OXFORD ALPHA FUND

10 Nov 2018

Payments Industry Report

Introduction to the payments

Global consumers are increasingly paying for goods with non-cash/cheque electronic methods such as mobile wallets, credit cards, carrier billing and direct transfers. What exactly goes on when a consumer pays electronically? Six parties are usually involved: card issuers, card processors, networks, merchant processors, and point-of-sale terminal providers. To understand how they interact, consider buying a coffee from a neighbourhood coffee shop.

When I pay with my card, I tap it on a **point-of-sale terminal**, provided by Worldpay, or Square. The transaction is first processed by the coffee shop's bank, i.e. the **merchant acquiring bank**, before being sent through the **payments network**, such as Visa's VisaNet. Visa checks for fraud, and then checks with my **card issuer**, or issuing bank, Bank of America, whether I have the funds required. It might extend me a credit loan. If I am paying with debit, Bank of America puts the money on hold, and the authorisation is relayed back to the merchant acquirer via the network again. The acquirer sends the approval to the coffee shop and the barista lets me know that payment has gone through, a few seconds after the first tap.

Some time after I leave the coffee shop, payments are then cleared: they are batched and processed by the payments network, who sends a global consolidated statement to all issuers. Issuers then debit the required amounts. Settlement statements are then sent to all issuers and acquirers, who transfer funds to each other to settle all transactions within the processing day.
Card processors might support issuing banks: administrating loyalty programs or settling payments.
Merchant processors might support merchant acquirers or acquiring banks, participating in the processing and settlement stage and reporting transaction data.

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Total Addressable Market
On the Up and Up

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Total Addressable Market

We estimate the total addressable market (TAM) for consumer-to-business (C2B) payments $35T by 2022, growing at 11.5% CAGR from 2017-2022 and the TAM for business-to-business (B2B) payments to be $122T by 2022, with payment networks accessing payment volumes previously closed off. Visa and Mastercard estimate all $122T of that opportunity to be immediately accessible.

Our TAM estimates are based on global consumption and GDP by geography and product category as reflected by the personal consumption expenditures index (PCE), making exclusions for non-consumption transactions and exclusions to geographies closed off by regulation such as China. We size the current C2B market to be $12.1T, growing to $18.7T by 2022 based on growing penetration from 42% **(Exhibit 1)** to 54% by 2022.

The US remains the bulk of the current market at 43% **(Exhibit 2)** of total global payment volumes. However, moving forward, we believe this opportunity would be far more internationalized, with the US only forming only 19% of the current total addressable market **(Exhibit 3)**.

Exhibit 1: Global C2B Payments Shares

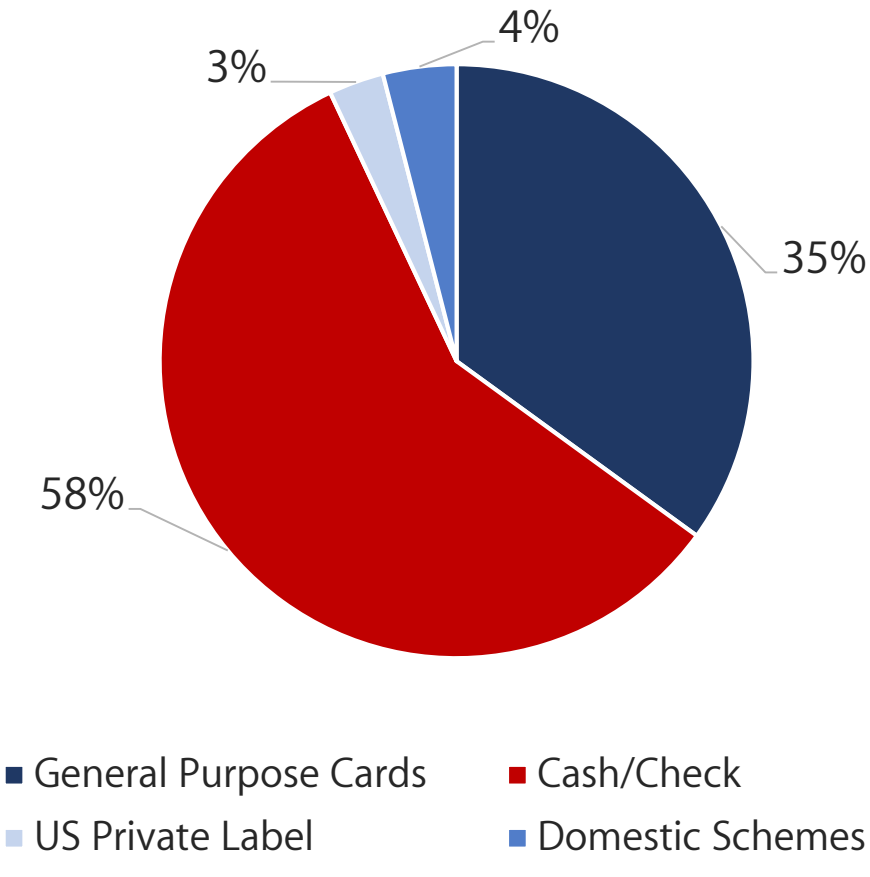


Exhibit 2: Current Card Payments Market

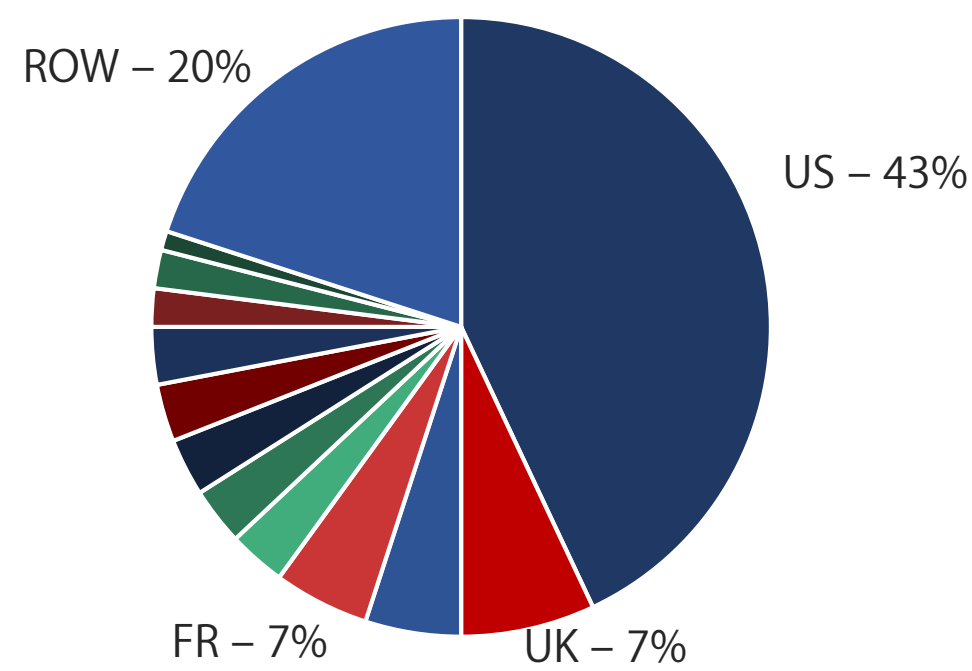


Exhibit 3: Current Remaining TAM

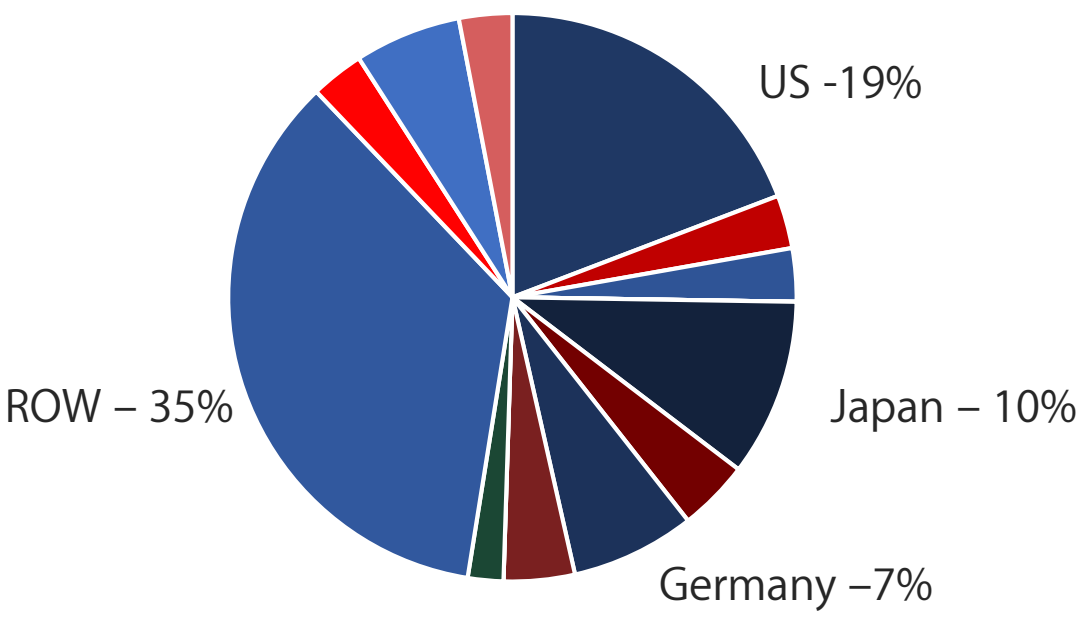
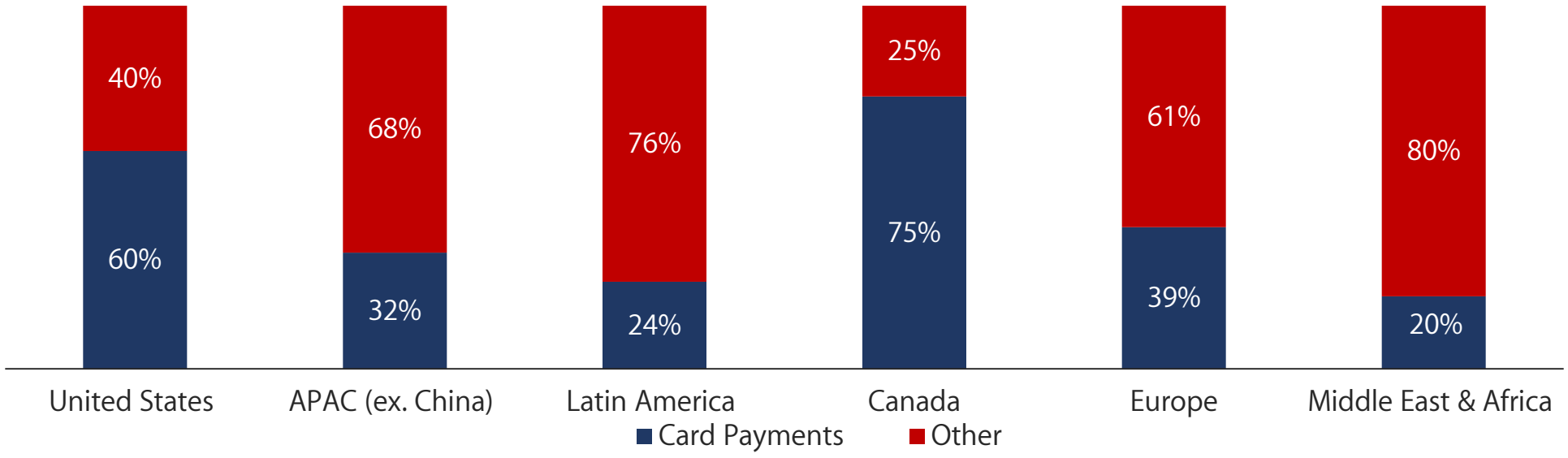


Exhibit 4: Global Card Penetration



Total Addressable Market
On the Up and Up

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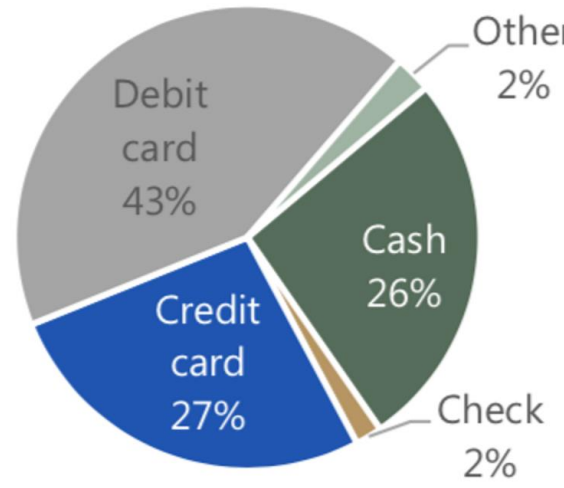
Why does cash persist?

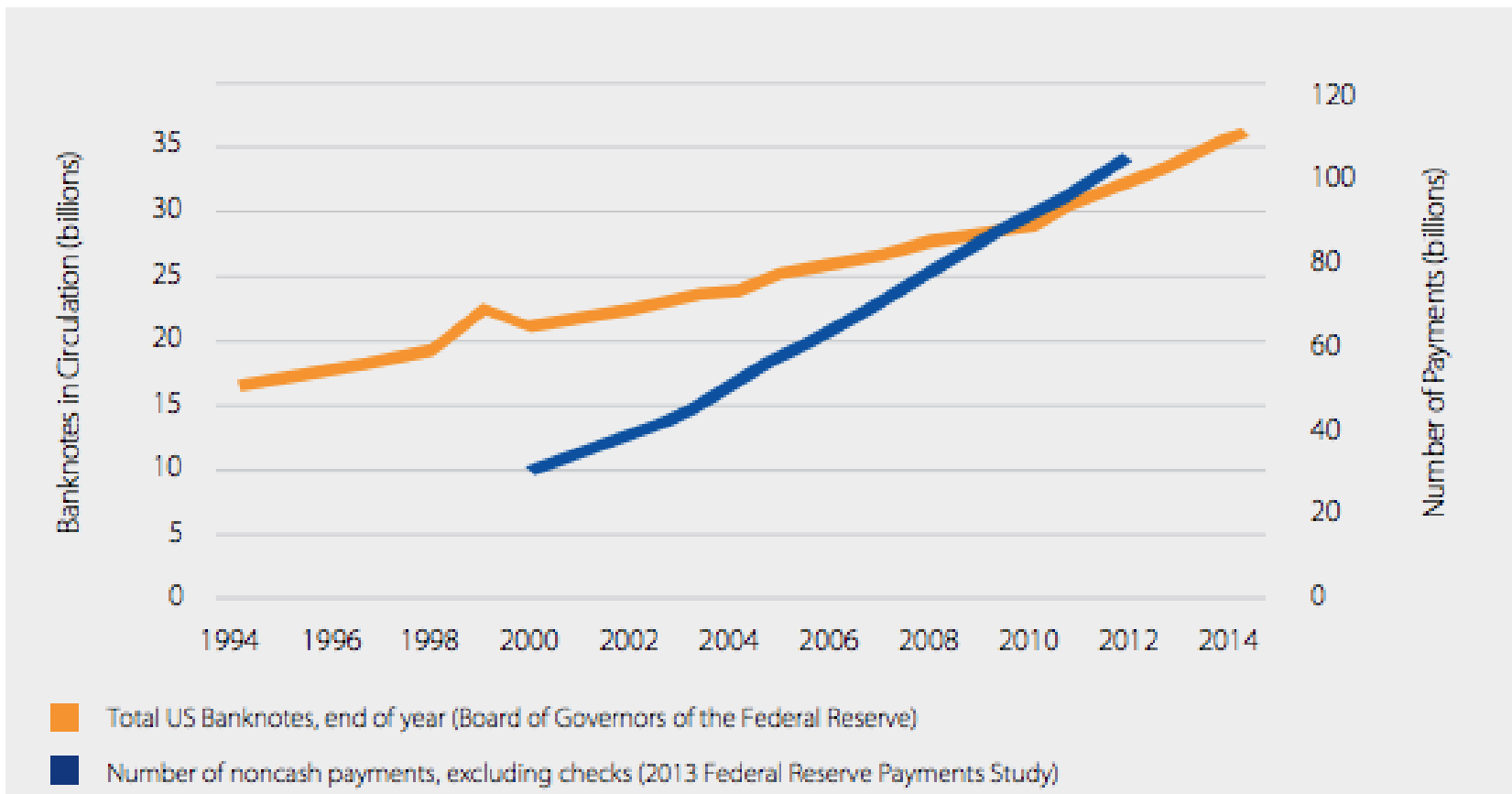
Cash continues to remain present in most advanced economies due to the higher costs faced by merchants when using point of sale (POS) terminals over cash. This is further driven by the lack of financial inclusion that is present in both developed and developing economies. Cash presents three main advantages - speed and efficiency, anonymity, and the non-necessity of a bank account. The persistence of cash speaks to its social value, and we believe that social value is likely to change due to the emergence of low-cost acceptance, electronic wallet adoption and mobile POS (mPOS).

