



Fundamental, Incisive,
Thematic, Thought-leading

Industry Emerging Payments

Date
12 April 2017

North America
United States

TMT
Payments, Processors, &
IT Services

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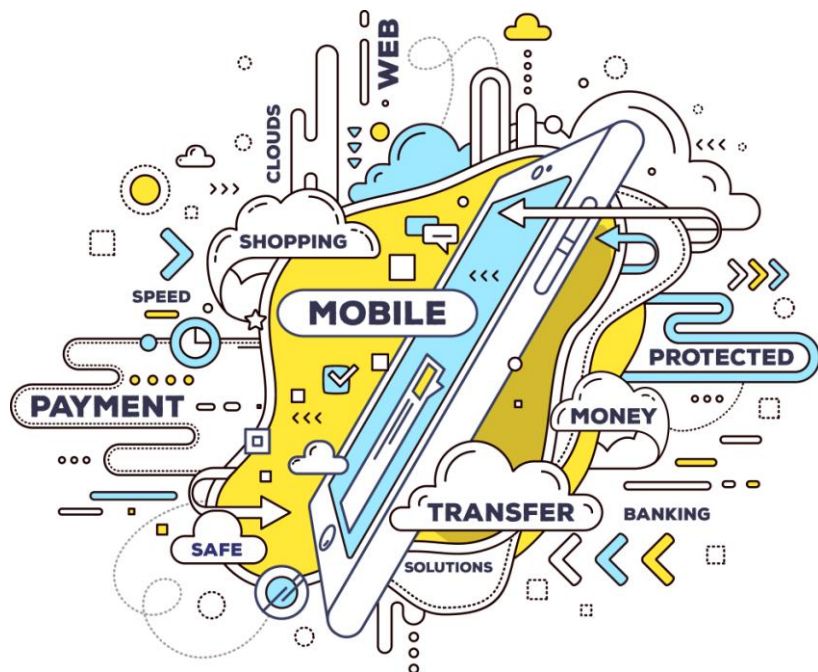
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F.I.T.T. for investors

Leveraging Platform Synergies to Break Adoption Barriers

Platforms best positioned to drive digital growth

Platform-based approaches with complementary value-add services focused on accelerating commerce through enhancing the customer experience while providing frictionless payments are best positioned to capture the growing digital payments marketplace. Opening up payments through data services and security APIs has the potential to drive significant innovation across the landscape especially as connected and contextual commerce gain traction. We believe V/MA enabling payment infrastructure platforms through tokenization and opening payment APIs, PYPL's commerce platform/seamless checkout solution (OneTouch) combined with Braintree/Venmo, and SQ digitizing small business services remain the best positioned public payment companies to revolutionize the payments industry.



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Differentiated approaches to platform-based payments

V/MA's platform strategy leverages VDEP (Visa Digital Enablement Program)/MDES (MasterCard Digital Enablement Service) to enable payment transactions over their respective rails and, importantly, in any form factor including card, mobile, or IoT (Internet of Payment Things). Networks' platforms could help entrench their presence in the evolving payments space and, more importantly, help earn incremental economics by capturing a higher percentage of processed transactions while also monetizing value-added services such as targeted offers and loyalty. PYPL's commerce platform, encompassing +15m merchants and 185m+ consumers, positions it well to expand two-sided acceptance at scale. Traditional offerings complemented by a robust platform offering (Braintree at the center) expand its ability to accept any form of payment while Venmo, whose social platform is revolutionizing P2P, is poised for expansion of merchant acceptance. Platform-based POS (point of sale) solutions can drive increased customer traffic/engagement, higher ticket/basket sizes, improved consumer experiences as well as enhanced business management capabilities for merchants in-store. We believe SQ's cloud-based POS software technology has a significant advantage by controlling the end-to-end commerce experience (not just payments), enabling small merchant growth. In addition, SQ is moving up-market by adding vertical specific solutions (a key requirement in the mid-market) through a build (Square for Retail) and partner approach.

