use, were already familiar to customers, and most importantly, are hardware independent. QR codes caught on, and now represent nearly 90% of all transactions on certain segments of the market.¹¹



¹⁰ Although rudimentary at the time, the use of text messages has continued to play a role in the global mobile payment market especially in Africa where feature phones are much more prevalent than smartphones. Carrier billing too has had a bit of a renaissance in the past few years around the world as an alternative form of payment, especially in emerging markets. From 2015-2016, carrier billing average revenue per paying user increased 30% in the Philippines

¹¹ Kapronasia Analysis

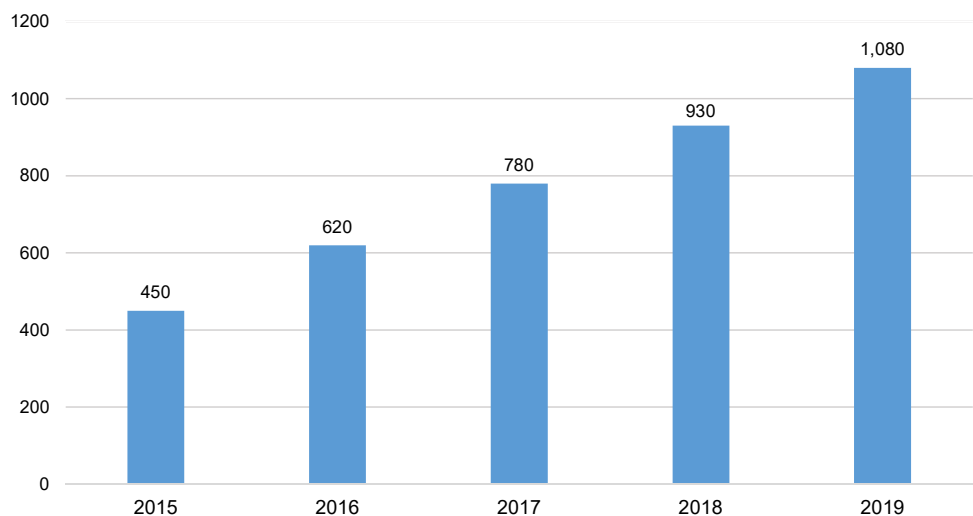
The integration of payments into Tencent's WeChat application has been even more interesting with the combination of chat and payments. WeChat Pay launched in August 2013, during the WeChat 5.0 update, which included QR code payments.

WeChat's usage of payments is part of a broader trend towards "social" payments that are conducted through a chat or social media app. The social aspect of the WeChat app fits with Tencent's history of providing some of the key communications platforms in China, including the still-present QQ messenger. The payments, in many ways, are simply the plumbing behind all of the other services that Tencent is layering on-top, including wealth management, taxi booking, etc.

Tencent has indicated that they make very little money on payment fees and so the company is likely more interested in the data flowing behind the payments. Leveraging that payment data, they can better understand their customer to be able to cross/up-sell other products. This is an excellent example of how the industry needs to look beyond just the profitability of the payment product itself and at the other products and services that can be layered on top.

Figure 4: Mobile payments continue to grow

Global mobile payment transaction value (USD billion)



Source: TrendForce

With a Wave of the Card

The first contactless payment was introduced in 1997 by Mobil.¹² The initial usage allowed customers to wave a contactless, pre-loaded "Speedpass" payment device, clipped to their keyring near a receiver, which allowed customers to pay for gas.

Public transportation would end up being the killer use for contactless cards. In 1997, Hong Kong launched the Octopus card, which allowed individuals to use the card in the HK metro, ferries, buses and trams. Although the Octopus card is somewhat limited by its company charter as to what it can or cannot do regarding card acceptance, many convenience marts and fast food restaurants, amongst other

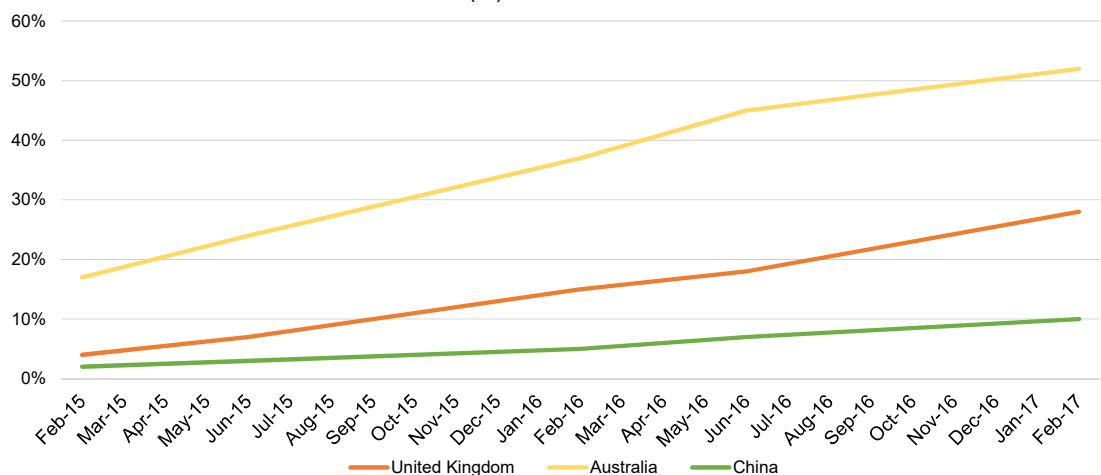
¹² David Parker, "A brief history of payments", Polymath Consulting, published October 2015, accessed 16 January 2018,

establishments, accept the Octopus card for payments. Hong Kong's taxi lobby has however resisted accepting them in taxis.

The turning point for contactless payments in the UK came in 2007 when Barclays started trialling the UK's first contactless credit card under the Barclaycard brand. UK restaurant chains such as EAT began to accept contactless payments as did public transport. Despite the launch of mobile payments from ApplePay and Google, contactless transactions number still increased by 174% in 2016 compared to 2015.¹³

Figure 5: China lags behind in contactless cards

Share of contactless transactions in all retail (%)



Source: UK Cards Association, RBA, Kapronasia Analysis

Real Time Payments

Another significant industry trend in the Present History of Payments is the proliferation of real-time payments. First implemented in Japan in the late 1970s, real-time payments were somewhat slow to catch on in other markets, but since the United Kingdom launched “Faster Payments” in 2008, the industry has been developing rapidly.

Today, all of the top-10 economies in the world have either already implemented real-time payments or are in the process of doing so. In Asia alone, Australia, Hong Kong, Thailand and Malaysia have all recently implemented real-time payment infrastructure and the rest of the region is not far behind.

In many scenarios, real-time payments are no longer optional, but a requirement. Whether driven by governments or pushed by private industry, all banks will need to shift to real-time at once to keep their competitive advantage. Often, real-time is also very useful for establishing new financial infrastructure and increasing financial inclusion. A good example of innovation on top of real-time payments can be seen in the growing set of cross-border real-time payment implementations.

¹³ The UK cards Association, “UK card payment 2017”, The UK cards Association, published 31 December 2016, accessed 16 January 2018, http://www.theukcardsassociation.org.uk/wm_documents/UK%20Card%20Payments%202017%20%20website%20FINAL.pdf

Real-time Cross Border

Hitherto, most of the development around real-time payments has been for domestic payment systems. Japan's Zengin system, despite having been around for nearly five decades, only serves domestic customers, similar to most other systems around the world. However, this is starting to change.

For many organizations, the move to real-time payments requires a broader infrastructure refresh as well, as many legacy infrastructures are not necessarily ready for the increase in transactions and the immediate nature of transactions.

In this way, real-time payments are only the start of a larger industry transition and provide a platform for new products and services to be built on top of the payment rails. Some of these can be in the form of direct value-added services around the payments themselves, or the basis of larger efforts, such as providing credit scoring, lending, or cross-border real-time payments.

Real-time cross-border payments connection between Singapore and Thailand. Singapore's G3 real-time system had been running for just over a year and Thailand had just finished the Prompt Pay integration. The integration is among the first of its kind, but one of many we are likely to see in the future.

Countries with Real-Time Payments				
Bahrain	Brazil	Chile	China	Denmark
Finland	Ghana	Iceland	India	Japan
Kenya	Mexico	Nigeria	Poland	Republic of Korea
Singapore	Spain	South Africa	Sri Lanka	Sweden
Switzerland	Taiwan	Thailand	Turkey	United Kingdom

The Role of the Regulators

Over the past decade, regulators have had their work cut out for them. There has been rapid change within the traditional financial industry as well as the threat of 3rd party substitutes like Alipay or TransferWise. Regulatory approaches have typically fallen into a few different categories:

- **Wait and See** – China is an excellent example of the ‘wait and see’ approach. The government recognized the potential benefits of new fintech business models in the payments and wealth management market, and let the companies grow, only later to regulate lightly to ensure that they did not generate too much risk.
- **Embrace fintech** – Around the world, many cities are competing to be fintech centers, often with government and regulator support. As an example, the Monetary Authority of Singapore has a director and division focused solely on fintech; in many jurisdictions we have also seen the development of fintech sandboxes to facilitate innovation. Many regulators have also pushed innovation directly through the implementation of real-time payment systems and regulations/requirements on API and open banking, such as Europe’s PSD2.
- **Business as Usual** – For many jurisdictions, including the U.S., certain fintech models are limited by existing regulations. As an example, setting up a payment business in the U.S. requires different licenses from each of the states where the system will be operating which can be costly. Although fintech continues to grow in these jurisdictions, it can be hampered by regulation.

Regulator or Private driven?

Many of the global real-time payment implementations are good examples of how smart regulation can help the industry and the economy as a whole. Implementations are often driven by the government and used to support a national agenda of innovation to drive economic growth. An efficient payment infrastructure can help accomplish that goal. Singapore’s G3, Hong Kong’s Real Time Payments and Australia’s NPP have all been government-led.