Exhibit 5: Current payment methods in the US



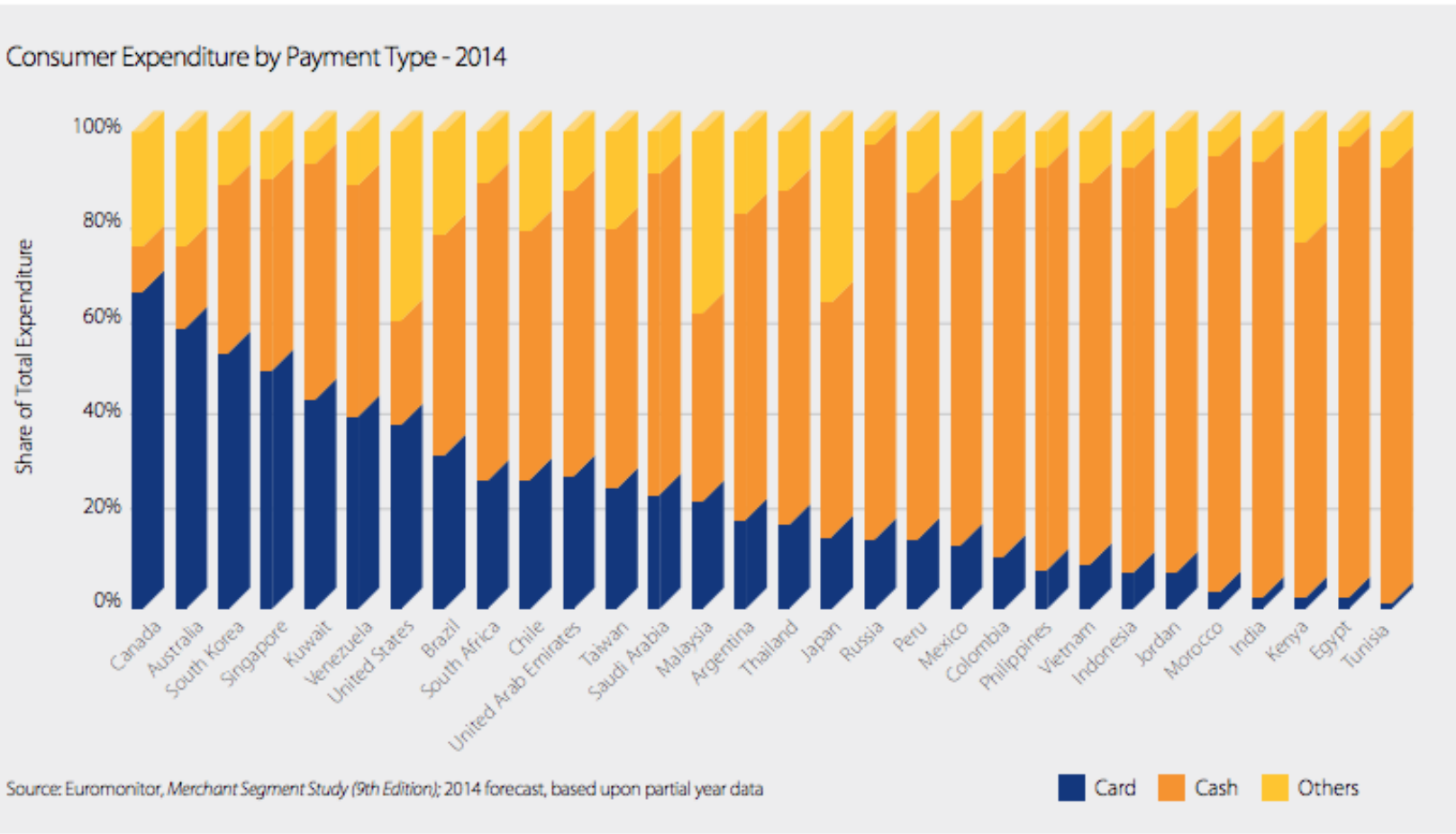
Source: Federal reserve

Exhibit 6: US Banknotes v Noncash Payments



Source: Euromonitor

Exhibit 7: Consumer Expenditure by Payment Type



Value Chain
A lay of the Land

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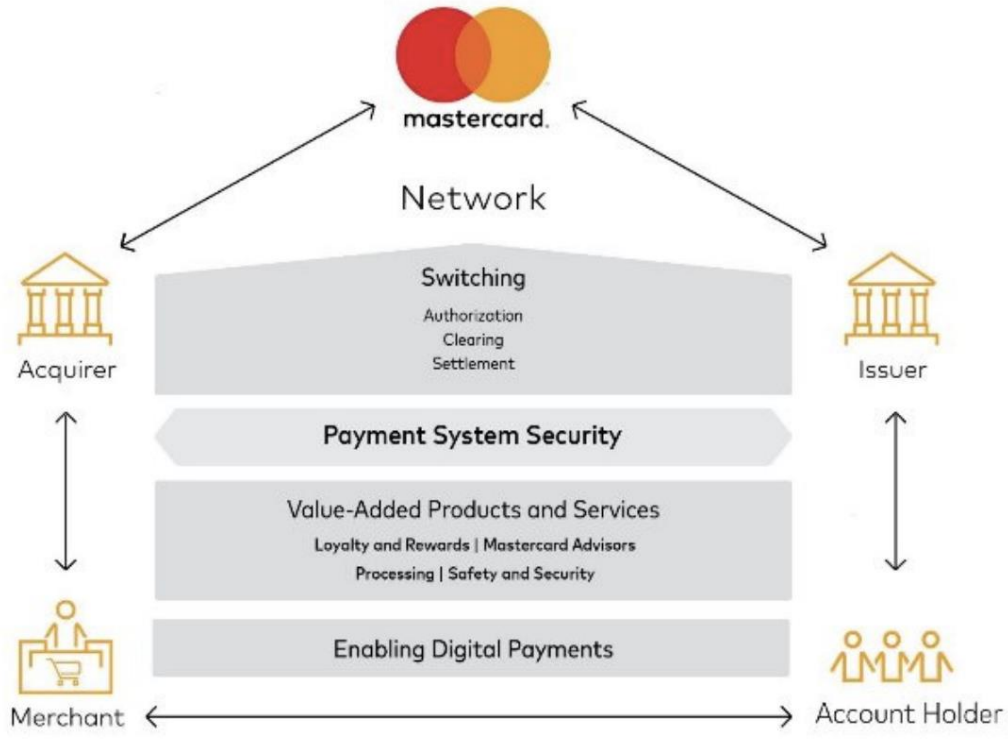
Market structure

The credit/debit card payments market is at its simplest a two-sided market structure. On one end of the market are card issuers, usually banks who issue cards to consumers. Card issuers allow consumers to make card transactions, either to buy goods and services from merchants that accept the card, or to withdraw cash from automated teller machines. On the other end are merchant acquirers, usually banks who process card transactions for merchants. Merchant acquirers allow merchants to accept card transactions from customers. Merchant acquirers and card issuers might be supported by card processors and merchant processors who provide support for auxiliary functions. Networks make interactions between the two possible: connecting merchants acquirers and card issuers appropriately while charging each side network fees.

Exhibit 8: Overview of market structure



Source: Mastercard

These fees are broken down into 3 types:

- Assessment fees, paid as a percentage spending volume
- Switch fees, paid according to the number of transactions processed
- Value-add service fees for consulting and research products, fraud prevention and detection services, loyalty and rewards solutions, etc.

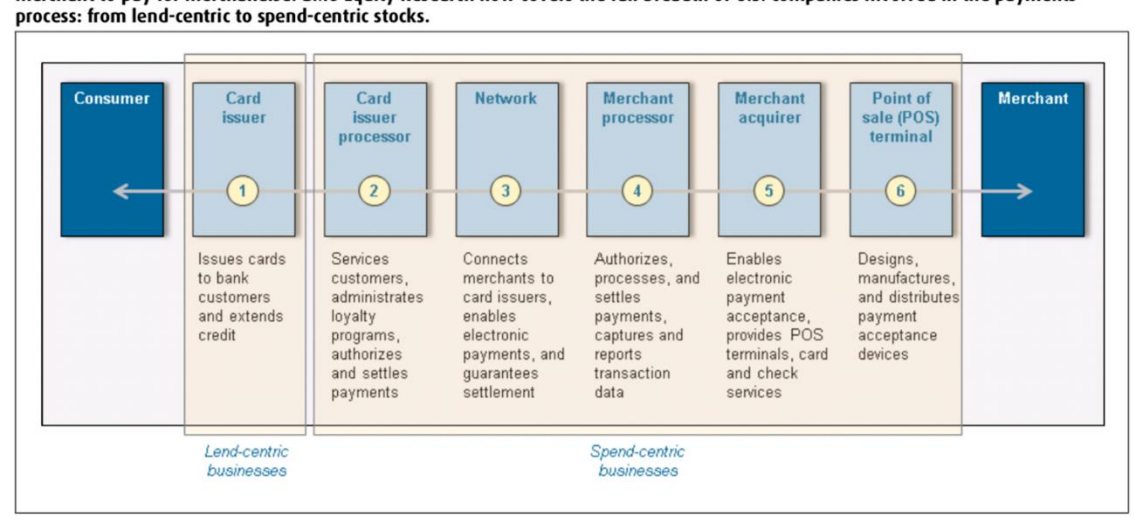
Value flow

Each of the above actors take a proportion of a merchant discount fee that is charged to merchants (and indirectly, to consumers as well) on each transaction. For example, if a consumer made a $100 purchase on a credit card, the retailer would get $97.50. The remaining $2.50 would then get divvied up. Networks are responsible for setting the interchange fees: the fees that merchant acquirer must pay the card issuer.

Of the $2.50, $1.80 of interchange fees would be paid by to the card issuing bank by either the acquirer or processor and be largely returned to the consumer in cashbacks and related promotional rebates. A portion of that would also be paid to card processors, if used. Merchant processors (if used) would get $0.10. Card issuers pay networks $0.05, while acquirers/processors pay networks $0.10 for access to the networks, net of rebate incentives returned to them by networks in order to get them on board.

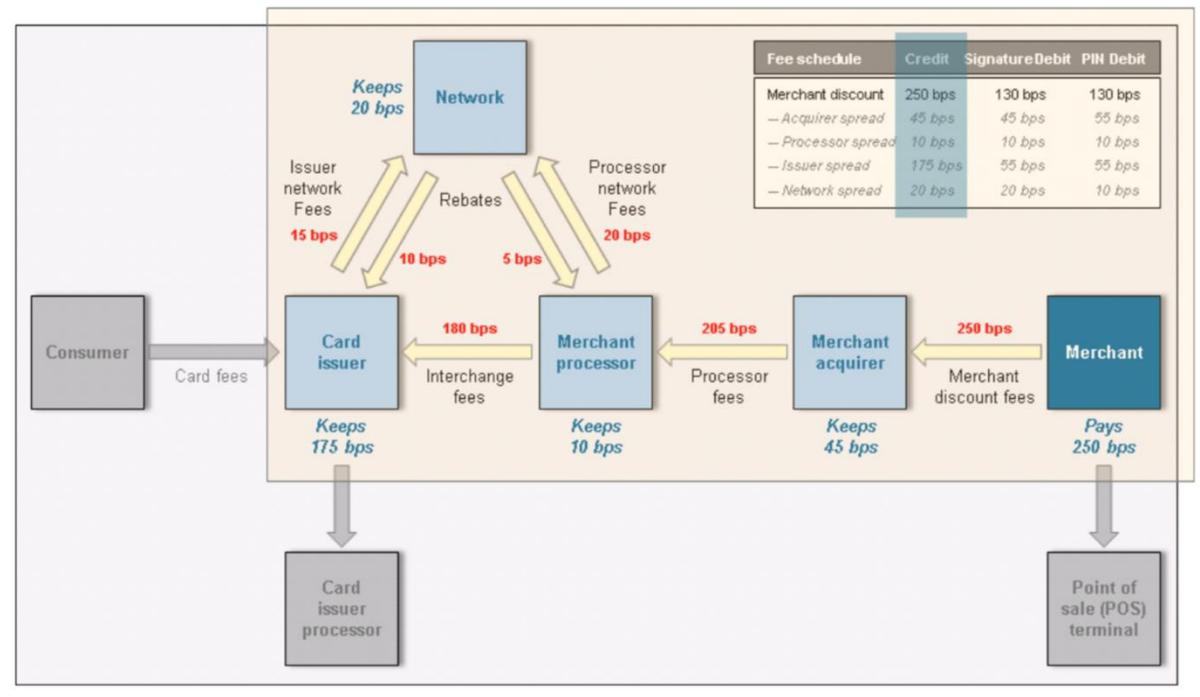
Exhibit 9: Industry functions

Exhibit 3: Six parties are involved in the facilitation of electronic payments, enabling the transfer of funds from consumer to merchant to pay for merchandise. BMO Equity Research now covers the full breadth of U.S. companies involved in the payments process: from lend-centric to spend-centric stocks.