Cracking the payments code for the gig economy

End-to-end payment flows for the Marketplace economy introduce a whole host of challenges such as paying sub-merchants, identity verification, flexible transfer, tax reporting, and split transactions. These challenges have been cracked by Braintree Marketplace, Stripe Connect, Adyen MarketPay, and WePay solutions, which offer differentiated solutions for online merchants and mobile app developers. Next-gen players are more nimble, flexible, and fast to market, which along with the lightweight APIs and easy on-boarding process have helped to reduce the integration complexities. In addition, these players are at the cutting edge of machine learning (ML)/artificial intelligence (AI) for offering sophisticated fraud prevention tools helping lower charge backs, which is a much larger issue in the CNP environment.

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Focus turning to monetization

Although initial mobile payment developments were geared toward driving adoption and acceptance, focus has shifted to improving monetization. We believe Pay with Venmo remains a significant opportunity and conservatively estimate potential contribution to revenue growth in FY20 of ~3.5pts and given the higher transaction margins driven by cheaper funding sources (ACH, Balance), estimate potential EPS contribution of \$0.28 in FY20. In addition, working capital loans to merchants and/or installment plans provided by PayPal, Square, and Alipay leveraging Big data offer high margin revenue opportunities. Providers are also emphasizing efforts on channels where adoption is easier as well as use cases which offer differentiated value propositions. Accordingly, we believe in-app and in-browser will dominate mobile payments while in-store mobile payments will be predominantly focused on differentiated value propositions such as omni-channel support, order ahead, and offer/coupon redemption.

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Top 15 Emerging Trends in Payments to Monitor – *Cashing in on the Digital Migration*

We are starting to see signs of traction in mobile payments, particularly for online and in-app while in-store continues to be a work in progress where some use cases, such as order ahead, are seeing strong adoption. Mobile payments in-store have garnered much more success in regions outside of the US such as Australia where NFC is prevalent and in countries such as China. Mobile wallet players are moving beyond frictionless payment experiences adding retailer loyalty/reward programs, and Samsung Pay was the first to launch its own rewards program helping improve the value proposition. NFC acceptance is growing (Apple Pay now accepted across ~5m NFC locations) and MST technology has helped Samsung Pay gain significant merchant acceptance (90%+ locations globally) while QR codes utilized by pay apps such as Wal-Mart Pay (seeing relatively strong traction) and Alipay are still a viable technology.

Mobile payment users are expected to double by the end of the decade and by 2020 over 50% of consumers are expected to be more comfortable paying on a mobile device than with a desktop computer, as per PYMTS.com. The market scale of China's third party mobile payments more than doubled in 2016 reaching \$5.5trn. In addition, mCommerce is expected to grow at a +22% CAGR through 2020 to \$242bn in volume (41% of online sales, ~4.5% of total retail) and proximity payments could gain traction as they are expected to double in 2017 to \$52bn, potentially reaching \$314bn by 2020 and surpassing mCommerce. Apple Pay and PayPal are the most widely adopted mobile payment services in NA with ~36% and ~34% acceptance across the top retailers while Alipay is dominating in China. PYPL is the most widely used digital wallet excluding Alipay and is used 5x more than competing checkout options. PayPal has +200m active accounts including ~15m merchants and mobile accounts for ~1/3rd of its overall +\$350bn in payment volume.

Importantly, the platform-based approach, with multiple value add services, focused on check-in to provide a seamless checkout experience and openness to partnership in the ecosystem for driving engagement, and adoption will be the winning strategy for players with scale, in our view. We believe V/MA as well as PYPL and SQ remain best positioned to benefit from disruptions in payments.