Banks may be more reluctant, which has caused issues in the past. Australia’s NPP was delayed by a year in 2014, as five institutions pulled funding; the system will finally be live in 2018.¹⁴ At the same time, third parties like Alipay and PayTM have taken advantage of the indecision and are using digital payments drive new revenue streams and enable new products and services. This underscores the importance of collaboration: private and public need to work together to ensure that benefits and challenges are understood all around.

The Dutch Payment Association (DCA) is an excellent example of how collaboration can help. Working with its members, the DCA has created an industry forum where issues around payment systems can be identified and addressed.¹⁵ The DCA, whose members include banks, regulators, the government and other interested third parties, even drill down to specific industry issues such as cyber-crime.

¹⁴ Shaun Drummond “Payment system’s \$1billion overhaul delayed a year”. The Sydney Morning Herald, published 11 December 2014, accessed 16 January 2018, <http://www.smh.com.au/business/banking-and-finance/payment-systems-1-billion-overhaul-delayed-a-year-20141202-11yfoi.html>

¹⁵ Dutch Payments Association, “Annual Report 2016”, Dutch Payments Association, published 6 June 2017, accessed 16 January 2018, <https://www.betalvereniging.nl/wp-content/uploads/Annual-Report-Dutch-Payments-Association-2016.pdf>

Regional Differences

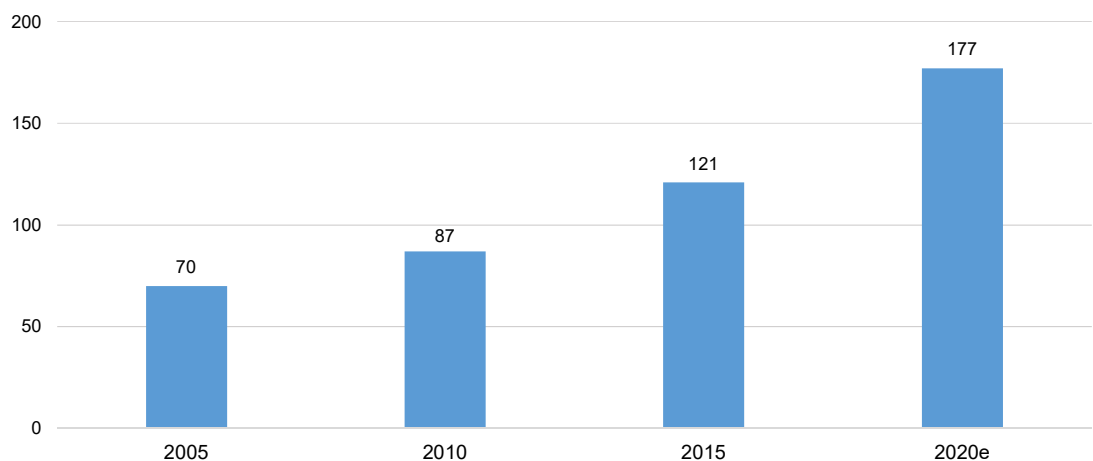
Although there are many commonalities across payments globally, there are regional nuances that can be attributed to several factors:

- In regions such as Africa, **technology availability and adoption** have meant that digital payments are primarily done on basic feature phones to deal with the fact that infrastructure is not as developed.
- **Regulators and governments** have also significantly affected payment development by encouraging innovations like real-time payments in various countries around the world development and defining payment guidelines such as Europe's PSD2 that will also affect API and open banking and payments in general.
- **Social-economic factors** like China's historical love of cash, are also being tested, as new generations of millennial customers demand a unique, digital payment experience.

Europe – Still the Land of the Cards

Today, cards dominate consumer payments in Europe as 46% of the 106 billion transactions per year in the European Union are done by card payment.

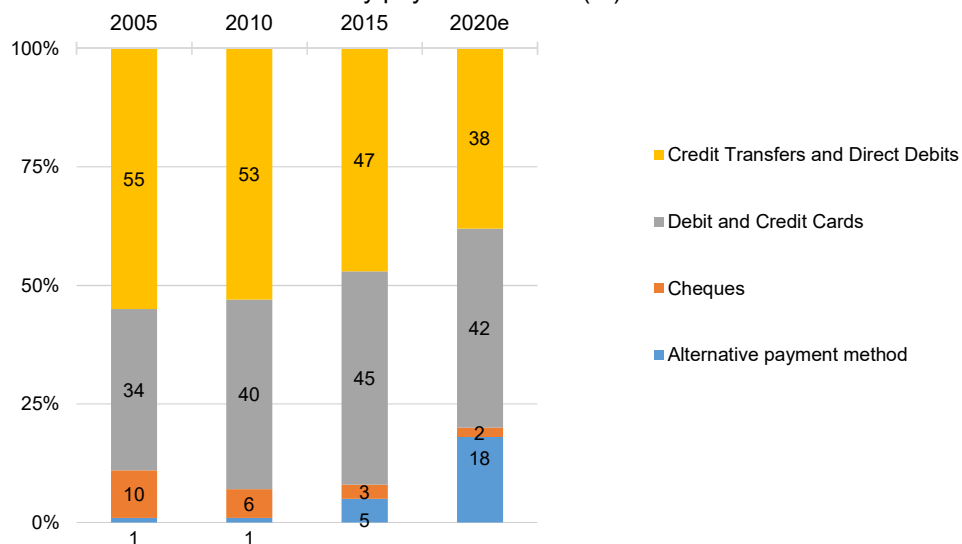
Figure 6: European non-cash transaction growth shows no signs of slowing
Number of non-cash transactions (USD billions)



Source: A.T.Kearney, European Central Bank

Figure 7: Europe's large growth in alternative payments

Share of transaction volume by payment method (%)



Source: A.T.Kearney, European Central Bank

This use of cards instead of mobile, is exceptionally high when compared to mobile banking. One would think that if a consumer were using their phone for mobile banking, they would also be using it for payments, yet despite the fact that nearly 68% of Europeans between 18-34 years old use mobile banking, mobile payment penetration is still low. In France, for example, more than half of smartphone users polled in December 2016 by Iflop, said they were not willing to use mobile payments, even for purchases less than €20 (\$22).¹⁶

French card payment penetration is even higher than the rest of the EU. In 2014, online and offline card payments accounted for 50% of non-cash payments, a number that is increasing 5% a year. The growth of card usage is supported by the French government's national payment strategy to provide a more accessible and faster payment method for consumers. This effort will be further supported with the arrival of open banking which should give consumers more options and better services.

In Germany, the situation is similar: offline card payments dominate the market. In 2014 only 8.5% of Germany's retail revenue was done online, while in China, it was already 11%.¹⁷ Online shopping represented 17% of all retail commerce in China, but it is predicted to be only 15% of Germany's e-commerce by 2025, likely due to socio-economic factors.¹⁸

¹⁶ Karin von Abrams, "Personal Mobile Payments on the Rise in Europe", eMarketer, published 10 April 2017, accessed 16 January 2018, <https://www.emarketer.com/Article/Personal-Mobile-Payments-on-Rise-Europe/1015592>

¹⁷ Industry Investment, "Ministry of Commerce" 2016 China Retail Industry Development Report", Sohu, published 6 July 2017, accessed 16 January 2018, http://www.sohu.com/a/155050733_465938

¹⁸ Denis Beau, "Breakdown of the use of non-cash payment instruments", Banque De France, published 5 December 2016, accessed 16 January 2018, <https://www.banque-france.fr/sites/default/files/media/2016/12/05/mapping-of->

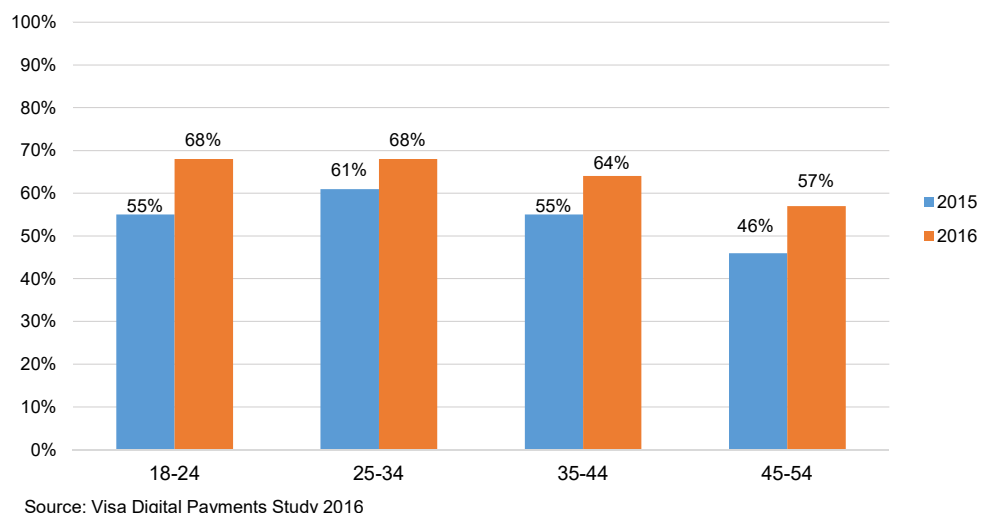
In the UK, the situation has advanced significantly in the past 20 years as fintech has grown and businesses have moved mobile. For example, Barclays launched their mobile wallet app in 2012 and attracted over 19,000 users in the first few weeks. New registrations reached 2 million, and user numbers increased 200% in 2013. Despite this, contactless cards remain popular, with over 50% of UK retail transactions in 2016 completed using a card.¹⁹

The Future – is it mobile?

The usage of cards in Europe is not surprising. With contactless cards in use across the continent, consumers have gotten used to frictionless “tap-and-go” transactions. The ease of contactless payments could be part of the reason that mobile payments have failed to take off in a big way in Europe, as they have in Asia. If the current model works well, why change? Indeed, when we look at the reasons why mobile payments have taken off in China, the friction surrounding contactless transactions was a key driver.