Source: BMO Capital Markets

Exhibit 10: Value chain



Source: BMO Capital Markets

Driver 1: Ecommerce

Let's get digital, digital

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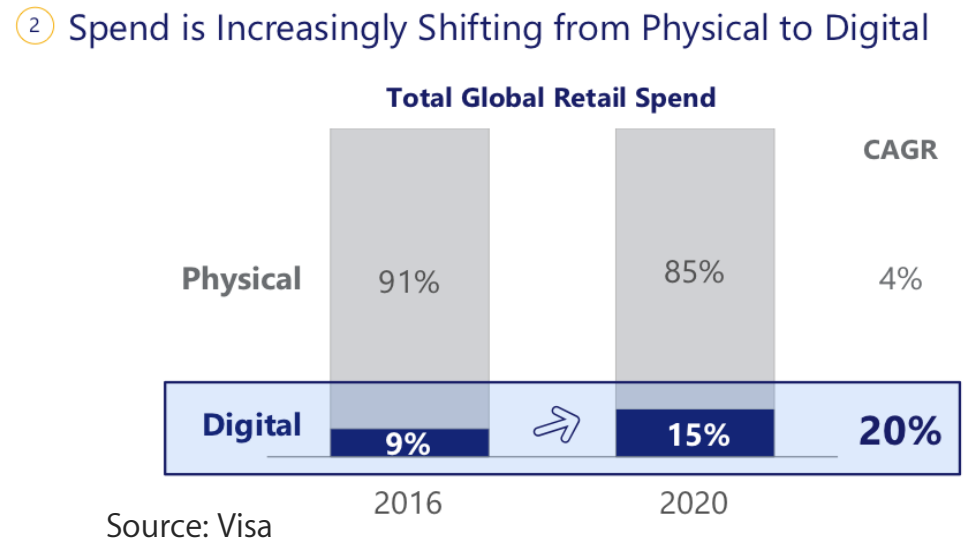
E-commerce growth

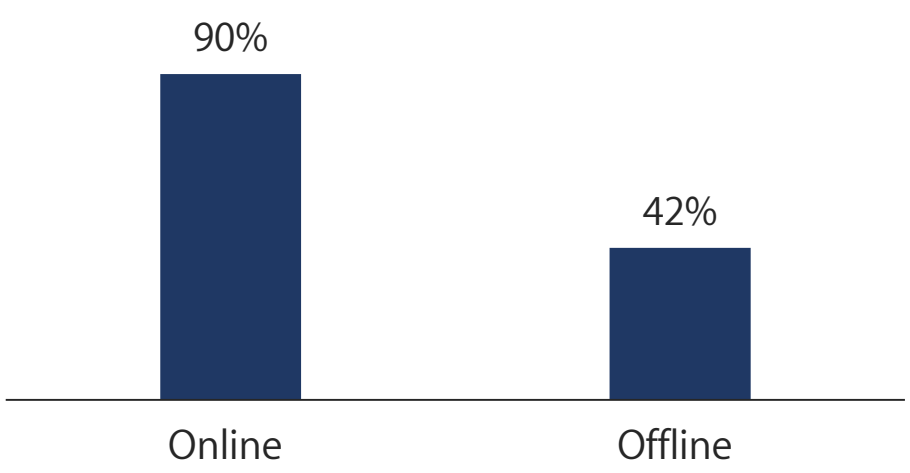
E-commerce is a major driver for payments growth in both developed and developing economies as spend shifts increasingly from physical to digital. Euromonitor estimates that digital is currently 12% of total retail and is expected to grow at a 20% CAGR to reach 22% of total retail by 2022. This grows at 3-4x the rate of growth for total purchases. 90% of payments made online involve card transactions (the other 10% requiring mPOS or P2P transfers like PayPal) while card penetration offline averages at 42% globally **(Exhibit 11)**.

Exhibit n: Spend shift



Source: Visa

Exhibit n: Card Payment Penetration



This is likely to accelerate volume growth as entire categories of spend move online (eg. groceries) and drive faster cash to digital conversion. This is driven by the expansion of e-commerce categories from goods to services as well in the gig economy, including food delivery, digital travel, and accommodation. This is estimated to be a $1T market in the US and $3T market globally.

IOT

This is further driven by advancements in the global internet of things (IOT), where consumers find greater convenience to pay with not only their mobile phones but also wearables and other smart devices. This accelerates e-commerce consumption as payment becomes truly seamless and hassle-free. This is likely to drive digitized consumption, bringing more consumption categories online.

Exhibit 13: YOY sales growth

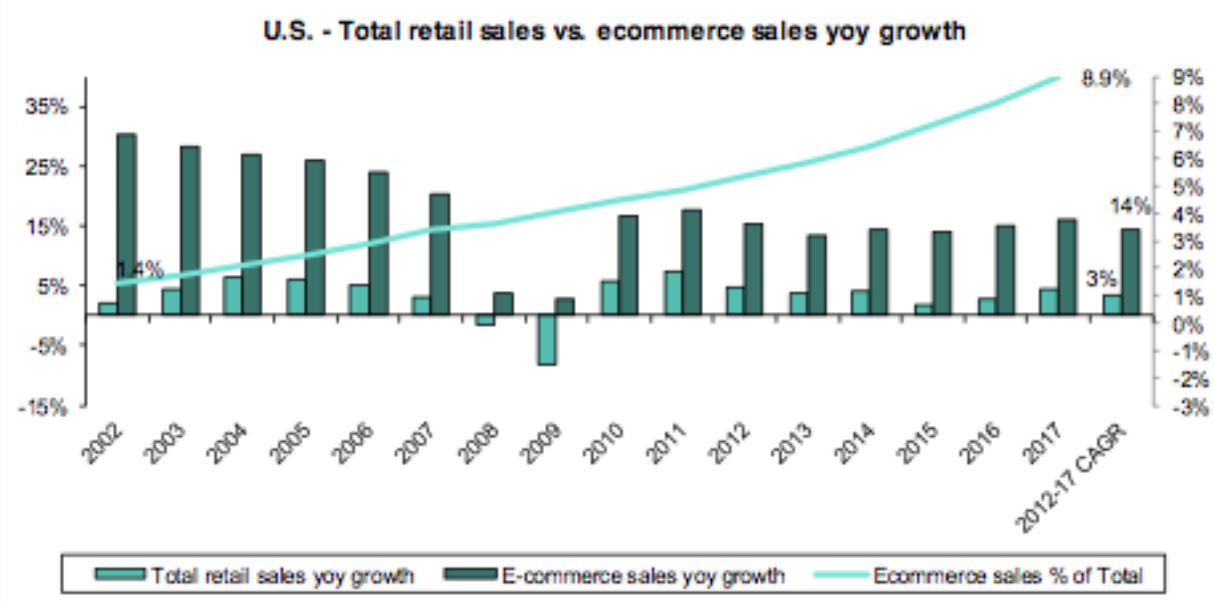
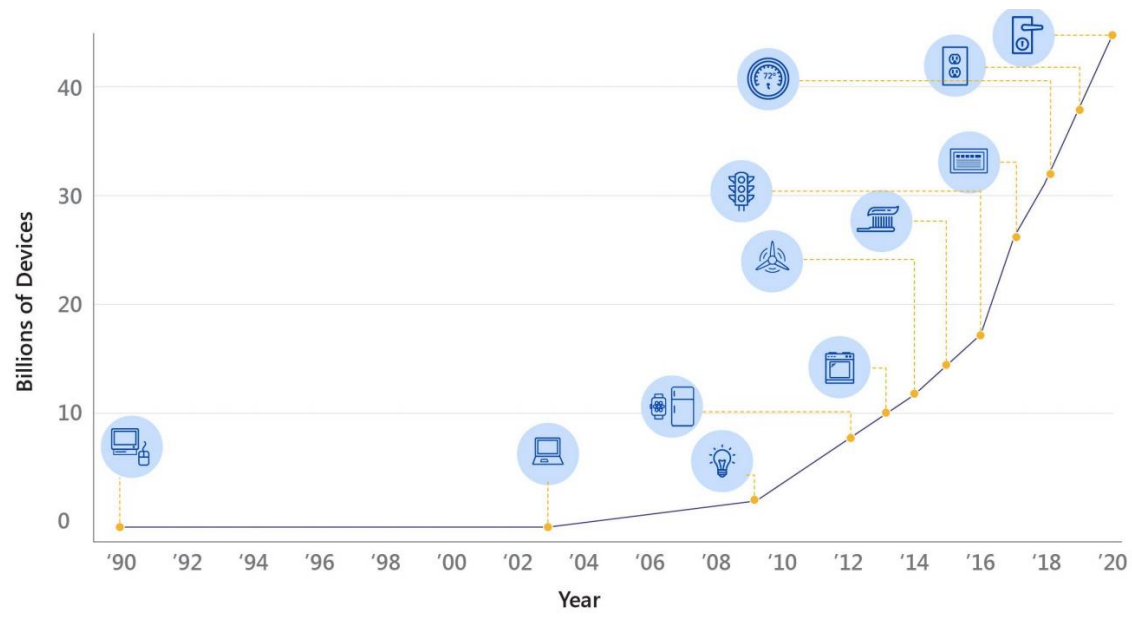


Exhibit 14: Networks are well positioned to benefit



Source: Visa

Driver 2a: Europe-Specific
Oui, Oui, we do take Visa

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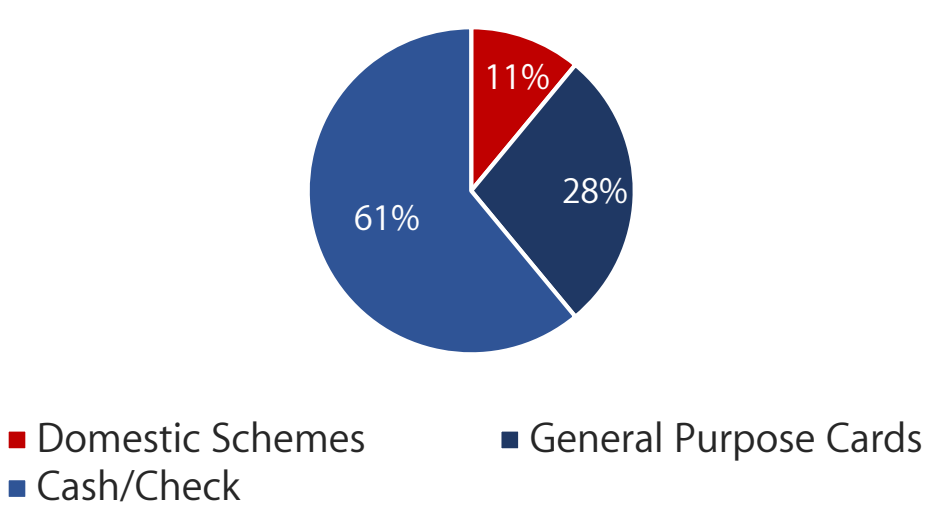
Europe

It is estimated that >80% of Europe's PCE is addressable. Europe remains one of the most under-penetrated regions with card penetration at 39% **(Exhibit n)**, including volumes from domestic schemes. We expect volumes to grow further at 10% CAGR, especially large, underpenetrated countries such as Germany, Spain and Italy.

The opportunity for card networks is twofold, including the processing footprint opportunity. Visa and Mastercard only process <50% of their branded transactions in Europe vs. 60-70% in ROW and 100% in the US - implying long-term opportunity to increase processing footprint.

Exhibit 15: Europe consumer payments mix



Processing activities in Europe is much lower than the rest of the world because of the presence of domestic networks in France (Cartes Bancaires), Germany (GiroCard), Italy (PagoBancomat). Domestic schemes are the result of a country's legacy efforts to establish a nationwide system of acceptance of debit cards. Prior to that - European countries set local payment routing rules, including routing domestic debit purchases along domestic rails - continue to earn cross-border and brand fees due to dual-badged cards - generally earn minimal fees for domestic payments processing in countries with dominant networks.

This implies a greater opportunity that can be accessed by both penetrating card utilisation and penetrating processing activities in Europe.

Exhibit 16: Payment shares across europe

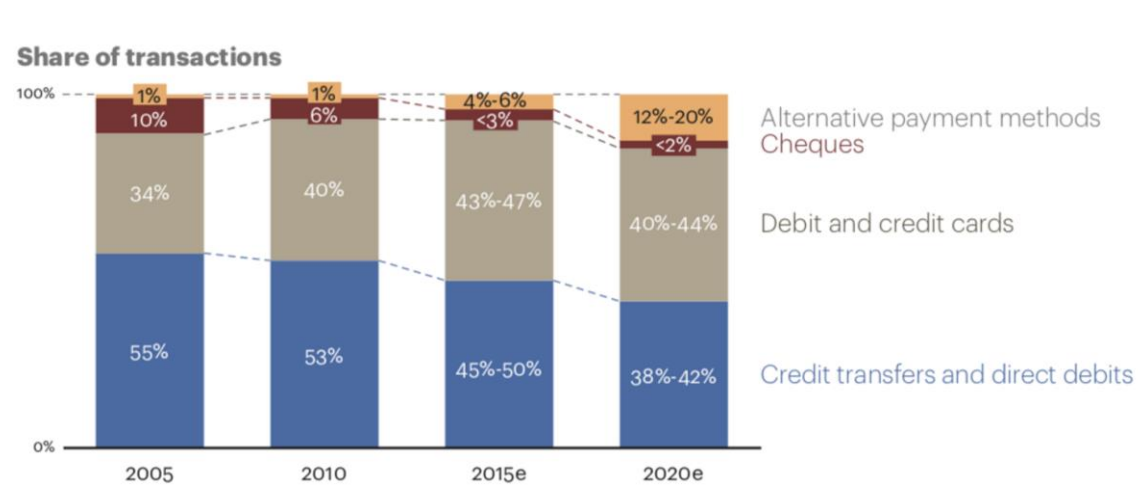
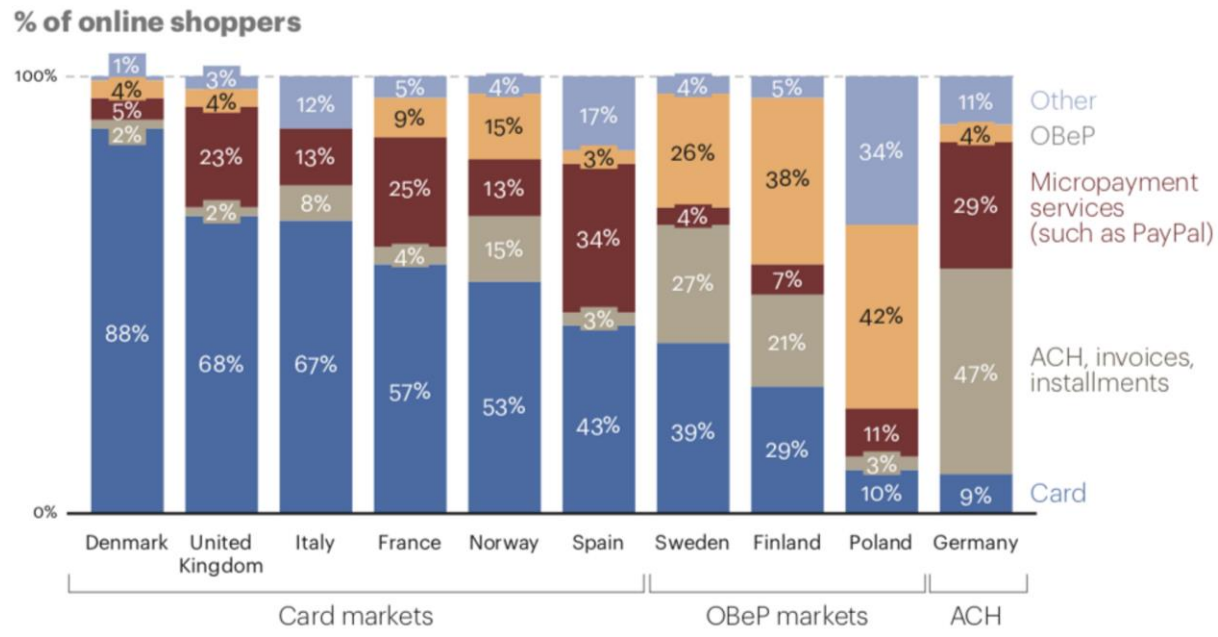


Exhibit 17: e-Commerce payments mix across EU countries



Driver 2b: EM-Specific
Emerging trends

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Asia

With global payments networks having missed out on the China growth story, they are looking to the other emerging market countries to fuel growth. India is the biggest single market in terms of unbanked population and a governmental push towards digitization but has plenty of homegrown competition. RuPay has exceeded Visa (V) and Mastercard (MA) in debit card issuance and is set to displace MA in terms of transaction volume. Mobile wallets are gaining traction, with Berkshire Hathaway-backed PayTM beating PayPal by a narrow margin at 9.9% of e-commerce transaction value.

Indonesia and the Philippines are also significantly underbanked with increasing smartphone penetration, but local players are nascent, resulting in lesser competition. A recurrent theme across Asia is the involvement of the public sector and a bias toward mobile based payment methods such as QR codes over traditional POS terminals.

Exhibit 18: Credit Card Penetration

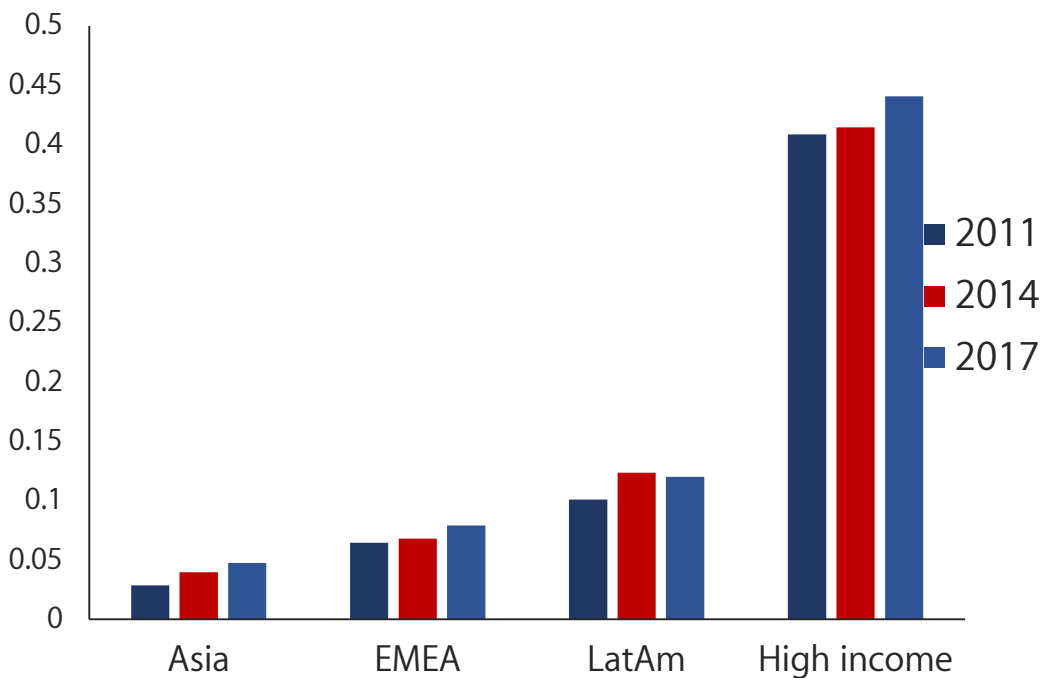
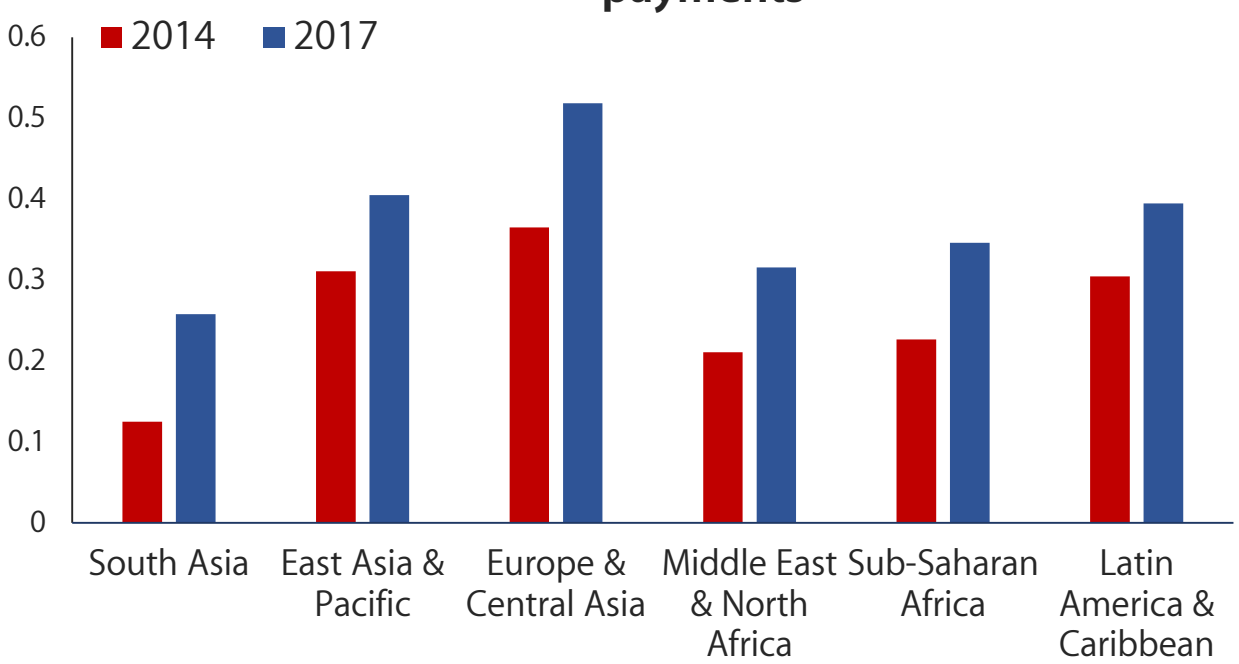


Exhibit 19: % of population made/received digital payments



Middle East & Africa

In Africa, mobile networks are enabling people to access online payments through virtual accounts which provide payment gateways, savings accounts, and credit facilities. Virtual account creation is catching up to the banking sector, with 20 million new accounts being opened over the last five years, compared to 30 million with banks. Kenya was one of the pioneers in mobile payments with their M-Pesa platform for P2P transfers. However, 80% of transactions in the country are made with cash, possibly because of high transaction fees and the multiple steps users are required to go through in order to pay with M-Pesa. Geopolitical and currency instability can be a key driver in the region: prior to their currency shortage in 2016, Zimbabweans only conducted 20% of transactions electronically; by 2017, 80% of transactions were electronic.

In the Middle East, Turkey has seen an increasing adaptation to card payments, but most of the growth is fueled by a local player, Troy, which partners with the Discover and Diners Club payment networks to facilitate transactions.

LatAm

Latin America on average has a much higher card penetration than Asia and EMEA, and installments are a popular way of financing purchases, making it an attractive market for networks. There is a spurt in local players catering to SMEs, such as PagSeguro in Brazil - a payments gateway and POS terminal provider which sits atop V and MA's existing payments networks. Disruptors like Tigo in Guatemala and BIM in Peru facilitate the use of mobile networks for money transfers amongst the rural population.

Alternative payment methods like cash vouchers are also very popular, and most countries have a local player leading the market. Boleto Bancario in Brazil offers over-the-counter payments for utility bills and online purchases – customers place their orders online and can complete the payment either online or offline at supermarkets and other vendors .

Driver 3: Low Cost Merchant Acceptance
mPOS-itioned to benefit from Disruption

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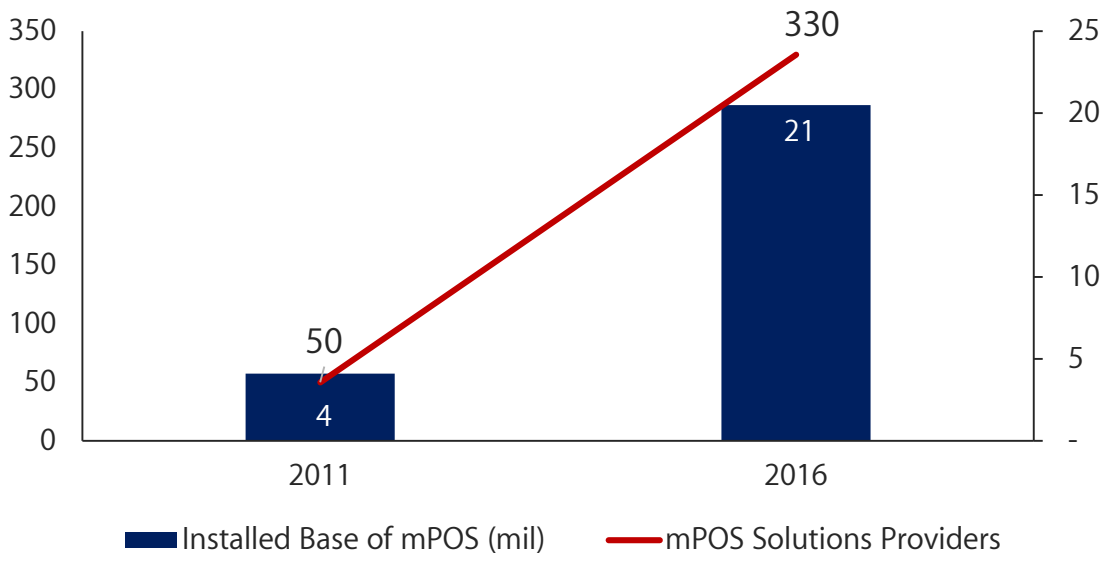
Rising mPOS acceptance

Small and medium businesses (SMBs) and micro-merchants represent a huge growth opportunity for networks moving forward. Payment providers and innovators in the mPOS space such as Square, PayPal and others have allowed SMBs to use mobile devices to accept card payments where they would have previously only accepted cash. These services still utilise existing networks to process and accept payments.

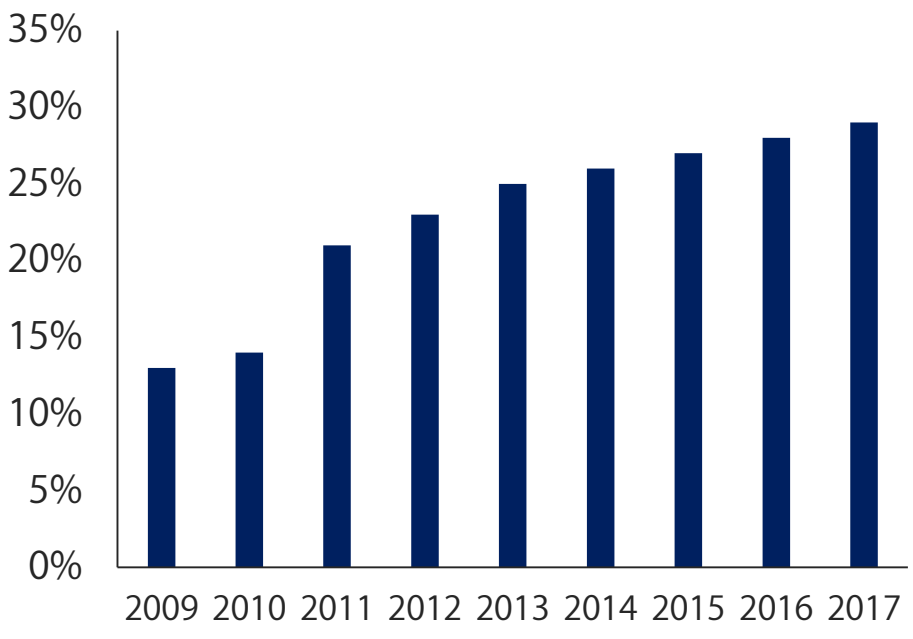
Where do these opportunities exist? We see rapidly rising mPOS acceptance globally, with the number of mPOS terminals installed globally increasing 4x over the past 5 years.

Exhibit 20: Explosion of low-cost mPOS merchants



Currently the US dominates global acceptance figures with 33.1 POS per capita vs 5.7 POS per capita for the rest of the world. We see huge growth potential for emerging markets, specifically if we make conservative assumptions regarding adoption converging towards that of the US. This is further supported by the higher proportion of SMBs and micro-merchants in emerging markets.

Exhibit 21: % of mPOS Providers in Emerging Markets



QR Codes and Wallets

In addition to this, we believe that QR codes act as a driving force behind the adoption of mobile wallets as they significantly reduce the upfront cost of adoption. While some might see this as a risk factor, we believe that this will drive network activity as most users on major platforms - Square in the US, PagSeguro in Brazil and iZettle in Europe - require sign-ups using an existing card, through which top ups flow through the network. This will be catalysed by the rapid adoption of mobile and contactless payment technologies. We have already seen evidence of existing networks, such as Visa, moving into this space.

Exhibit 22: Visa's partnerships in new Segments

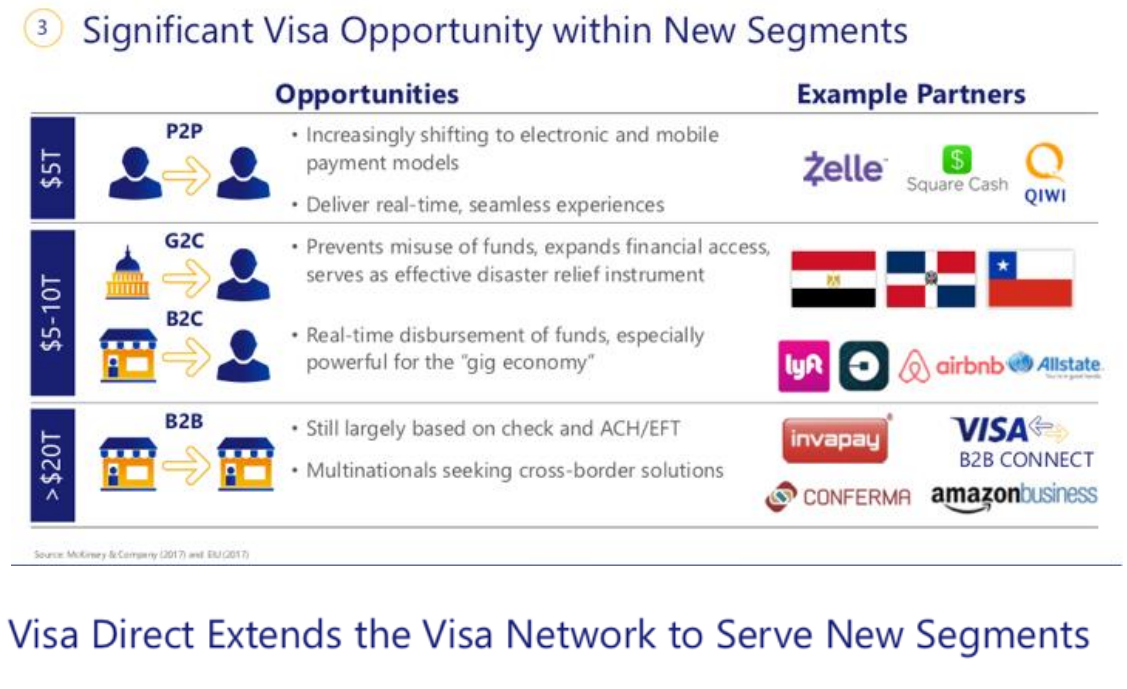
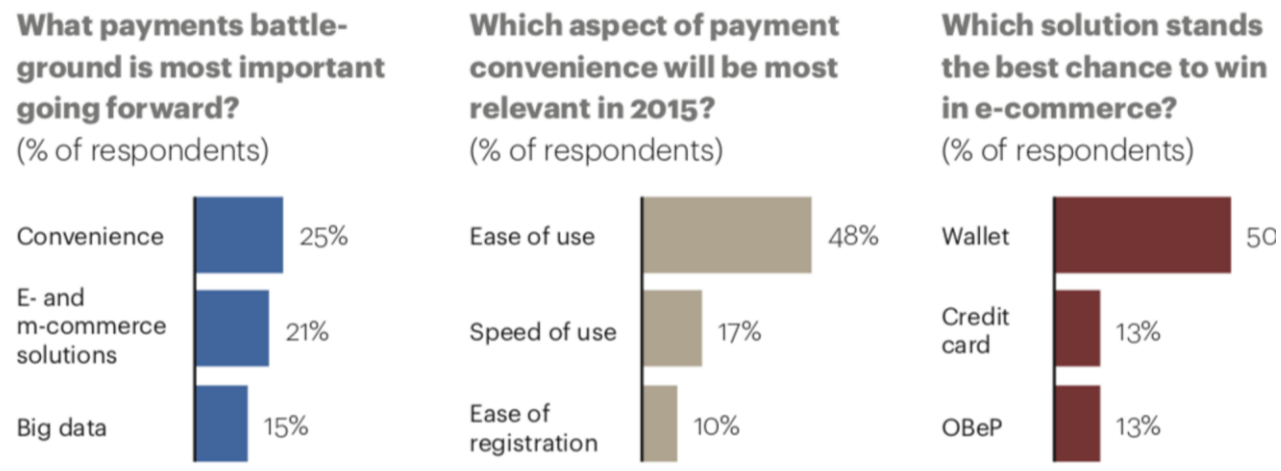


Exhibit 23: What drives e-commerce payments

Convenience is seen as the most important battleground, and wallets are seen as most likely to win in e-commerce



Driver 4: Financial Inclusion

You get a card! You get a card! And YOU get a card!