Despite this, European banks are ready for mobile payments. Nearly all of the big banks in Europe have smartphone banking applications that include some mobile payment functionality, while many new upstart ‘challenger’ banks are mobile-first and have no branches. On the consumers’ side, mobile banking is getting more popular too. According to study conducted by Visa in 2016, mobile banking acceptance has grown among the people from all the different age groups they surveyed.

Figure 8: More Europeans are shifting to mobile banking
European consumers using mobile banking (%)



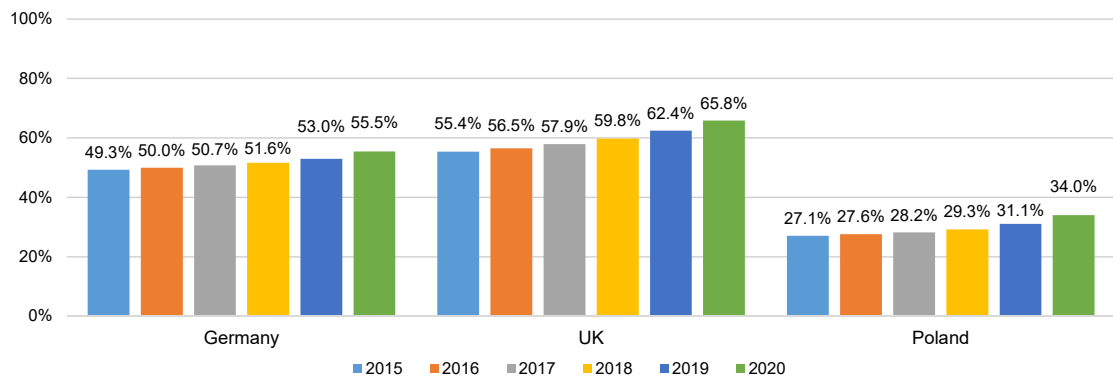
cashless-means-of-payment-2014-data.pdf; Gerold Doplbauer, “Ecommerce: Growth without end?”, GfK GeoMarketing, published 31 July 2015, accessed 16 January 2018, http://www.gfk-geomarketing.com/fileadmin/gfkgeomarketing/en/consultancy/20150731_GfK-eCommerce-study_fin.pdf

¹⁹ The Guardian. 2018. “Cash no longer king as contactless payments soar in UK stores” The Guardian, 12 July 2017 Accessed 17 January 2018, <https://www.theguardian.com/money/2017/jul/12/cash-contactless-payments-uk-stores-cards-british-retail-consortium>

Alternative payment players such as Apple Pay are trying to shift the market as well, but still have significant challenges ahead.

One of the key takeaways from Europe's mobile payments market is that being 'frictionless' is critical, and that typically means a digital solution. Although trust in cash is considered the highest of all payment methods due to its immediacy and physical nature, the speed and convenience of cards are difficult to beat, even by mobile phones. Many consumers seem to find it easier to take a card out of their wallet than to unlock their phone. Despite this, we should continue to see mobile payments grow in Europe.

Figure 9: Europe slow to accept digital
Non-cash payments (%)



Source: Kapronasia, PYMTS.com, Deutsche Bundesbank, Vaultex

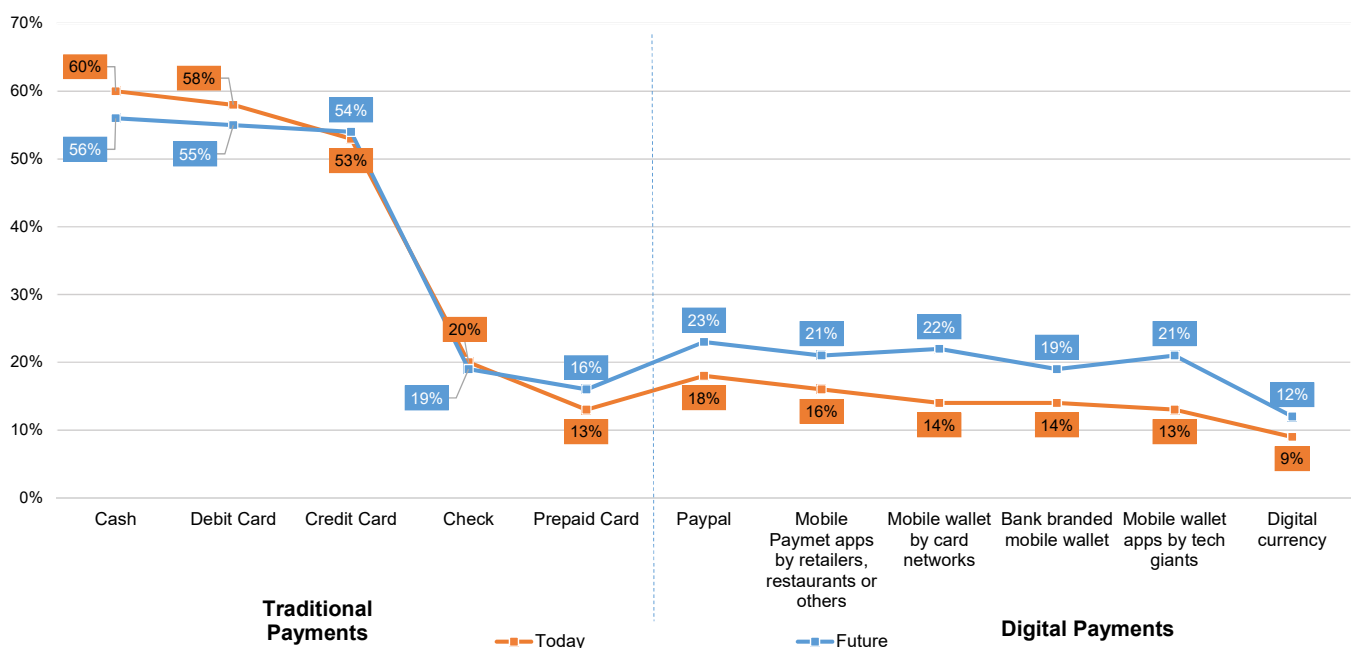
North America

The United States is the world's biggest economy, Canada 10th and Mexico 15th.²⁰ Consumer spending alone is worth USD\$13.2 trillion per year in North America, and the region is also the second largest e-commerce market in the world with a gross merchandise value (GMV) of USD\$562 billion per year.²¹

This economic heft makes North America one of the most competitive globally, not just overall, but in banking and payments as well. However, cash and cards are still dominant as the uptake of mobile payment is still relatively slow.

Figure 10: Consumers open to digital payment, but tradition remains

Comparison of consumer use of payment options today and future (%)



Source: Accenture, December 2016

Canada

Canada is one of the most financially inclusive societies in the world. 99% of Canadians have a bank account, and 73% have credit cards.²² Only 8% of Canadians do not have access to the internet, and 71% of the population own smartphones. Three-quarters of the population use online banking. Cash is still the most frequently used method of payment at the POS, and credit cards dominate the market by value, primarily driven by their use in e-commerce.

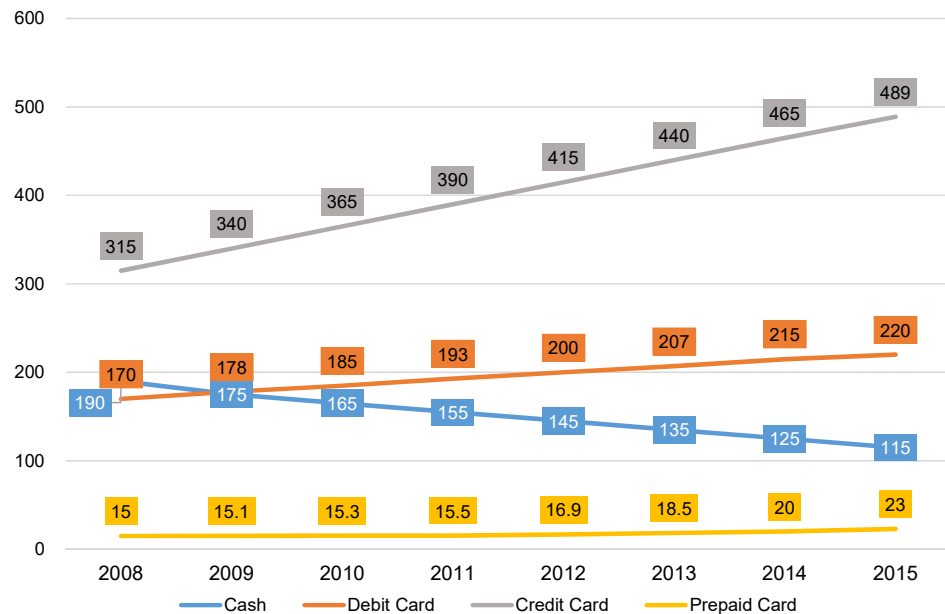
²⁰ Worldbank

²¹ PPRO Financial Ltd, "PPRO'S Payments & E-Commerce Report: North American & Oceania", PPRO Financial Ltd, published 2 March 2017, accessed 16 January 2018, http://www.paymenteye.com/wp-content/uploads/sites/19/2017/05/PPRO_NAO_ecommerce_report_2016.pdf

²² ibid

Figure 12: The rise of Canadian credit cards

POS transaction value in Canada (USD billions)



Source: Michael Tompkins and Viktoria Galociova, 2016 Canadian Payment Methods and Trends