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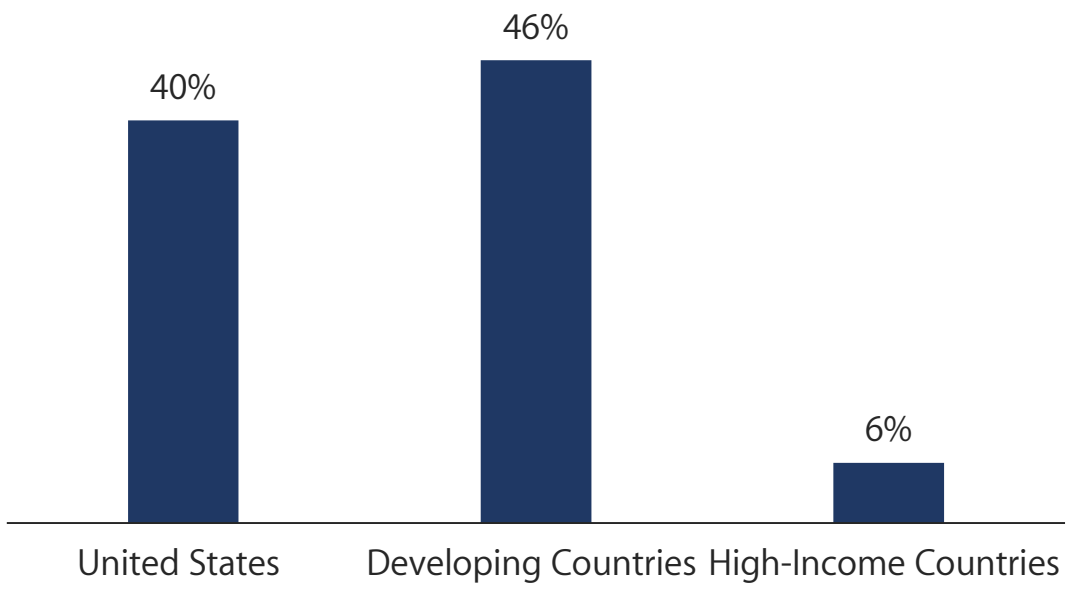
Unbanked and underbanked

Financial inclusion is a key driver for both the US and emerging markets due to the large remaining proportion of unbanked and underbanked population. This is estimated to be 6% in high-income countries, 46% in developing countries, and curiously enough, 40% of the US, with credit-rating FICO scores below 700 **(Exhibit 24)**.

Exhibit 24: % of underbanked/unbanked adults



Financial inclusion as a catalyst is encouraged by the increased use of pre-paid cards in the US and P2P transfers in emerging markets that enable users to build a credit history and obtain bank accounts. Governments have also encouraged the opening of national bank accounts and in the case of India, the use of biometric optical identity readers to enable payments. This accelerates the digitization of payments. In the US, pre-paid card programs form 5% of total payment volumes and grow substantially faster than the market at 15% CAGR. This represents a market that has historically been untapped, and will likely see more growth moving forward due to strong governmental support.

Exhibit 25: % of consumers who bought a pre-paid card

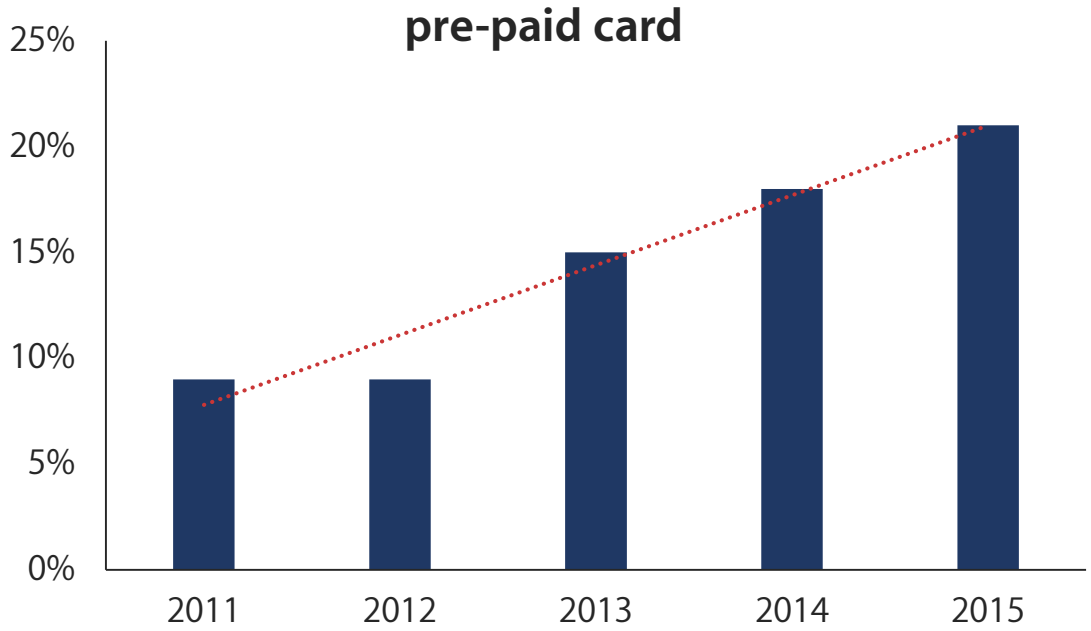


Exhibit 26: US General Purpose Card Divide

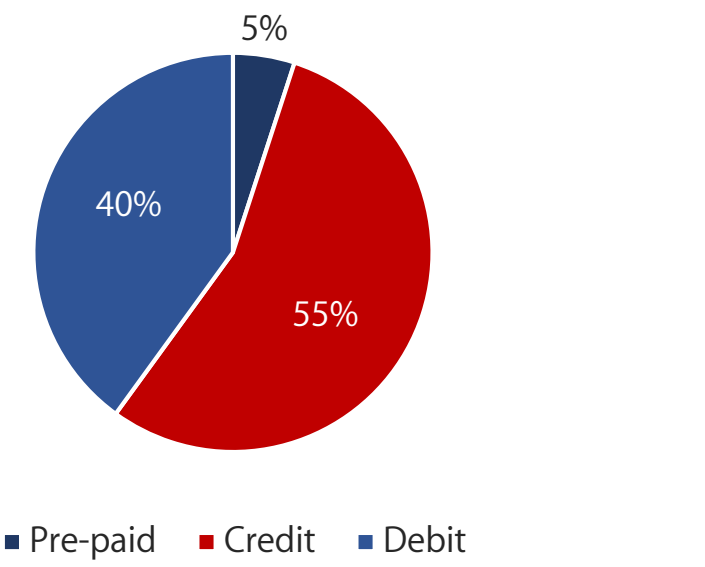
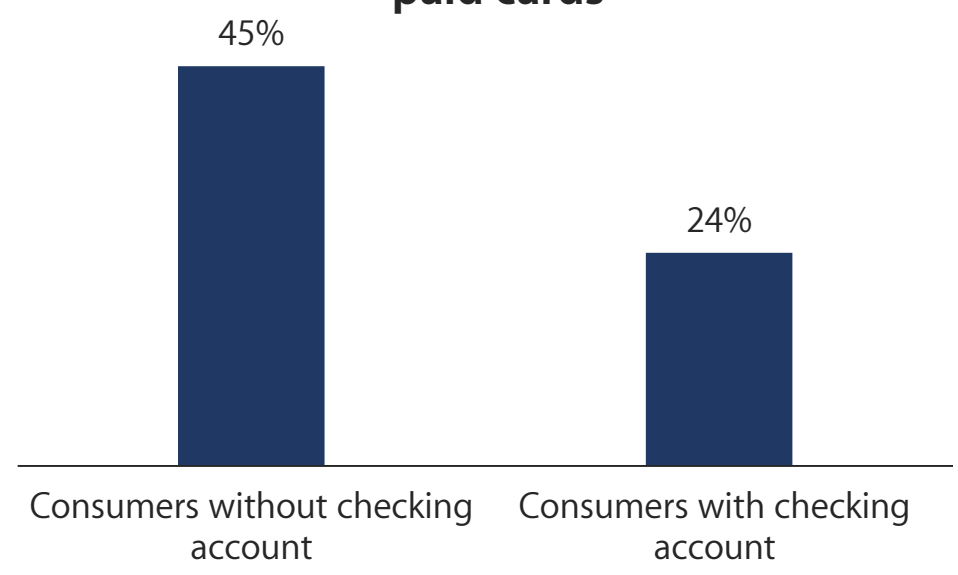


Exhibit 27: % of Consumers that own pre-paid cards



Driver 5: B2B Payment growth

Mi accounts payable, su accounts receivable

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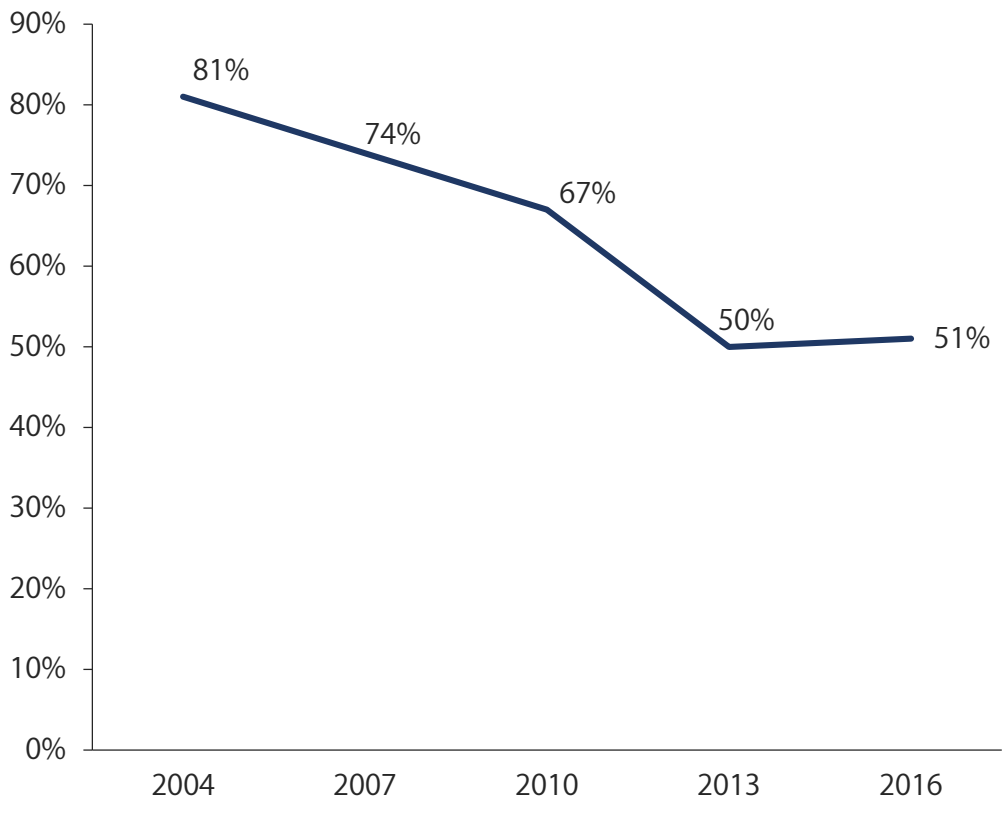
The cost of speed

The majority of industry revenues (interchange fees, merchant discount rates, card network assessment/ processing fees) are a derivative of payment volume. However, we recognize that available data is sparse, limiting our ability to effectively estimate B2B payment volumes in order to determine an ample runway for general growth opportunities.

Mastercard estimate B2B payment flows globally to be approximately $120T, with $100T of this related to accounts payable (AP). This is significantly larger than the current C2C TAM previously discussed at $35T. Sell-side research has largely not focused on B2B opportunities due to reversing trends in cash/check usage decline **(Exhibit n)**. Why is this the case, and why shouldn't we be worried? The primary reason is that other payment methods are associated with higher costs of use. While cash/check usage has no obvious fees and appears free – it in fact has an opportunity cost can be associated with the slow transaction. Automated Clearing House (ACH) payments also enjoy the second largest share of B2B flows due to lower costs (approx $0.50 per transaction), rendering it suitable for high-volume, recurring transactions. Card payments on the other hand charge approx. 2% plus processing fee which at the moment is too costly for large, recurring B2B payments.

Exhibit 28: Percentage of B2B Payments made by Cheque

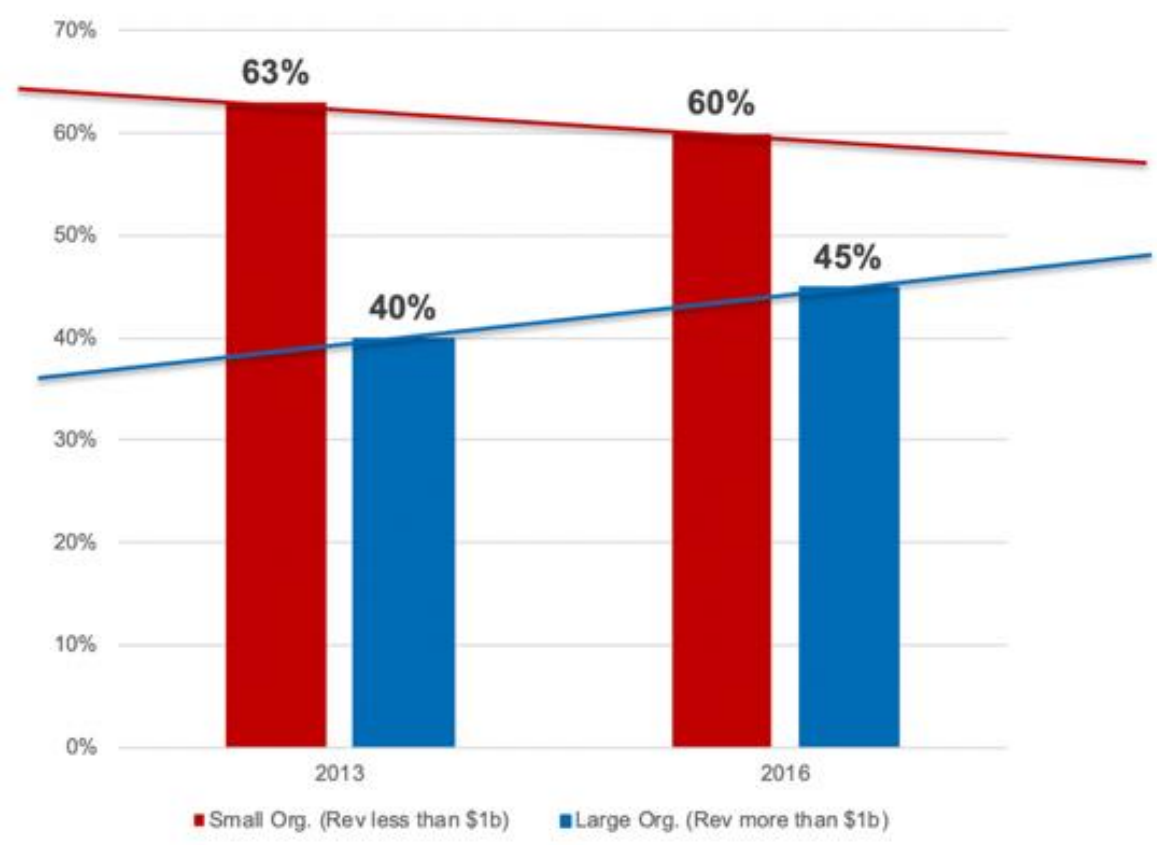


Source: 2016 Electronic Payments, Association for Finance Professionals

Automation of AP departments

So where is the room for innovation? According to Mastercard and AFP surveys, organisations rank costs and efficiency as the primary concern points with regards to B2B. The complexity of B2B payments has led to slower adoption of technological advantages. AP departments are essentially cost centers for businesses, especially large businesses. Networks are already working to drive automation of AP departments completely and thus drive cost reductions for complex AP departments. We are already seeing this trend in smaller businesses with less established AP departments and we believe that this will propagate into larger businesses in the long term. **(Exhibit 29)**.

Exhibit 29:



Source: 2016 Electronic Payments, Association for Finance Professionals

Electronic Payments Dominate

The transition to electronic B2B payments away from cash leaves ACH and card payments as options. ACH implementation requires each and every buyer/seller relationship be set up separately with completed forms and agreements. ACH is thus suited for high-volume, recurring transactions: setting up an ACH transfer for a single transaction is simply not cost effective. On the other hand, using commercial cards for B2B transactions - whether for one-time or recurring payments - only requires providing suppliers with card numbers. We currently see networks well positioned for the long-term shift towards card payments as we see networks driving the automation of AP departments as well as networks positioning themselves within the fast-ACH space (e.g. Mastercard).

Moats

Fact of the day: Visa actually owns a literal moat

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1. Network effects

Card networks are textbook interactive networks. They benefit from positive feedback loops which lead to winner-takes-most outcomes: having users and scale begets users and scale. Mastercard and Visa hold dominant market share, with fragmented issuers and acquirers on either end of the network. Visa for example, more than 3B cards on their issuer end and 13,000 issuers, with 3000 acquirers signed on to their scheme and 44m merchant locations. Within North America alone, Visa is partnered with 10,400 financial institutions, 9m merchant locations, and has issued 900m cards, making up 45% of NA's payments volume and processes 62% of all transactions. Mastercard has 1,100 issuers and 1.7B cards.

Exhibit 30: Comparisons between major networks

	Visa Inc.[2]	MasterCard[3]	American Express[3]	JCB[3]	Discover | Diners Club[3]
Payments Volume ($B)	$6,266	$3,514	$1,024	$234	$149
Total Volume ($B)	$8,872	$4,827	$1,038	$241	$161
Total Transactions (B)	141.2	78.3	7.4	3.0	2.4
Cards (M)	3,143	1,669	110	103	57

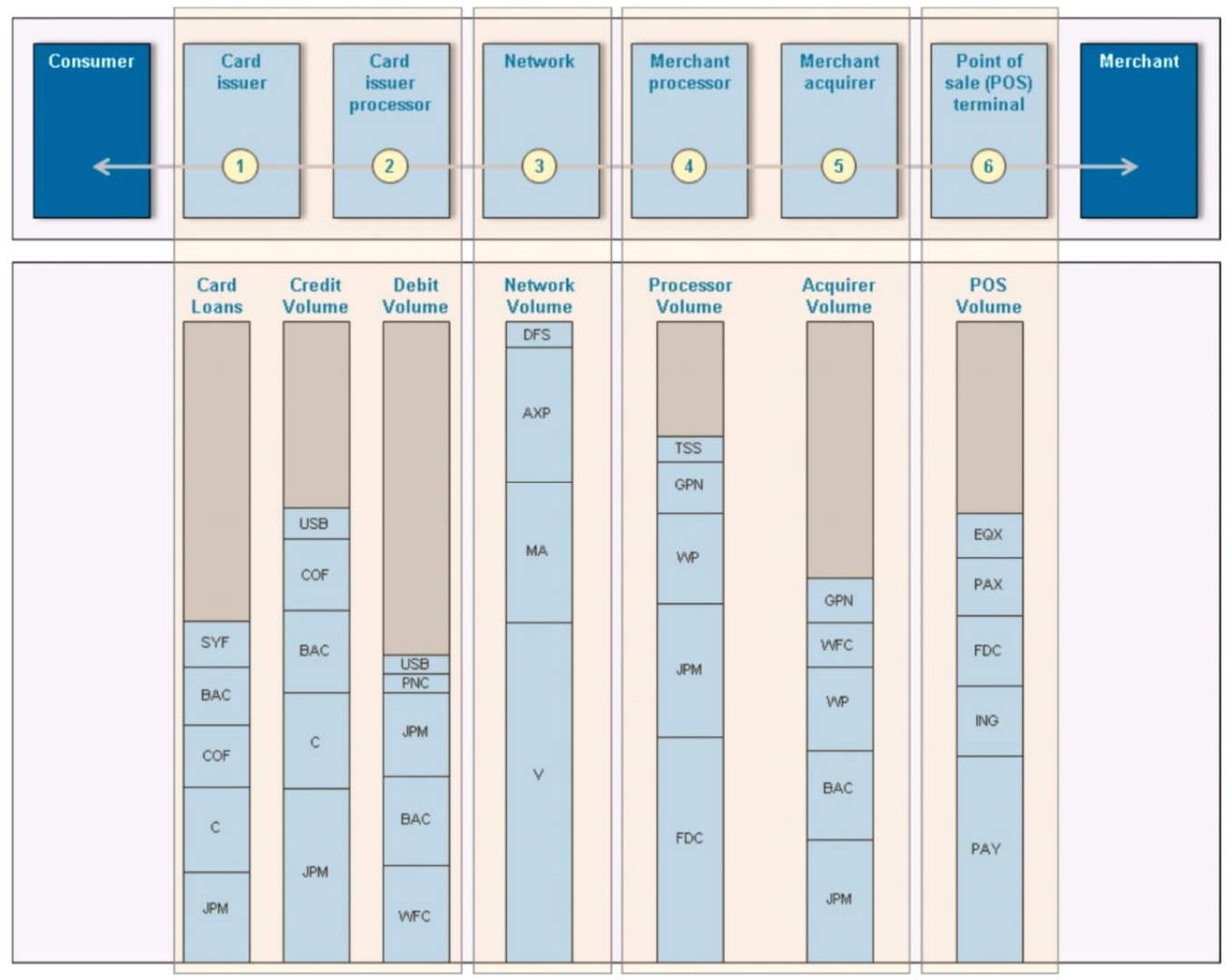
Source: Visa

Network effects form a formidable moat in part because of the difficulty of bringing customers on to the network. Visa and Mastercard's partnerships are built with financial institutions and banks, not customers. Thus potential upstarts would need to attempt to build a network not with individual consumers, but with risk adverse and compliance bound institutions. This makes getting things off the ground particularly challenging for potential competitors: they would have to convince financial institutions and banks to adopt a new, untested platform - a platform which only has value if there are already users using it.

Customer acquisition is also costly - due to their scale, Mastercard and Visa are able to offer significant incentives to attract clients to their platform. Visa's client incentives paid to financial institutions, merchants, and partners in order to build payments volume comprised $4.6B of 22.9B gross revenues - a significant 20% of sales. Visa values its relationships at $24B, while Mastercard values its relationships at 600M.

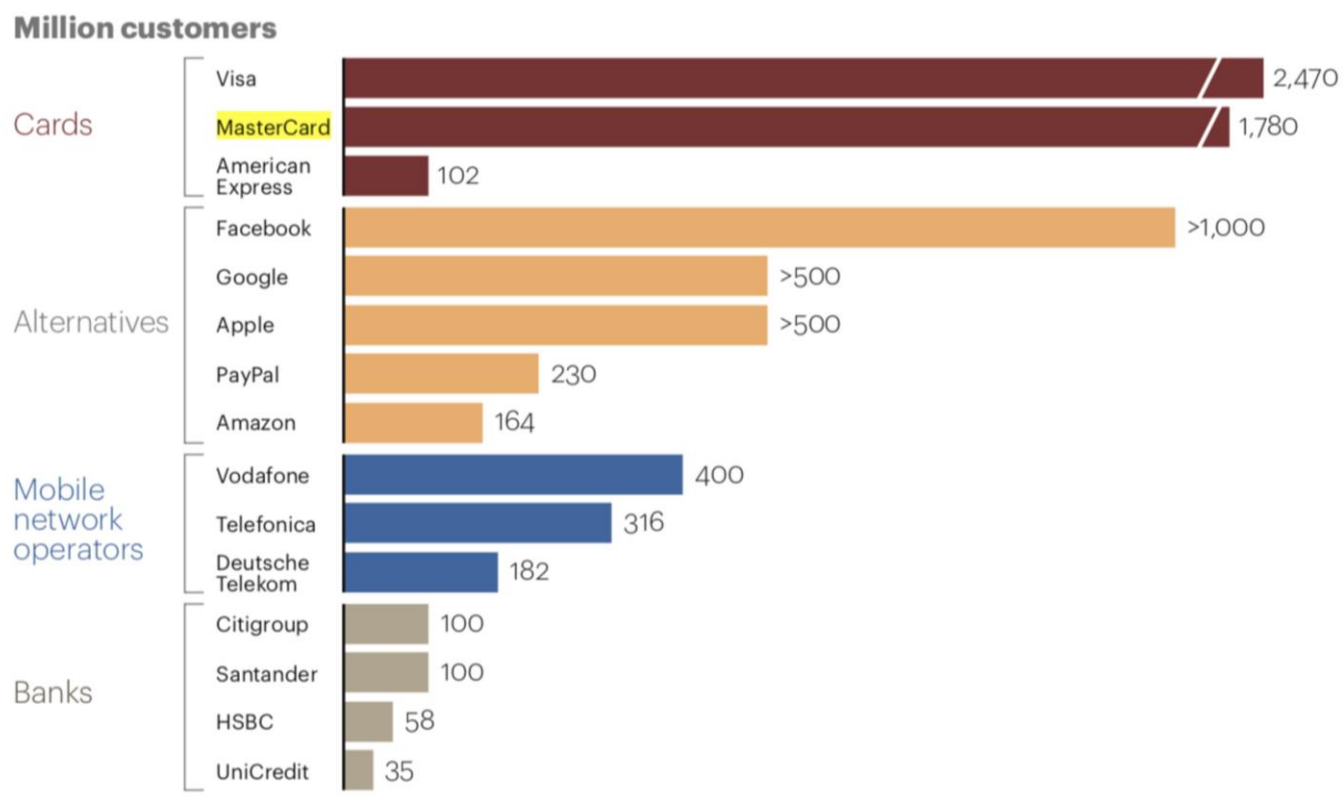
Further evidence of the segment's moat is seen in the relative fragmentation of the other industry segments on the either end as seen in **Exhibit 31.**

Exhibit 31: Top 5 players in each segment



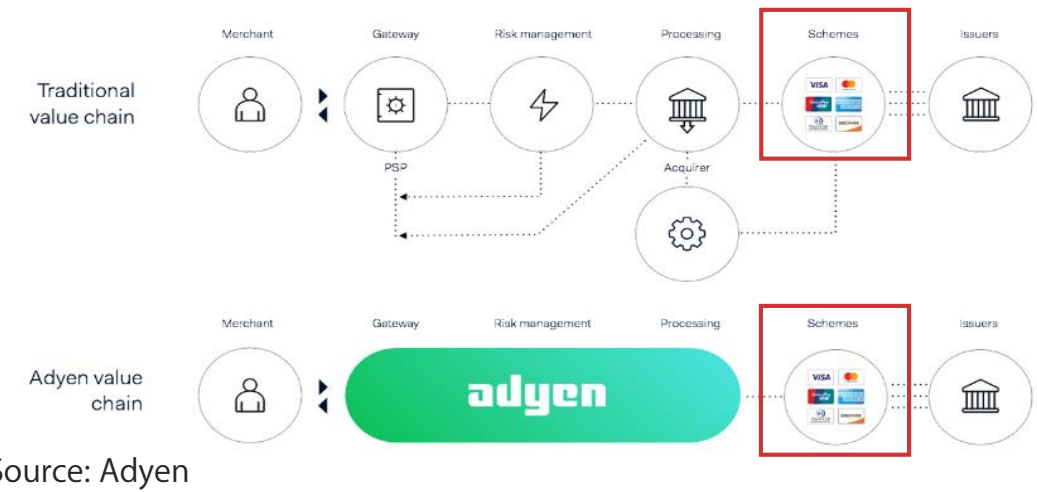
Source: BMO Capital Markets

Exhibit 32: Industry relative customer bases



Source: AT Kearney

Exhibit 33: One does not simply escape the network



Source: Adyen

2. Brand preference

One reason partners would be unwilling to opt for an upstart card network is because of consumer brand preference. Visa and Mastercard have spent billions of dollars to develop their brands - they are widely known to be accepted worldwide and are considered safe. This brand preference amongst consumers is a strong incentive for partners to choose established networks: merchant acquirers would find their own demand driven by demand for access to the network, while issuing banks would aim to be associated with the strongest brands. The market power of Visa and Mastercard can also be seen in how they are responsible for setting the interchange fees for tens of thousands of member institutions.

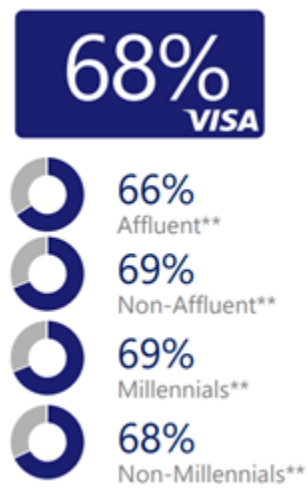


Exhibit 34: Visa's brand strength

Source: Visa

3. Technology

Card network development requires enormous initial investment and enjoys a strong adoption externality. Mastercard's capitalised technology stands at $1.5B as at 2017, and Visa's at $2.5B. Average yearly capex for the past 5 years at $204mn for MA and $534M for Visa. Total capex for the last 5 years represent 2.17% and 1.45% of total historical investment. Once set up, networks are immensely scalable and marginal costs per new customer are negligible. Visa's VisaNet, set up in the early 1970s, is supported by 1,600 secure network endpoints linked by 1.2M miles of fiber optic lines.