The United States

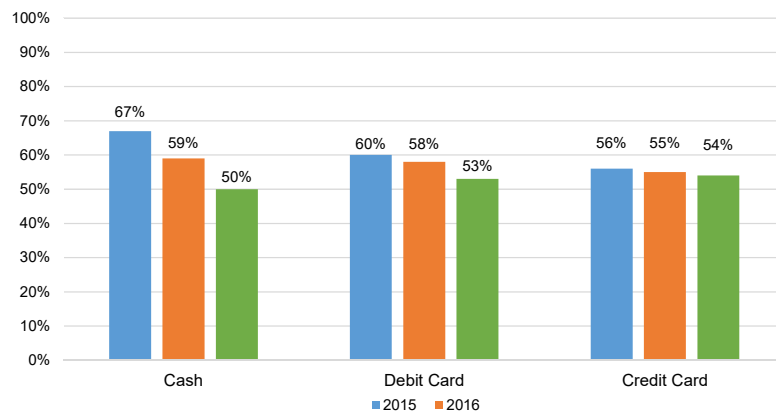
The US is also heavily card driven with 95% of Americans holding credit cards.²³

84% of Americans use the internet regularly. Although the popularity of shopping online has increased and the fintech industry has grown rapidly, mobile payments, eWallets, touch and go, and other payment methods have not taken to the market quite yet. Only 19% of Americans use an eWallet and at the moment, PayPal is the leader in alternative payment methods.²⁴

²³ Ibid

²⁴ Jim Marous, "US Consumers Won't Change Payment Habits", The Financial Brand, Published December 5 2016, accessed 17 January 2018 <https://thefinancialbrand.com/62691/mobile-digital-payments-usage-awareness-iot/>

Figure 13: North Americans losing touch with cash
Retail payment usage of individuals per week (%)



Source: Accenture, October 2016, North America Consumer Payment

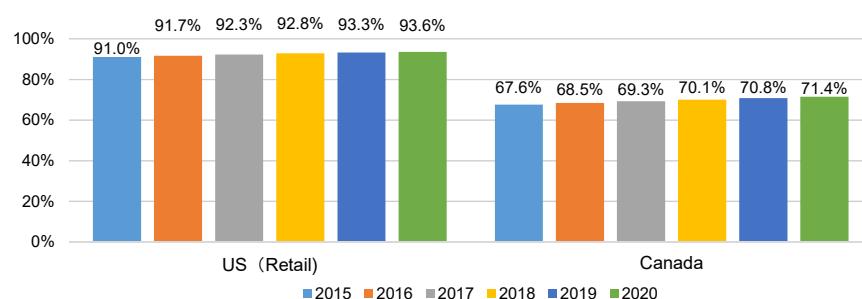
The Future

The use of cash in North America will slow in the future, but still remains important to the continent. Cards will still be one of the most used forms of payment and although usage of debit cards is expected to decline, credit cards should remain strong.

Despite the United States being a tech powerhouse, mobile payments have been slow to take off. Some of this is likely due to differing standards and lack of merchant acceptance, but with the convenience of cards, there is no significant incentive to switch, especially when cards offer miles, discounts, cash-back, and other rewards.

The North American retail payment market is huge and has significant potential. The question is if the industry can get consumers to use their phones not only to Tweet and Snap, but to make transactions.

Figure 14: North America relies heavily on non-cash
Non-cash payments (%)



Source: Kapronasia, Capgemini, Payments Canada, Cash Product Office; Federal Reserve System, PYMNTS.com

Middle East - Cash is King as governments push for digital

There are only 17 countries in the Middle East. Even so, the economic disparity is obvious. The Gulf Cooperation Council (GCC) consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. The GCC accounts for 20% of the Middle East's total population but contributes to over 60% of the GDP.²⁵ Because of the concentration of wealth in these countries, we also see higher mobile phone penetration. In Qatar, 75% of the population has a mobile phone, the UAE 73% and Saudi Arabia 60%.²⁶

Despite this mobile penetration, cash still dominates the payment market as the general payment preference of both buyers and sellers. According to a PwC Middle East retail survey in 2016, over 80% of the transactions in the Middle East are made in cash.²⁷ Even for online shopping, cash payment remains people's first choice with cash-on-delivery accounting for 80% of all online transactions in 2016. E-commerce sales volume in the Middle East will expand from USD 22.3 billion in 2016, to USD 43.3 billion by 2020.²⁸ Although it is unclear how many of these transactions will be made using cash in the future, we should expect a significant amount to remain.

The Future

The Middle East's reliance on cash is due to a number of socio-economic factors: including education, awareness and habits. Although cash will likely remain king in the Middle-East, through government promotion, people are gradually learning about the ease and benefits of a cashless society.

A recent survey from MasterCard indicates that mobile payments in the Middle East will increase rapidly with over 70% of respondents in the survey stating that they were willing to use mobile phones to make payments.²⁹ The shift to mobile could also have a tremendous economic impact, as studies have shown that the Middle East could add USD 95 billion in GDP by 2020.³⁰

25 Armando Guastella & Alex Menghi, "GCC Market Overview and Economic Outlook 2017: A Challenging Transformation Ahead to Achieve Desirable Growth", Value Partners, published December 2016, accessed 16 January 2018, <http://www.valuepartners.com/wp-content/uploads/2016/12/MENA-REGION-122016-DIGIVERSION.pdf>

26 Enrico Benni, Tarek Elmasry & Peter aus dem Moore, "Digital Middle East: Transforming the region into a leading digital economy", McKinsey, published October 2016, accessed 16 January 2018, <https://www.mckinsey.com/global-themes/middle-east-and-africa/digital-middle-east-transforming-the-region-into-a-leading-digital-economy>

27 PwC Middle East, "Total Retail Survey - Middle East 2016", PwC, published 12 December 2016, accessed 16 January 2018, <https://www.pwc.com/m1/en/publications/total-retail-survey-2016.html>

28 BMI Research, "Middle East e-Commerce: A Market In Transition", BMI Research, published 1 June 2016, accessed 16 January 2018, <https://www.bmiresearch.com/articles/middle-east-e-commerce-a-market-in-transition>

29 Mastercard, "Mastercard survey shows Kenyans want more digital services", MasterCards, published 27 September 2016, accessed 16 January 2018, <https://newsroom.mastercard.com/mea/press-releases/mastercard-survey-shows-kenyans-want-more-digital-services/>

30 Enrico Benni, Tarek Elmasry & Peter aus dem Moore, "Digital Middle East: Transforming the region into a leading digital economy", McKinsey & Company, published October 2016, accessed 16 January 2018, <https://www.mckinsey.com/global-themes/middle-east-and-africa/digital-middle-east-transforming-the-region-into-a-leading-digital-economy>

APAC – The World Leader in Mobile Payments

The APAC region now accounts for three quarters of global payment transactions, with China accounting for the majority of those transactions. China is also seeing third-party payment companies take a leading role in the payment industry with Alipay and Tencent's WeChat Pay holding an impressive duopoly with over 95% of the third-party mobile payment market in 2017.

Japan was one of the few countries that first developed mobile payments. Yet, credit card payments still dominate the Japanese payment market.³¹ A unique payment method in Japan is the convenience store payment system called Konbini which, in 2016, accounted for over 16% of the payment market in Japan.³²

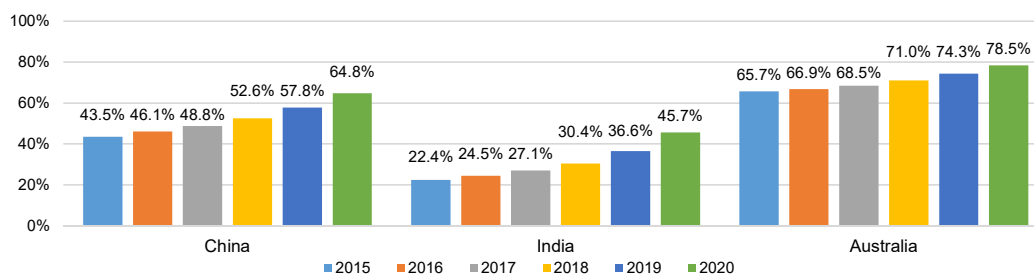
The Future

Mobile payments will dominate the payment market in APAC, with China continuing to lead the way. The successful example of the Chinese payment industry has seemingly inspired other countries in the region, including India and Southeast Asia. People, and more importantly governments, are starting to realize the usefulness and advantages of mobile payments.

China's payment giants Alipay and WeChat Pay are also expanding rapidly overseas. Their initial expansion was to follow Chinese tourists and provide acceptance in other markets, but we are increasingly seeing them provide additional products and services in the local markets.

In Southeast Asia, comparatively open regulation combined with the vast population and financial services' limited accessibility, has led to the creation of an entirely new and innovative form of financial services. According to analysis, in 2016 the e-commerce market reached 50 billion dollars and it is expected to be 200 billion dollars by 2025, leaving an incredible market for online payments.³³ With these figures continuously growing, online consumption, online payment and mobile payment markets, are becoming increasingly valuable and important.

Figure 15: APAC leads the digital revolution
Non-cash payments (%)



Source: Kapronasia, PYMTS.com, People's Bank of China, The Boston Consulting Group, The Institute for Business in the Global Context, Reserve Bank of Australia

31 KPMG, "Card payments in Asia Pacific, the state of the nations", KPMG, published April 2009, accessed 16 January 2018, https://www.kpmg.de/docs/Payments_in_Asia_Pacific.pdf

32 Tim Parry, "A Snapshot Look at Ecommerce Payments in Japan", MultiChannel Merchant, published 27 March 2014, accessed 16 January 2018, <http://multichannelmerchant.com/must-reads/a-snapshot-look-at-ecommerce-payments-in-japan/>

33 Rajan Anandan, et al., "E-Conomy SEA Spotlight 2017", Google and Temasek, published 12 December 2017, accessed 16 January 2018, <http://www.temasek.com.sg/Documents/userfiles/files/e-Conomy%20SEA%20Spotlight%202017%20Full%20Report.pdf>

South America

Just over 400 million people call the world's fourth-largest continent home. Financial inclusion across the continent is also a challenge, with only 30% of the continent's population having access to a bank account. Furthermore, 60% of SMEs' transactions are done with cash and 47% of employees are working in an 'irregular' (part-time / intermittent) economy.³⁴

In general, cash is the most common payment method for individuals in South America, but credit card usage has grown in the last couple of years, especially in Brazil, where credit card businesses are very profitable.³⁵ Despite consumer credit reaching its limits, credit card businesses are growing, albeit in a more challenging environment, as competition increases.³⁶

At the same time, the e-commerce industry has grown quickly in some countries, which has led to a wider range of payment options and spurred fintechs to set up e-wallet and payment businesses. PayPal launched in Brazil in 2010 and now covers Mexico, Chile, Peru and Columbia. PayU is a Colombian company and covers even more areas in Latin America. Mercadopago is also competitive in the market and has a partnership with Alipay.³⁷

However, e-commerce development is different across the continent. In Mexico, only 14% of consumers shop online, due to high interest rates and fraud. In other countries, digital banking is less developed, so cash underlies many of the transactions, meaning that many potential trades are refused. On the other hand, 60% of the population in Peru shops online.³⁸

From the government's perspective, it is important to encourage non-cash payments. Especially since Latin American governments are fighting a "War on Cash" to stop tax evasion and corruption in the continent.³⁹

The Future

South America's future development will remain unbalanced throughout the region and differ from country to country. The majority of payment choices are influenced by Brazil, the largest economy and trade partner. Cash will remain an important method of payment, but the increased issuance of cards and penetration of smartphones will support a larger shift to digital payments.

34 Ding Pei, "Latin America Digital Payment Market Report", ISTIS, published 17 July 2017, accessed 16 January 2018, <http://www.istis.sh.cn/list/list.aspx?id=10726>

35 Michelle Evans, "How Latin American Digital Consumers Shop and Spend", Euromonitor International, published 12 November 2017, accessed 16 January 2018, <https://blog.euromonitor.com/2017/11/latin-american-digital-consumers.html>

36 Americas Market Intelligence, "Latin America Cards & Payments Trends Whitepaper", Americas Market Intelligence, published 25 October 2015, accessed 17 January 2018, <https://www.slideshare.net/AmericasMarketIntelligence/latin-america-cards-and-payment-trends-whitepaper>

37 Ding Pei, "Latin America Digital Payment Market Report", ISTIS, published 17 July 2017, accessed 16 January 2018, <http://www.istis.sh.cn/list/list.aspx?id=10726>

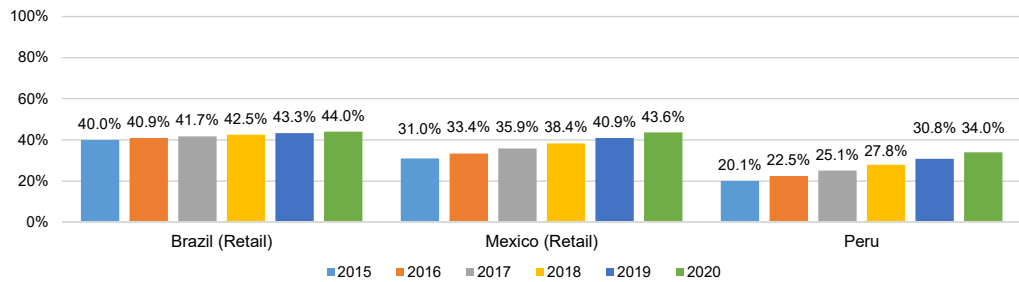
38 *ibid*

39 AMI Americas Market Intelligence, "Latin America Cards & Payments Trends Whitepaper", SlideShare, published 25 October 2016, accessed 16 January 2018, <https://www.slideshare.net/AmericasMarketIntelligence/latin-america-cards-and-payment-trends-whitepaper>

The risk in South America is the alignment of the government to driving programs around payment innovation. With political and economic issues plaguing some of the continent's largest countries, payment innovation across the continent will remain uneven and largely driven by private enterprise.

Figure 16: Latin America still loves cash

Non-cash payments (%)



Source: Kapronasia, Central Bank of Brazil, Pew Research Center, Americas Market Intelligence, PWC

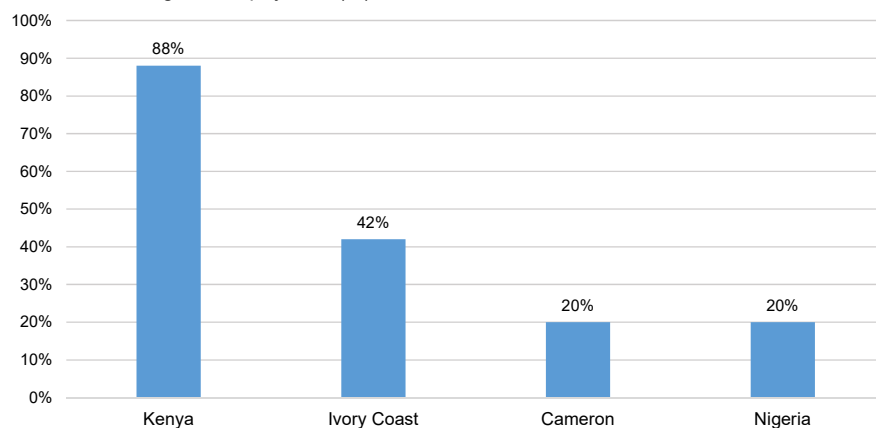
Africa – A diamond in the rough for Mobile Payments

In most African countries, cash is the dominant payment method, even for e-commerce where many transactions are cash on delivery. However, in certain countries such as South Africa and Morocco, the e-commerce and credit card payment markets are growing rapidly.

Mobile payments have also had tremendous success in Africa and continue to grow in popularity, especially in less developed areas. M-Pesa is one of the most successful mobile payment platforms in the world and has done a lot to help tackle the challenge of financial inclusion. M-Pesa marked its 10th anniversary in 2017 with nearly 30 million customers and 287,400 agents across 10 countries. In 2015, 89% of Kenya's population was using M-Pesa for mobile payments. The Ivory Coast, Cameroon, and Nigeria have also developed a large user base of mobile payment users.⁴⁰

Figure 17: Kenya leads the pack in mobile payments

Individuals using mobile payment (%)



Source: African Development Bank Group, October 2016

⁴⁰ Daryl Collins, Julie Zollmann, & Peter Fleming, "Is M-PESA Replacing Cash in Kenya?", CGAP, published 14 November 2012, accessed 16 January 2018, <http://www.cgap.org/blog/m-pesa-replacing-cash-kenya>

Several Chinese companies have also invested in developing mobile payments in Africa. Alipay, WeChat Pay and Huawei have all set up business there. China's Transsion Holdings, is one of the largest mobile phone manufacturers in the world and second largest smartphone vendor in Africa selling the TECNO, itel and Infinix brands. Transsion was one of the first Chinese smartphone manufacturer to explore the African market and have a manufacturing plant in Africa.

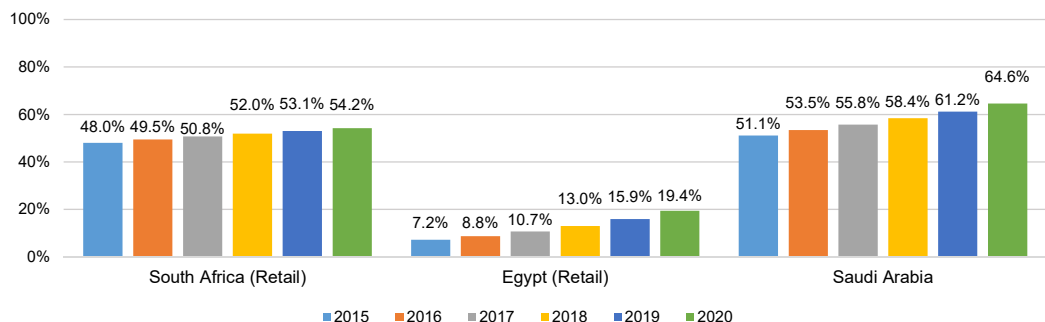
Although most of Africa's mobile phone users are using feature-phones, the arrival of these reasonably priced smartphone manufacturers is laying the groundwork for a potential shift from SMS-based mobile payments, to smartphone-based payment platforms.

The Future

With this increased usage of smartphones in Africa, the mobile payment market is expected to keep growing. Cash may remain the dominant method for the next few years, but in areas with high mobile penetration, digital payment will grow quickly.

The investments and footprint of Tencent in Africa may also impact the development of the payment market. One of Tencent's earliest investors was Naspers, a South African VC, which is now helping Tencent to grow its footprint in Africa. The interoperability of the QR-code based WeChat Payment system, may be incredibly useful in Africa, where the most likely next step will be cheaper smartphones like TECNO.

Figure 18: Africa & The Middle East shows a dramatic contrast
Non-cash payments (%)



Source: Kapronasia, Mastercard, PYMTS.com, McKinsey on Payments, World Bank, Payment System Strategy Board, Mada

The Future History of Payments will be marked by the adoption of new technologies which will lead to new ways of making payments and interacting with financial providers. Smartphones ushered in the first wave of the 'new digital payments'; now technologies like blockchain, biometrics and IoT will usher in the second.

Biometrics

Biometric payments are surprisingly old, and first appeared in 2006 in the United States. In March 2006, 'Pay by Touch,' the leading biometric payment provider at the time, reported that more than two million customers had enrolled in their biometric services and that Pay By Touch had authenticated approximately \$8 billion in transactions.⁴¹

Despite the failure of Pay by Touch a few years later, Biometrics is seen by many as the future of payments. Traditional card and digital payments raise concerns over security breaches, hacking and identity theft, however this could all be a thing of the past. What better password or authentication system than your own unique finger print or facial scan?

Biometrics represent the potential for safer, harder to replicate authentication techniques, with the added advantage of not having to rely on a card, which can be easily lost, copied or stolen. According to a recent report by Acuity Market Intelligence, mobile biometrics will increase by 41 percent CAGR from \$6.5 billion in 2016, to \$50.6 billion in 2022.⁴² The driving force behind this change is the desire for increased security.