Exhibit 36: V and MA set interchange fees together

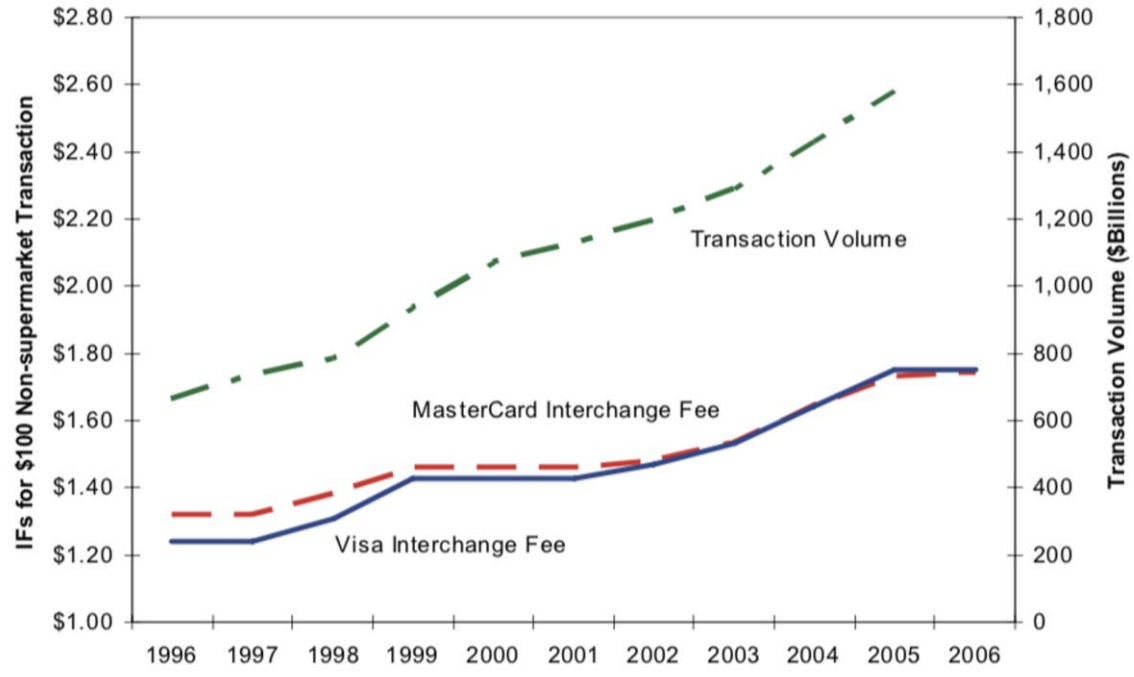
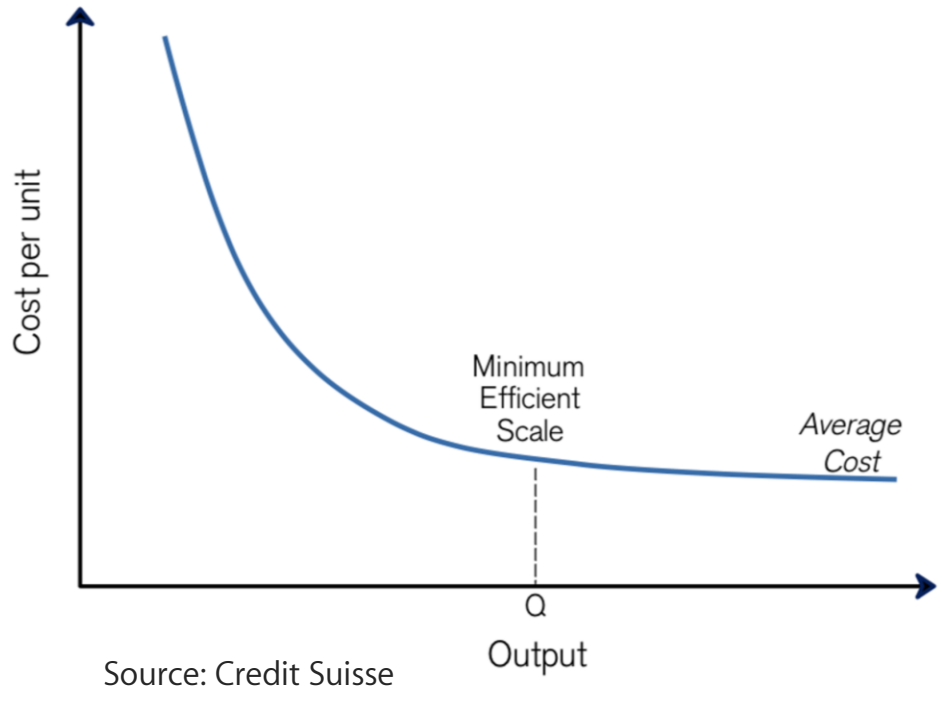
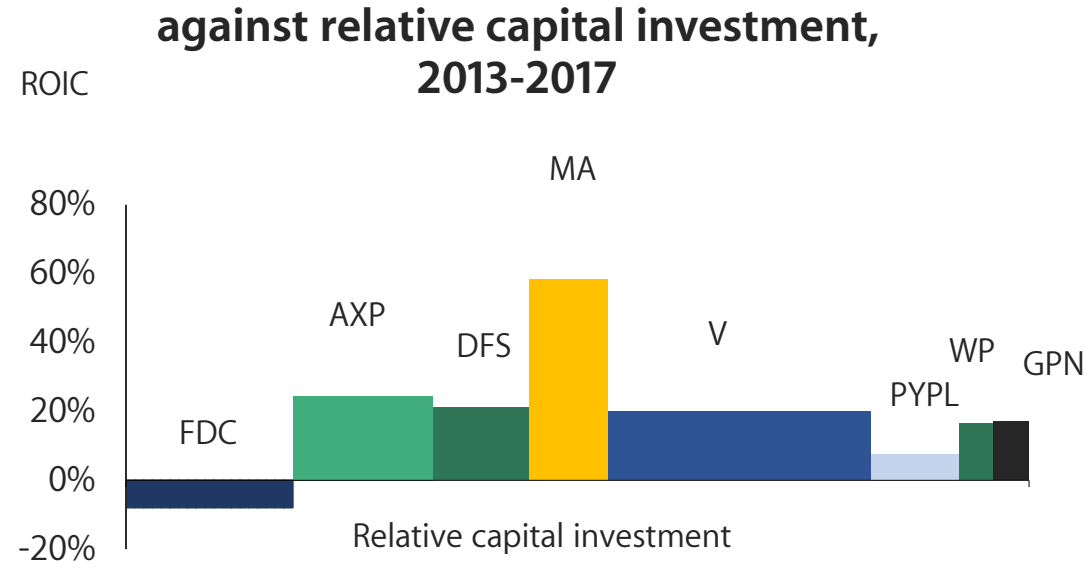


Exhibit 35: As quantity rises, average cost is largely constant



Source: Credit Suisse

Exhibit 37: Investment pool: ROIC against relative capital investment, 2013-2017



Regulation
When cash isn't king

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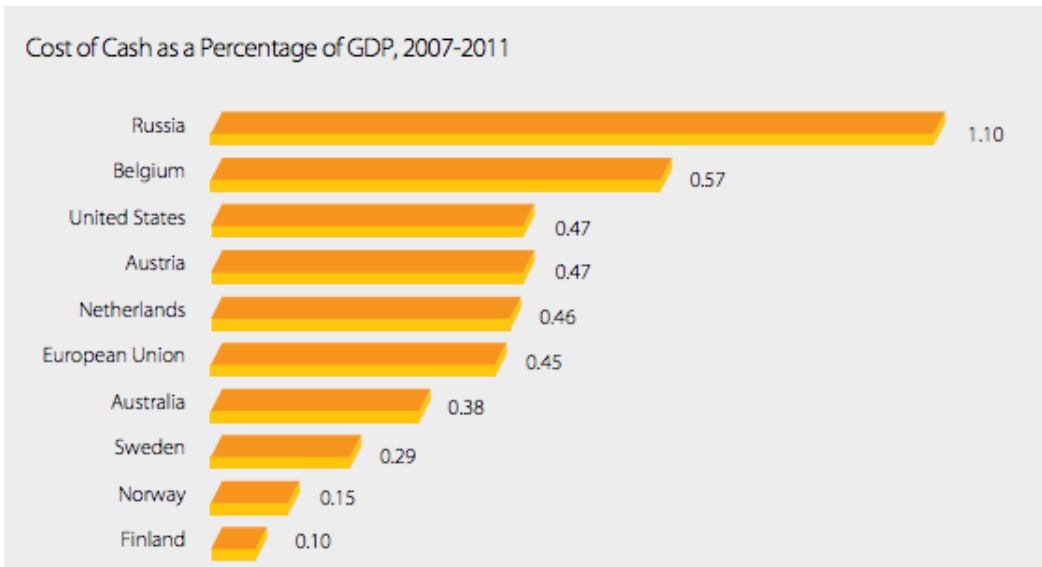
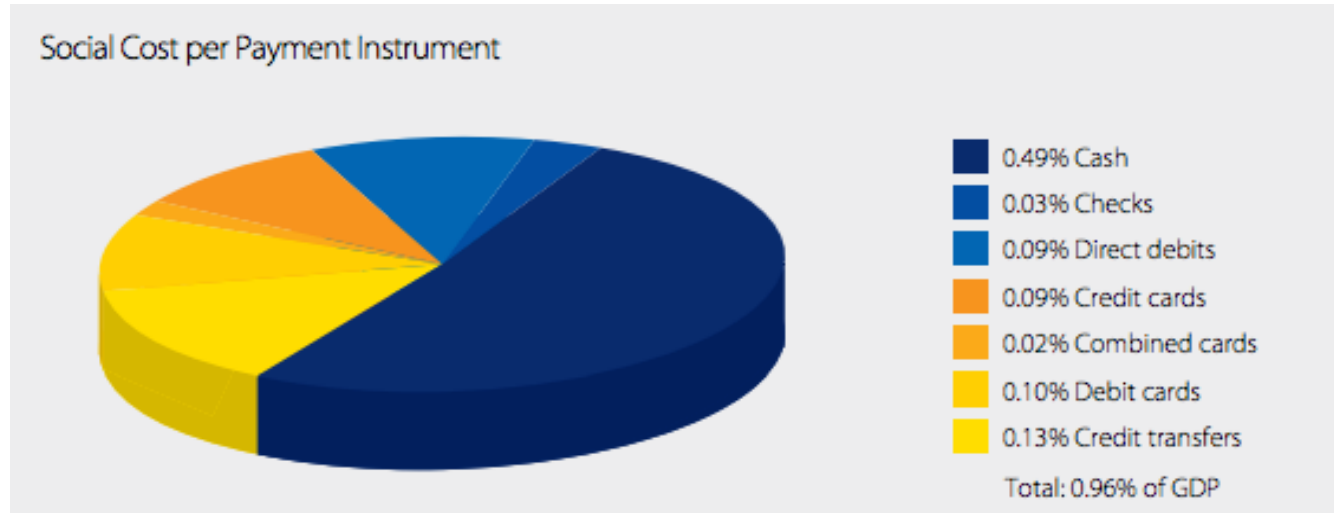
Cash is Expensive…

Exhibits 38 & 39: Cash is pricey



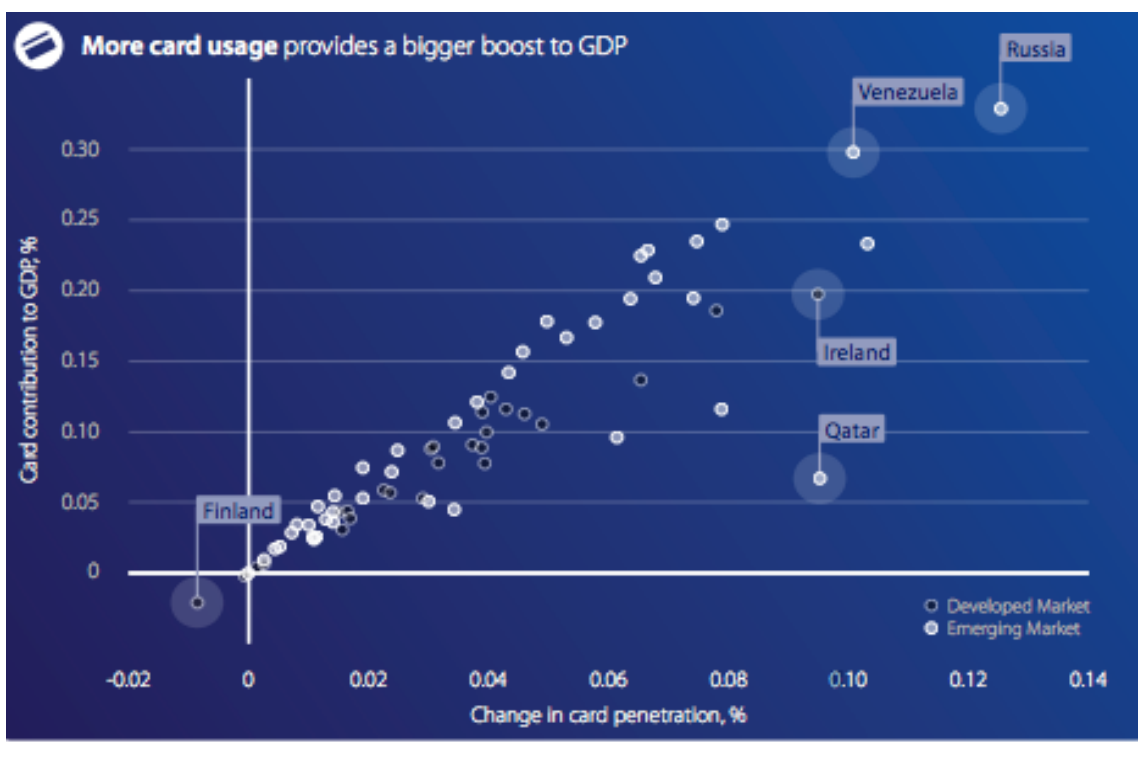
Source: McKinsey



Source: ECB

… and card payments boost GDP growth

Exhibit 40: Card contribution to GDP against change in card penetration %



We expect governments globally to support, if not actively push for, a transition to card based payments. Consumption and economic growth has been driven by accelerating card penetration in global markets. Further, increased card usage is attributed to shorter inventory days, a shorter cash conversion cycle, and therefore increased production. Increased card payments are also expected to increase employment –around 2.1m jobs were created in total globally per annum due to a 2% increase in card penetration over 2011-2015. This increases global GDP by 0.3-0.5%.

The Indian government, for example, has worked to accelerate financial inclusion and reduce its reliance on the cash economy with implementation of Direct Benefits Transfer (DBT), which is linked to Aadhar with 400 million citizens enrolled.

Exhibit 41: Jobs added due to increased card penetration, avg betw. 2011-2015

Argentina	41.29	Greece	(0.08)	Netherlands	6.45	South Korea	10.96
Australia	21.36	Hong Kong	3.29	New Zealand	1.33	Spain	1.11
Austria	3.65	Hungary	9.86	Nigeria	16.88	Sri Lanka	3.42
Azerbaijan	1.13	India	336.93	Norway	1.39	Sweden	1.49
Belgium	1.76	Indonesia	62.96	Oman	1.90	Switzerland	2.56
Brazil	169.13	Ireland	3.74	Peru	33.49	Taiwan	9.98
Cambodia	4.73	Israel	0.14	Philippines	3.46	Thailand	75.73
Canada	17.61	Italy	25.95	Poland	30.42	Tunisia	(0.01)
Chile	18.40	Japan	27.84	Portugal	4.04	Turkey	56.62
China	427.10	Jordan	0.44	Puerto Rico	0.88	UAE	14.17
Colombia	11.02	Kazakhstan	2.08	Qatar	1.05	UK	34.51
Czech Republic	5.23	Kenya	5.33	Russia	235.05	Ukraine	13.52
Denmark	3.60	Kuwait	0.90	Rwanda	1.02	Uruguay	2.80
Egypt	2.30	Lebanon	0.72	Saudi Arabia	12.47	USA	180.85
Finland	(0.52)	Malaysia	4.75	Serbia	2.93	Venezuela	37.44
France	6.81	Mexico	77.54	Singapore	3.38	Vietnam	74.84
Germany	33.25	Morocco	4.01	Slovakia	2.66	Total	2,616.43
Ghana	2.82	Myanmar	4.92	South Africa	26.55		

Regulation
Potentially Favourable For the Payments Industry

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Durbin Amendment (US)

Regulation could be favourablefor the payments industry, should the Durbin Amendment be repealed in lieu of Trump's unwinding of the Dodd-Frank Act.