The payment and technology industry is still exploring how consumers can use their own bodies to maximize security. Many companies are testing the use of fingerprints, faces, voices and irises to validate and authenticate a payment or transaction. MasterCard recently announced that it is testing facial recognition technology to authorize transactions, with an anticipated roll-out to the general public in 2018. Alibaba is testing using a 'selfie' to pay and verification through facial recognition.

Samsung is looking at fingerprint, voice and iris recognition for its Samsung Pay offering; Apple already allows fingerprint authorization for iTunes purchases and payments with Apple Pay, and the new iPhone X incorporates facial recognition for authentication. With these industry giants looking at biometrics, there is strong evidence to suggest the technology will be key to future payment systems.

The downside of Biometric payment systems, particularly facial recognition, is the lack of privacy. If companies and institutions possess databases with everyone's faces or voices, it gives them the ability to identify customers everywhere they go. This pervasive tracking already exists to a certain extent with location-based software on most smartphones, however through biometrics, consumers will leave a data trail almost everywhere they go.

⁴¹ Margaret Rouse, "Biometric Payment", SearchSecurity, accessed 16 January 2018, <http://searchsecurity.techtarget.com/definition/biometric-payment>

⁴² Justin Lee, "Mobile biometrics market to exceed \$50.6B in revenue in 2022", biometricupdate.com, published 18 September 2017, accessed 16 January 2018, <http://www.biometricupdate.com/201709/mobile-biometrics-market-to-exceed-50-6b-in-revenue-in-2022>



An even greater risk would be if hackers managed to gain access to this Biometric database. In fact, according to an article by the Telegraph, researchers have claimed they have hacked a Samsung Galaxy S6 and a Huawei Honor 7 phone by taking a photo of someone's finger and printing it out with special ink.⁴³ It has even been reported that Fingerprints have been copied using molds made from gummy bear sweets. By exploiting biometrics, hackers could track any individual's movement and purchasing habits. However, it is still considerably more difficult to steal and reproduce a fingerprint than to overcome a password or a pin.

The question which then arises, is how much privacy are consumers willing to trade for convenience and security? According to a 2016 Experian survey conducted in the UK, 61% of consumers believe biometric identification is either “just as secure, or more secure, than current system passwords” and 40% would be “happy to use a fingerprint scan to access their accounts.”⁴⁴

Despite some of the concerns highlighted, many countries are choosing to embrace biometric payment systems, and are using them to their advantage.

In Japan for instance, the Ministry of Economy, Trade and Industry will be rolling out fingerprint scanning technology that can make payments, check-ins, and other services a lot more seamless for tourists. Restaurants, hotels and other establishments visited by tourists in popular destinations will be a specific focus.

The fingerprint experiment is part of a wider effort by the Japanese government to encourage visitors from overseas to visit the capital leading up to the 2020 Tokyo Olympic and Para-Olympic Games. Officials are hoping to launch the system throughout the country, including Tokyo by 2020, with as many as 40 million overseas annual visitors expected by that year.⁴⁵ The new payment system will be called ‘Touch and Pay’, and will use unique fingerprint technology provided by Liquid Inc.

Liquid Inc's technology uniqueness lies in the fact that it doesn't rely solely on fingerprints, or what the prints look like. Instead, their patented scanners use feature points such as branch points and endpoints. This improves its reliability by over 90,000 times, which translates to one error every 9 billion scans.⁴⁶ Like most advanced fingerprint scanners, the technology doesn't store fingerprint images. Instead, it stores data derived from fingerprint features which are impossible to revert to an image.


Fingerprint payments should make retail payments easier for visitors during the Olympics and the government also wants to make them faster. Regulators have set the ambitious goal of having all retail payments be real-time by the Olympics in 2020.

43 Danielle Demetrio, “Tourists in Japan to use fingerprints as ‘currency’ instead of cash”, The Telegraph, published 11 April 2016, accessed 16 January 2018, <http://www.telegraph.co.uk/news/2016/04/11/tourists-in-japan-to-use-fingerprints-as-currency/>

44 Experian, “UK now ready for biometric banking”, Experian, published 13 January 2016, accessed 16 January 2018, <https://www.experianplc.com/media/news/2016/uk-now-ready-for-biometric-banking/>

45 Danielle Demetrio, “Tourists in Japan to use fingerprints as ‘currency’ instead of cash”, The Telegraph, published 11 April 2016, accessed 16 January 2018, <http://www.telegraph.co.uk/news/2016/04/11/tourists-in-japan-to-use-fingerprints-as-currency/>

46 Lexi Golden, “Facial recognition technology will replace IDs, credit cards, and passwords”, VentureBeat, published 11 October 2017, accessed 16 January 2018, <https://venturebeat.com/2017/10/11/facial-recognition-technology-will-replace-ids-credit-cards-and-passwords/>



In the US, HSBC has enabled voice-based authentication for its customers. Called 'Voice ID', the system uses voice biometrics for authentication, where a customer needs only to repeat a passphrase to confirm their identity. In a statement announcing the system, HSBC US Head of Direct Channels LuAnne Kingston emphasized the superiority of this kind of biometric authentication over security based on passwords and security questions, which are "a common consumer frustration, both from a convenience and security standpoint."⁴⁷

It is another example of HSBC's growing interest in biometric authentication, with the bank having launched a selfie-based account registration system for business customers in autumn 2016, and a Technology Advisory Board with a strong focus on biometrics at the start of 2017. However, according to a BBC investigation, a man's non-identical twin was able to access his brother's account by mimicking his voice, leading to concerns over the system's effectiveness and security.⁴⁸

In China, Alibaba ran an experimental café that replaces cashiers with biometric recognition and a mobile app. It's called the Tao Cafe, and it was run as part of the Taobao Maker Festival, an event meant to showcase participants in Alibaba's Taobao mobile marketplace. Using Alibaba's AI and data technologies, Tao Cafe invited customers to shop at the offline store without having to wait in queues to pay for drinks or food.

The cafe had a few employees on hand to prepare the food and drinks, however, no cashiers were required as all transactions were done digitally.

A customer could walk up to the counter and order an americano, which prompted the system to scan her face through the screen and withdraw the price of the coffee from her Alipay account.⁴⁹

Digital Ledger Technology

The original concept of Bitcoin was to create "A Peer-to-Peer Electronic Cash System" to allow individuals or entities to move value cross-border for very low cost and relatively quickly. Although that concept is still possible, technical challenges in the Bitcoin code mean that transactions have become relatively expensive and slow. There have been several attempts to remedy the challenges, but any change to the direction of Bitcoin's development requires a hard-fork and getting consensus on what that hard-fork should look like has not been easy.

There have also been some attempts to layer technology around bitcoin to address these issues, such as the Lightning network, but the view of Bitcoin seems to have shifted from viewing Bitcoin as a payment tool to viewing it as a store of value, effectively a digital gold. Indeed speculation is that the interest from institutional and hedge-fund investors is behind a significant increase in Bitcoin's value in the last 2-3 years.

⁴⁷ FindBiometrics, "HSBC Launches Voice ID Biometric Authentication System for US Customers", FindBiometrics, published 25 April 2017, accessed 16 January 2018, <https://findbiometrics.com/hsbc-voice-id-404253/>

⁴⁸ Dan Simmons, "BBC fools HSBC voice recognition security system", BBC NEWS, published 19 May 2017, accessed 16 January 2018, <http://www.bbc.com/news/technology-39965545>

⁴⁹ FindBiometrics, "Alibaba's Experimental Tao Café Replaces Cash With Biometrics", FindBiometrics, published 21 July 2017, accessed 16 January 2018, <https://findbiometrics.com/alibaba-tao-cafe-biometrics-407218/>

Although Bitcoin's direction and future use may be as an asset, the Blockchain technology that came with it, will be essential for cross-border payments.

Cross-border payments & Blockchain Technology

Cross-border payments play an important role in the global payments flow. According to a McKinsey report, in 2014, cross-border payments volume accounted for 20% of global payments, it contributed to USD 360 trillion in revenue, which represents 50% of global transactional revenue.⁵⁰

Despite this, for years cross-border payments have encountered the following main problems:

- ***Lengthy:*** a cross-border payment can take more than two working days, depending on the payment system and the connections among banks.
- ***Expensive:*** Cost is not really an issue in a large transaction in terms of the percentage, but can make a difference for smaller retail transactions. On average the remittance fee is 7.45% per transaction.⁵¹ For small transfers like USD 200, the remittance fee can take around 10% to 15% of the principal amount. For small and medium companies or certain groups of people, the fee can be a significant financial burden, especially when dealing with frequent payments.
- ***Unclear information:*** The information on money flow is not transparent enough. Most of the time, during the transfer period, clients understand the money is on the way but they have no way of tracking where the money actually is until it is received. Although they can check with the banks, each bank can only share the information for its own role in the payment transfer and are unable to offer further details after they hand off the money to the next party.

To solve those problems, some companies have decided to connect blockchain technology to enable cross-border payments such as Stellar. The company claims that its blockchain-based payment system can settle international payments in 2-5 seconds at a 40% cost reduction as compared to a traditional banking wire. This system has been verified and proven to be able to support over 1,000 transactions per second.⁵² Stellar has already launched in Europe, the Philippines and India.

New fintech companies are not the only ones to focus on the business, traditional players have also been innovating. SWIFT's Global Payment Innovation (GPI) system, developed a Tracker database to enable banks to provide their clients with end-to-end payment tracking.


In the first phase, SWIFT is improving the speed and transparency of cross-border transfers and has so far implemented GPI in 110 banks.⁵³ In the current second

50 McKinsey & Company, "Rethinking correspondent banking", McKinsey & Company, Pg.4, published June 2016, accessed 16 January 2018, <https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Rethinking%20correspondent%20banking/Rethinking-correspondent-banking.ashx>

51 World Bank, "World Bank Remittance Prices Worldwide", World Bank, published 5 January 2018, accessed 16 January 2018, <https://remittanceprices.worldbank.org/en>

52 Coingogo "Stellar partnered with IBM to develop a blockchain cross-border payment solution", Coingogo, published 17 October 2017, accessed 16 January 2018, <https://www.coingogo.com/news/2888>

53 SWIFT, "SWIFT GPI Brochure", SWIFT, Pg.4, published 2017, accessed 16 January 2018, <https://www.swift.com/resource/swift-gpi-brochure>



phase, SWIFT plans on introducing distributed ledger technology to allow banks to immediately stop or recall payments and further increase the accuracy and efficiency of the payments.

HSBC, VISA, Finastra, and others, have also launched their own blockchain-related payment systems. It is widely anticipated that this new technology has the potential to start a new chapter in the history of payments.

Internet of Things

The internet of things (IoT) is the concept of having everyday objects being connected to the internet, as well as being able to distinguish and identify other objects. This ability to interconnect and discern is referred to as "ambient intelligence."⁵⁴

The concept has enormous appeal for both consumers and manufacturers. Consumers would benefit by having an object which can potentially learn and adapt to their habits and needs, whereas manufacturers would benefit from increased access to valuable data on their product's usage. In the past, when a consumer purchased an item such as a fridge or a washing machine, unless the product expressed a fault down the line, the relationship between consumer and manufacturer essentially ended when the item was paid for. With the concept of the internet of things however, the product can now be a gateway for an ongoing relationship, through the continual transmission of data and information.

For example, imagine if your fridge was connected in some way to the internet and was able to distinguish or scan the items placed inside of it, the fridge could potentially inform you, via your smartphone, that you are running low on milk, or that your eggs are about to expire. Combine this with location software on phones and you could even receive a notification when close to a supermarket, or better yet, have the fridge directly connected to your grocery ordering app.


This adds value to the customer's experience, as they reduce waste, save time and money, yet arguably, this adds even more value on the manufacturer's end. In this example, the fridge manufacturer could sell this valuable data to the supermarket chains or other third parties, such as milk and egg suppliers, who may be interested in how their product life cycle fairs and how quickly people consume products.

The concept of IoT is already a reality. Smart Fridges, thermostats, ovens and even smart cars already exist. In the UK, smart thermostats are the most popular household form of connected device, with British Gas' 'Hive' the largest, with over 150,000 users in 2015.⁵⁵ On the global scale, research by Fortune on 150 existing IoT applications estimates that these platforms could have a total economic impact of \$3.9 trillion to \$11.1 trillion per year by 2025.⁵⁶

⁵⁴ Techopedia, "Internet of Things (IoT)", Techopedia, accessed 16 January 2018, <https://www.techopedia.com/definition/28247/internet-of-things-iot>

⁵⁵ Nicole Kobie, "The internet of things: convenience at a price", The Guardian, published 30 March 2015, accessed 16 January 2018, <https://www.theguardian.com/technology/2015/mar/30/internet-of-things-convenience-price-privacy-security>

⁵⁶ James Manyika & Michael Chui, "By 2025, Internet of things applications could have \$11 trillion impact", Fortune, published 22 July 2015, accessed 16 January 2018, <http://fortune.com/2015/07/22/mckinsey-internet-of-things/>



The issue however, as with any new technology, is the price and relative ease of use. LG showcased a smart fridge which can detect when you are running low on milk, although it cost over £2,000 in 2015, a hefty investment for a relatively trivial level of convenience. Another example is Philips Hue, a smart light that can be turned on and off from your phone, and even be set to wake you up in the morning. However, the installation kit cost \$240 and a single bulb will set you back over \$30.

Another issue with the technology so far, is its current capabilities regarding ambient intelligence. Many of the IoT products currently available offer very niche and unilateral services. In addition to this, the varying products and services are seemingly disconnected from one another. The difficult task at hand is therefore to bring all of the available technology and merge it into one platform, allowing for better interoperability. If each individual item possesses its own standalone app or platform, it makes both the user experience more complicated and leads to higher costs for providers, as they need to develop and maintain their own app.

Some companies that have developed several 'smart' devices possess a certain degree of interoperability. LG for instance, has developed a platform called 'SmartThinQ', and partnered with external firms allowing for its devices to be operated via voice control, firms such as Google, through its Google Assistant on the Google Home device and Amazon's Echo voice control system, powered by Alexa.⁵⁷

A final obstacle for IoT businesses is concerns of privacy and data security. Businesses operating IoT platforms need to ensure consumers data is stored securely and only shared with trusted external parties. In addition, the system's firewalls must be able to withstand inevitable hacking attempts, as in a world where all our appliances are connected to the internet, the opportunities for hacks increase.

One example of IoT usage which offers great convenience coupled with considerable risk, is fully automated retail checkouts which would allow customers to simply exit a store with no requirement to scan, swipe or wait in line. Using data scanning beacons, the technology would track and scan the customer's purchases in a shopping cart and deduct the required amount from their mobile wallet as they exit the store.

Industry forecasts for this kind of technology predict that it could lead to as much as \$380 billion per year in cost saving for retailers around the world in 2025. However, the risk of this technology falling into the wrong hands, or the potential for hackers to intercept these beacons and illegally extract funds from shoppers, is a cause for great concern. As a result of all this, IoT will seemingly require a high level of trust from consumers and a demanding level of responsibility from businesses.

IoT and the payments industry

The opportunities for the payment industry are significant. Visa estimates that the number of devices connected to the Internet will rise from 6.6 billion today to over 20.4 billion by 2020, including 90% of cars produced.⁵⁸ This substantial increase will undoubtedly benefit corporations such as Mastercard, American Express, Visa and PayPal, due to an increase in non-cash payments and access to priceless data.

57 LG Life's Good, "SmartThinQ", LG Life's Good, accessed 16 January 2018, <http://www.lg.com/us/discover/smartthing/thinq>

58 BI Intelligence, "Visa makes major IoT play with IBM partnership" Business Insider, published 17 February 2017, accessed 16 January 2018, Visa, "Visa brings secure payment solutions to the Internet of Things", Visa, accessed 16 January 2018



These opportunities are not going unnoticed, with Visa opening an office in 2014 with over 500 employees whose sole purpose will be to ensure that devices connected to the internet can be enabled with a secure platform for commerce.⁵⁹ More recently, Visa announced a partnership with IBM in 2017, giving IBM's IoT platform's clients access to Visa payment services.

The partnership will provide Visa with new access to around 6,000 IoT businesses, in turn, giving them access to Visa's tokenization through their devices or platforms.⁶⁰ This would effectively transform these devices into point of sale terminals, enabling users to pay on the go. Going back to the example of our fridge earlier, Mastercard in fact launched a smart refrigerator in 2016, which offers users the ability to pay and order groceries from a touchscreen panel embedded in the fridge.

The opportunities regarding IoT and payments are not exclusive to payment services companies, as many technology firms as well as retailers are seeing the potential in the sector. Technology firms are specifically looking into developing payment tracking systems, firms such as Libelium, a provider of wireless sensor network technology. Applications of such technology could allow businesses to effectively charge customers for the exact time they spend using their services.

For example, a gym could charge you for the amount of time you spend in their facilities or more specifically the time spent on an individual machine, and transportation services such as buses could charge people for the duration they spent riding the bus. In addition to the precision afforded to charges, businesses utilizing this kind of technology will gather a wealth of valuable data.

The same technology can similarly monitor machine performance both in a supply chain or in the final product, enabling the user to effectively schedule and pay for maintenance or track the machine's usage, facilitating predictions on the chance of a breakdown. If applied properly, the technology could reduce maintenance costs by 25% and limit the amount of unforeseen equipment failure by 50%, thereby prolonging the lives of machines.⁶¹ Amazon has also announced that Amazon Pay will be available to third party developers on the Amazon Alexa virtual voice assistant, cementing Alexa's place in the homes of the tens of millions of people who have bought one.⁶²

In light of all these recent developments regarding the IoT, it is safe to say that the technology will undoubtedly be pivotal in the future of payments. Businesses must learn to harness the technology's capabilities, whilst being mindful of the potential risks and responsibilities attached. One thing we can be certain of is that the IoT will facilitate and accelerate the process of moving into a cashless society.

59 Hailey Winston, "The Internet of Things Will Revolutionize the Payment Industry", Yale Economic Review, published 11 November 2014, accessed 16 January 2018, <http://www.yaleeconomicreview.org/archives/2204>

60 BI Intelligence, "Visa makes major IoT play with IBM partnership" Business Insider, published 17 February 2017, accessed 16 January 2018, <http://www.businessinsider.com/visa-makes-major-iot-play-with-ibm-partnership-2017-2>

61 James Manyika & Michael Chui, "By 2025, Internet of things applications could have \$11 trillion impact", Fortune, published 22 July 2015, accessed 16 January 2018, <http://fortune.com/2015/07/22/mckinsey-internet-of-things/>

62 Rachel Green, "Amazon Pay coming to Alexa for in-app purchases", Business Insider, 1 December 2017, accessed 7 February 2018, <http://www.businessinsider.com/amazon-pay-coming-to-alexa-for-in-app-purchases-2017-12>, Bret Kinsella, "Bezos Says More Than 20 Million Alexa Devices Sold", voicebot.ai, 27 October 2017, accessed 7 February 2018, <https://www.voicebot.ai/2017/10/27/bezos-says-20-million-amazon-alexa-devices-sold/>

The Role of Traditional Finance

Although financial technology has been around for decades, it has only been over the past few years that we have seen the uptake and interest in “fintech.” It is then no surprise that banks globally have shown increased interest in, and responses to, fintech. These responses typically fall into one of three categories:

- Setting up either jointly or solely-led fintech programs (i.e., Hackathons / incubators / accelerators) designed to drive innovation. Banks typically play a collaborative role with other banks, fintech companies, or external organizations and provide mentorship, program sponsorship, and branding in exchange for access to fintech networks, as well as the latest trends. If they run the programs on their own, they also gain a first mover advantage. As an example, Standard Chartered was a partner of Hong Kong’s first SuperCharger innovation program.
- Some banks set up internal innovation structures through venture funds, teams, or internal innovation groups. These are typically separate entities within a group that are supported by investment funds, research tools, or proprietary technology for developing innovative solutions. Citi, HSBC, and many others have setup fintech focused corporate development arms.
- There is a certain subset of banks that have no fintech focus.