Part of the 2010 Dodd-Frank Act, Durbin lowered debit card interchange fees substantially. It resulted in banks losing revenue and subsequently introducing rewards programs on debit cards.

Visa suffered the most (relative) due to its exclusive agreements on PIN cards. However, PIN debit is its lowest yielding product in terms of revenue earned per volume. Visa maintained margins by adding on other fees and encouraging Signature over PIN.

A repeal of Durbin would benefit issuers, acquirers, card networks, and independent third-party PIN-debit/FT networks attempting to undercut Visa to gain PIN processing share. Visa would be benefit more than MasterCard due to its regulated v. unregulated debit mix.

Exhibit 42: Visa's yield growth despite Durbin

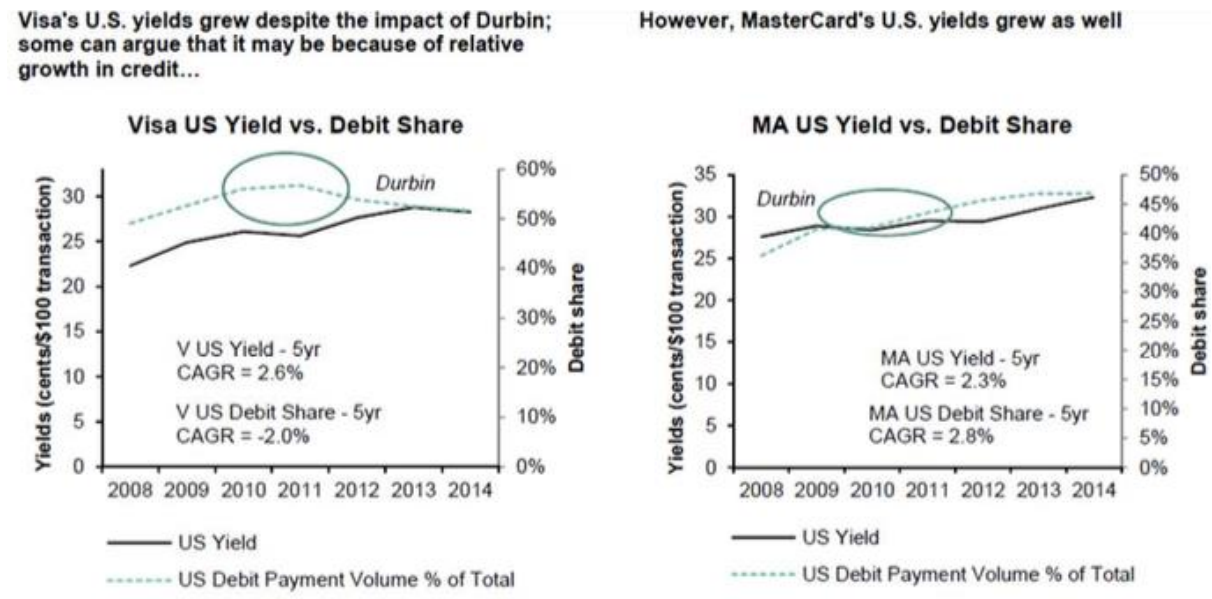

Exhibit 43: USD 7.7Bn loss for Banks due to Durbin

Revenue Loss Projections for Banks Based on 2009 Data[5]	
Total value of debit transactions	$1,420.6 billion
Number of debit transactions	37.9 billion
Interchange revenue under old rules (1.15% x $1,420.6 = $16.34)	$16.3 billion
Interchange revenue under new rules ($.21 x 37.9 = $7.96)	$8.0 billion
Fraud loss adjustment under new rules (.05% x $1,420.6 = $.71)	$0.7 billion
Total loss of revenue ($16.34 -7.96-.71 = $7.67)	$7.7 billion

PSD2 (Europe)

PSD2 (Revised Payment Services Directive) is currently being implemented across the EU and will continue to be done throughout 2018. Under PSD2, banks are obligated to provide third-party providers access to their customers' accounts through an open API. Bank customers will be able to use third-party providers to manage and analyze their finances and initiate payments from their bank accounts, essentially ending the monopoly banks have historically had on account holder transaction data and payments services.

PSD2 opens up banking to non-banks through an open API. New entrants can focus on offering a single service and connecting to other service providers through the API. Moreover, PSD2 lets third-party providers operate in the entire EU as long as they are licensed by the financial authority of their own country of origin. While banks currently have a monopoly on customer transaction data and how these data are shared with customers, PSD2 will give third party APIs the ability to leverage customer spending and expense data.

We see Payment Initiation Service Providers as standing to gain the most from PSD2. They will be able to enter the financial services market free of the heavy compliance and infrastructure that banks are required to maintain. Banks will thus likely cede market share and a face a drop in revenues.

There are four possible broad outcomes that can be identified from the implementation of PSD2:

1.Financial markets remain primarily domestic, and the use of non-banks for financial services will be limited
2.Consumers adopt non-bank financial services, but markets remain primarily domestic
3.Consumers adopt non-bank financial services across country lines
4.Consumer trust in non-bank entities remains low; big banks become leading PISPs and AISPs

The most likely outcome, in our view, is **Scenario 2** gradually evolving into **Scenario 3**, due to the nature of PSD2 legislation and the attraction of non-bank financial services following its implementation.

Technology and Disruption
TFL Status update: Service as usual

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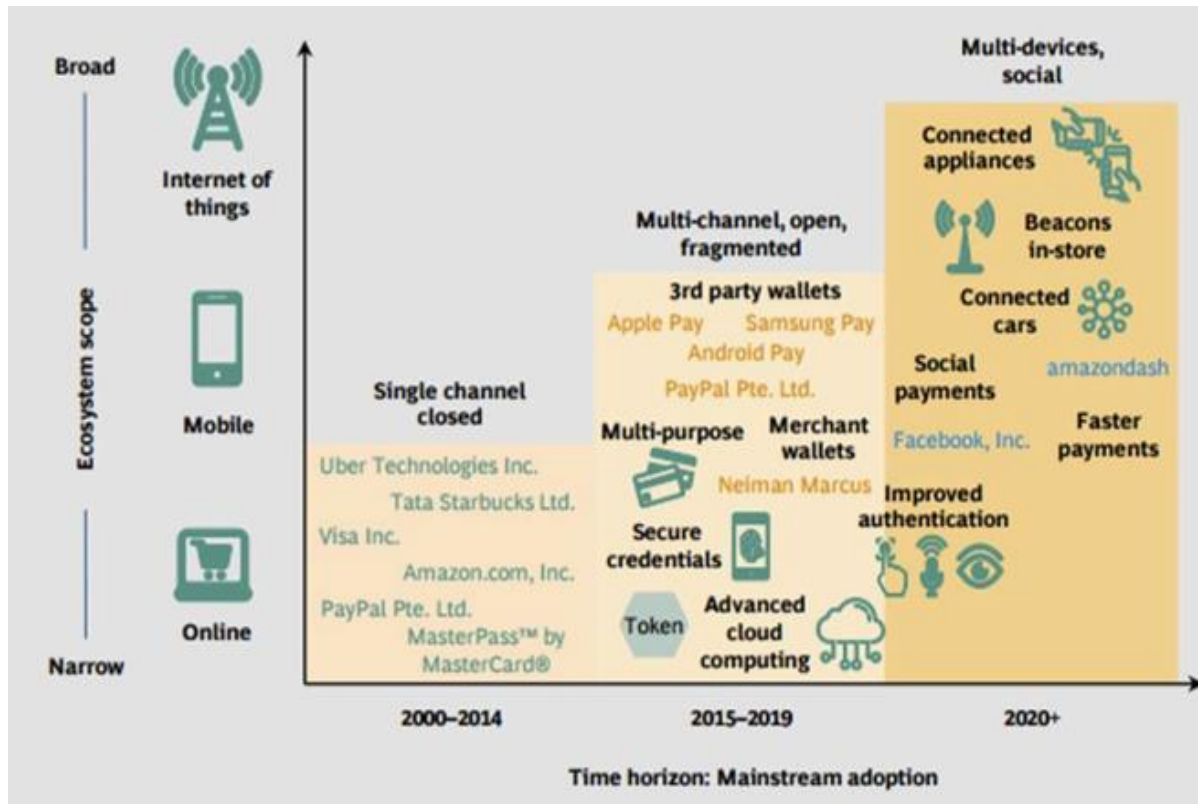
Merchant Acquirers

Merchant acquirers and card issuers at either ends of the network are at greatest risk to disruption, with card networks largely shielded from disruption. Particularly at risk are tech vendors that serve merchants and consumers, especially those that do not underwrite settlement risk. These include POS tech vendors (Verifone, Ingenico, electronic cash registers) and sub-scale merchant acquirers. This is in line with rising popularity of social networks, self-service apps and smartphones coupled with the convergence of the online and brick-and mortar worlds. Merchants have been forced to develop omnichannel retailing and payment platforms and driven change in the non-bank merchant acquiring space.

Merchant acquirers are increasingly relying upon technology as a differentiator to wrap around card processing services (integrated payments), recognizing that traditional "feet on the street" sales methods are facing secular pressure. McKinsey estimates the traditional field merchandising model accounted for about 65% of the market in 2013, but will shrink at a 2.5% clip, while tech-enabled POS software solutions will pick up the slack and grow yearlyat8.9%.

Exhibit 44: Evolution of Consumer Digital Payments



Source: BCG Experience and Research

Exhibit 45: Stripe facilitates merchant and mobile transactions

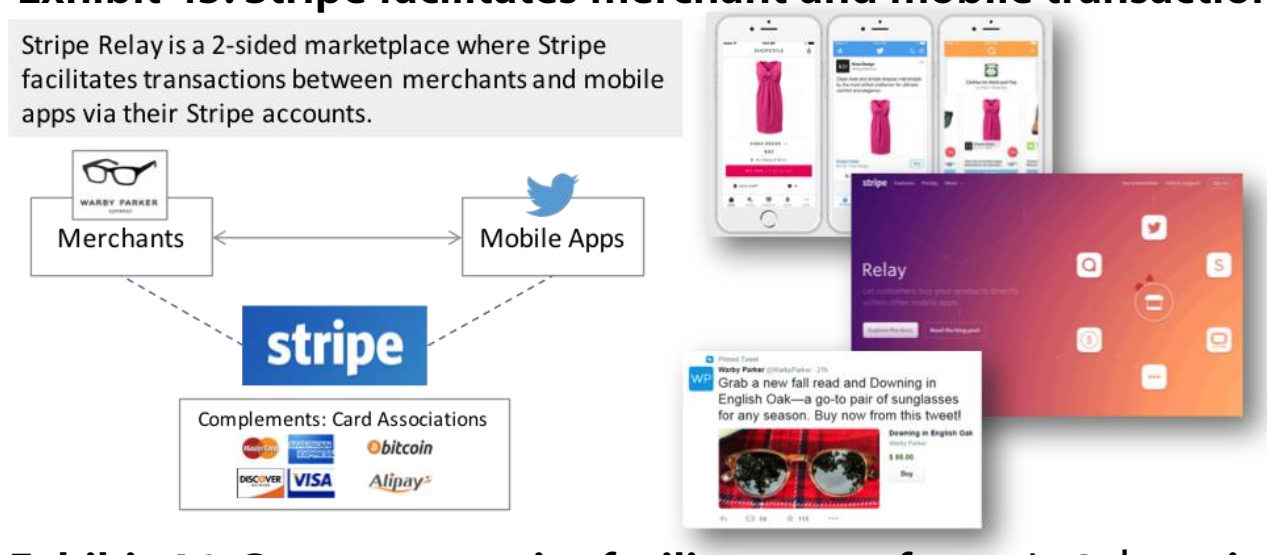
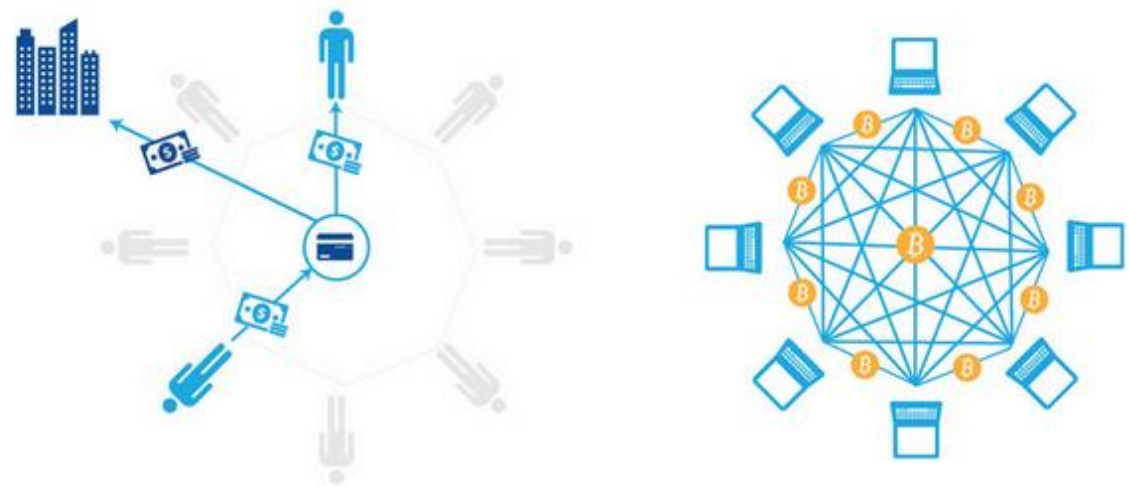


Exhibit 46: Cryptocurrencies facilitate transfers w/o 3rd parties



Blockchain

Cryptocurrencies have certain advantages over incumbent payment forms, such as faster settlement times and lower fees, as well as their ability to operate without trusted third parties such as banks and governments.

Tech merchants including Microsoft, Tesla, Virgin Galactic, Zynga, and Steam have adopted small scale cryptocurrency payment functions. Merchants who accept cryptocurrencies will likely intend to convert the funds into their domestic fiat, and given the volatility in most cryptocurrencies this is likely a hurdle to acceptance.

Integration and operational complexity may keep mainstream merchants on the sidelines. For example, Overstock.com, a large merchant early to promote Bitcoin acceptance, recently suffered a technical glitch which allowed customers to purchase items using Bitcoin Cash (a separate currency from Bitcoin) while being quoted Bitcoin prices, representing a steep discount.

We thus see wide-scale cryptocurrency adoption and disruption of card networks unlikely in the medium term given a lack of trust in the currency by many merchants and consumers, and a limited progression in its demand and acceptance cycle. Part of the value of a currency is driven by faith in its ability to function both as a store of value and as a means of exchange, and neither have yet been seen.

The underlying technologies behind trust-free distributed ledgers (blockchains) could have wide applications in the payment space. Payment Initiation Service Providers stand to gain the most, as they will be able to enter the financial services market without the heavy compliance and infrastructure banks are required to maintain.

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