Globally there are a number of banks that are seen as market leaders in the fintech space. DBS has a full-time Chief Innovation Officer and opened a dedicated innovation center. Santander, a Spanish bank, launched a US\$100 million fintech fund “to get closer to the wave of disruptive innovation in the fintech space.” Citi Fintech was set up in November 2015 and is staffed by employees hired from Amazon, PayPal, and other external tech companies.

The Ping An Group is one of the traditional financial industry players in China that has taken a significant interest in China’s fintech landscape. First, Ping An invested in, and is a 43% owner of, Lufax, the largest P2P lender and digital financial product distributor in China. Secondly, they have co-invested with Ant Financial in Zhong An, China’s first digital-only insurer. Finally, Ping An has embraced blockchain technology by being the first Chinese member of the R3, a fintech consortium of banks and service providers cooperatively exploring the potential uses of blockchain technology.

The challenge for traditional banks is to avoid losing relevance. Europe’s current PSD2 effort will be a good test of this, as the market will likely open up rapidly to new competition. At the moment, it is too early to tell how the banks will react and how PSD2 will affect their business. Most European banks have set up teams and working groups within the organization to prepare for this. As part of the PSD2 implementation, third parties will be able to access nearly the same customer information as banks and create their own products and services to supplement or even replace those of a bank.

How banks handle this competition and differentiate themselves will be key. Those that do, will be successful. Those that do not, will simply be utilities that may not have a role in the future of finance. The risk is great: even PayPal has recently found itself the disruptor being the disrupted with E-Bay deciding to launch its own payments platform to process payments.

If we were to sum up the Present History of Payments in one-word, it would be: digital. Whether it is a mobile payment or a card transaction, payments globally are inexorably going digital. In certain places like Sweden, over 80% of all retail transactions are card-based, a 20% increase from five years ago.

It is not only consumer demand and availability that is affecting the shift to cashless, but also the governments themselves. India, as an example, pushed a demonetization drive at the end of 2016, that has drastically re-shaped their consumption patterns, and around the world, governments are looking at 'sovereign digital currencies' to replace cash and existing digital payment methods. China's support of the payment giants and Europe's PSD2 are two other good examples of programs that provide a socio-economic push to move into digital, as well as the infrastructure to enable it.

On the other hand, government involvement may also limit growth. Regulation like the GDPR (General Data Protection Regulation) will constrain use of user data and more general regulations like the U.S.'s FATCA will also constrain what is possible and indeed profitable for banks; ask an American how much fun it is to apply for a bank account in Hong Kong or Singapore.

The shift to digital will also provide significant benefits for the financially excluded. Firstly, digital payments tend to be more transparent and secure than cash payments, especially in countries without a mature payment infrastructure, there is often little transparency, particularly when middlemen and agents are involved.


A study in India's Andhra Pradesh showed that the percentage of funds lost through "leakage" fell from 30.7% in control areas to 18.5% in areas that embraced digital payments. The estimated total reduction in National Rural Guarantee Act leakage across the studied districts was \$38.7 million per year.⁶³ This was about nine times the cost of implementing a digital payment scheme. In addition, the 2012 World Bank Development Report estimated that by digitizing subsidy flows, the Indian government could save 1% of its gross domestic product annually, an amount equivalent to about \$20 billion. Digitizing has had enormous financial gains for the government and for its citizens, enabled by the transparency of direct real-time payments.

Secondly, digital payments promote economic opportunity, particularly in developing countries. As an example, in Ordos, one of China's 'ghost cities,' there are groups of entrepreneurs who have setup their own Taobao shops which allow them to sell products and services to a much larger client base than would have been previously possible.⁶⁴ In China, Tencent's WeChat Pay has a variety of different wealth management products that individuals can invest in. Many of the products have a very low minimum investment requirement, sometimes as little as 1 RMB (~US\$0.15) and will start paying interest within a day.

These are both economic opportunities that would not be available if not for digital payments.

⁶³ Sanjeeb Mukherjee, "Smart Cards cut fund leakage in MGNREGA by 12%: Study", Business Standard, published 3 April 2014, accessed 16 January 2018, http://www.business-standard.com/article/economy-policy/smart-cards-cut-fund-leakage-in-mgnrega-by-12-study-114040201339_1.html

⁶⁴ 'Ghost cities' refer to cities in China that were purpose built to be new economic centers, but for many reasons, failed to develop as the government had intended and even today, remain largely uninhabited.



The shift to digital will be further supported by efforts to enable API and open banking. Europe's Payment Service Directive 2 (PSD2) will be an interesting case-study in opening up banking to third party institutions. Previously, most of this experimentation had been limited to particular bank or set of banks, but this will be the first time that a regional initiative will be implemented.

While this shift to digital has a number of benefits, many of which we reviewed above, there are some draw-backs and some argue that going cashless is bad for the poor or the underbanked who may not have access to financial accounts or services, or even a mobile phone, which will make it difficult to conduct commerce in the future. Although Africa has come up with some unique solutions to overcome these challenges, it remains to be seen if it is a long-term solution or a temporary one; India will be another telling case-study.

Innovation will drive The Future History of Payments, which will be marked with substantive change, much more so than what we have seen in the recent past. Technologies like blockchain, IoT and biometrics will create new payment business and usage models in the future that few could have predicted today. Open banking and APIs will open up one of the world's oldest industries to intense competition.

The Future History of Payments will also be a period of trial and error. The industry focus on fintech today has completely changed the approach that financial institutions have to technology. What was once a line-item in the costs of many banks, is now a potential revenue driver as technologies like AI, blockchain and IoT will potentially re-shape the future.

But the end-state is far from clear. There have been numerous proof-of-concepts on both internal and external blockchain-based payment solutions, but only a few that have gone into production. Similarly, with IoT, the jury is still out on whether people want their refrigerator helping them to pay their bills.

This experimentation is a natural part of the evolution of technology within the financial industry and something that we should continue to expect as we move forward into the future. Technologies will rise and fall in importance. Solutions based around those technologies might take months if not years to gain acceptance. Even something as straightforward as Bitcoin has yet to find its 'killer-app' beyond being a speculative asset.

Despite the benefits of digital payments, some habits are hard to change. In India, the volume of overall digital transactions grew 42 percent from 672 million in November 2016, to 958 million in December 2016, then declined by 20 percent to 763 million in February 2017.⁶⁵ Education, awareness and infrastructure will be key to their development.

There is uncertainty in the Future History of Payments, but there is also immense possibility. A famous Chinese saying states: "A crisis is an opportunity riding a dangerous wind." This is truer today than ever before: although the challenges for the traditional financial industry are great, this new technology renaissance brings incredible opportunity change and growth. The only challenge is staying ahead of the change to ensure you have a place in the Future History of Payments.

⁶⁵ Reserve Bank of India

Conclusion & Closing Words

The Banking industry as a whole is undergoing a huge transformation and the payments ecosystem is no stranger to this disruption. New, all-digital banking entrants and fintechs are muscling in to offer what could be “the next big financial service,” which the digital savvy institutions are clambering after, either through partnership, investment or acquisition.

The trend for real-time payments for example has accelerated considerably, acknowledging significant enhancements with the Faster Payments scheme in the UK, from which 30% of all traffic flows through Finastra's Payments solutions. With interest and demand spreading worldwide, the marked necessity for faster payments is driving the launch of new platforms, for example in Thailand and in the United States.

As a software leader with a mission to provide the solutions and support for the successful adoption of real-time payments, Finastra has publicly stated they will be ‘where our customers need us to be’, further cementing their commitment to succeed in this field, and across the Payments ecosystem.

A typical example would be SWISH in Sweden - a collaboration of Swedish banks which introduced a mobile phone based instant payments service in 2012, underpinned by Finastra, that was adopted by over half the population to make domestic payments.

The creation of frictionless payments makes economies more efficient; they support innovation and serve to accelerate positive growth. The immediate gains from real-time payments in terms of speed, reliability and transparency are immense. The adoption provides a gateway to accessing further additional Value Added Services leveraged from the rapid adoption of APIs and “Platformification”.

With this huge capability in mind, it is easy to see when combined with Cloud based services and IOT, that technology can take us anywhere anyone wants to go.

This report illustrates well the pace at which technology has evolved, the speed of adoption, and in the case of financial inclusion, its positive contribution to socioeconomics. By leveraging the capabilities of just a smart device and a 3/4G signal, Finastra's digital solutions power the ability to open an account using facial recognition, create financial goals and milestones, make/receive payments and remittances. Even organise loans through crowdsourcing via the LenderCom platform.

The power of payments transcends all elements of Financial Services, from consumer micro payments of mere cents and dollars, to sovereign payment transactions in the hundreds of millions or billions of dollars. Whether looking to transform banking services in the traditional on-premise installations or harness the power of the Cloud through Microsoft Azure, Finastra is the trusted partner on the journey to giving your customers the service and experience they expect in the Future of Payments.



Matthew Williamson
Global Head of Payments

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Finastra unlocks the potential of people and businesses in finance, creating a platform for open innovation. Formed in 2017 by the combination of Misys and D+H, we provide the broadest portfolio of financial services software in the world today—spanning retail banking, transaction banking, lending, and treasury and capital markets. Our solutions enable customers to deploy mission critical technology on premises or in the cloud. Our scale and geographical reach means that we can serve customers effectively, regardless of their size or geographic location—from global financial institutions, to community banks and credit unions. Through our open, secure and reliable solutions, customers are empowered to accelerate growth, optimize cost, mitigate risk and continually evolve to meet the changing needs of their customers. 48 of the world's top 50 banks use Finastra technology.

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