#1 Platform-based approach best positioned to drive sustained engagement

Creating a strong value proposition is the most important driver of sustained engagement. Value propositions in mobile payments are expanding to include tangible benefits such as loyalty/reward programs (Samsung Pay is doing well here) and seamless checkout experiences (e.g. One Touch). The best value proposition comes from a platform of services, rather than standalone



payments. PYPL offers a platform of value-add services (credit, digital money transfer, social peer payments et. al.) and is focused on omni-channel (expanding in-store through V/MA deals) as well as accepting all tender types providing customer choice. Amazon Payments platform includes an online marketplace and sophisticated delivery, entertainment (video/music), and innovative consumer electronics (Alexa) for accessing the platform of services – all solving for friction points in the ecosystem. End-to-end platforms also provide the best data with multiple collection points (Amazon collects payment credentials, shipping addresses, and shopping preferences), which can be used to drive further engagement (e.g. targeted offers/coupons). A platform-based approach resonates not only among consumers, but also across the merchants with integrated payment solutions offered by GPN/VNTV as well as FDC (Clover) and SQ's end-to-end platform, allowing for improved business management (merchants able to focus on growth) and customer analytics while developer friendly open platforms allow for innovation in value-add services. V/MA have some of the most valuable assets in the market and through their payment technology as well as platform of products and services are working to be at the center of everything payments related. The networks are embracing payment innovation as they are working to ensure their retail payment networks are open platforms (i.e. Visa Developer Program) providing access to valuable capabilities such as P2P, in-store and online payments (Visa Checkout, MasterPass), and account holder identification capabilities to name a few. In addition, V/MA through the VEDEP and MDES platforms are providing the tokens for securing mobile payments while other services such as V's VIMS platform is enabling development and execution of key marketing services for issuers. Overall, we believe V/MA are uniquely positioned with a set of platform services difficult to emulate backed by a global network of acceptance and brand recognition.

#2 Focusing on check-in for driving frictionless check-out

Check-out friction due to payment credential collection and small screens (mobile/tablet) along with cognitive friction from account management overload hinders conversion rates. Next-gen mobile payments are focused on reducing check-out friction through one-time check-in data collection. Combined with a platform of services, seamless checkout experiences lead to increased convenience, greater adoption, improved engagement, and monetization opportunities. PYPL's One Touch is a prime example of how seamless checkout can lower cart abandonment (boasts 87.5% conversion rates), which is the most valuable asset a merchant can ask for. Uber has driven near invisible checkout similar to Amazon's voice activated Alexa home assistant for accessing its platform of offerings all by focusing on check-in while Amazon Go is looking to disrupt the traditional retail environment by eliminating the physical check-out lines completely. The networks have also delivered their own online digital checkout experiences namely Visa Checkout and MasterPass which have gained significant traction due to the convenience and conversion lift and their goal is to be top of every mobile wallet. Issuers are challenged in an invisible checkout experience with maintaining brand recognition and need to create a significant value proposition of their own such as incentives/rewards while the networks remain the underlying rails for payments in an expanding universe of digital payment use cases.



#3 Partnerships helping increase ubiquity of mobile payments

Embracing a partnership based approach helps reduce friction and improve the customer experience. PYPL's partnership with the networks in the US represented a key milestone increasing customer choice, lowering friction, and driving better engagement. In addition, PYPL/Visa recently expanded their partnership to include Asia Pacific, and we expect both partnerships to expand internationally overtime. Importantly, the partnerships allow PYPL to have relationships with the issuers (e.g. Citi, Discover) while the eBay split allowed for partnerships with competing marketplaces (e.g. Alibaba) where players such as Amazon could struggle. PYPL has also been able to partner with tech companies such as Facebook and Google. Issuers benefit from PYPL's digital distribution (high growth area for them) and help promote PYPL's brand with potential for discounts and other collaborative initiatives (e.g. adding cards into PYPL from mobile banking apps). The network partnerships also opened the door to in-store for PYPL (~90% of total retail spend) leveraging the network's token platforms (VDEP/MDES) and helping create an omni-channel experience to drive further engagement. The networks are perhaps the poster child when it comes to partnerships as they are working with a multitude of payment players in the ecosystem to ensure they continue to be the rails of choice. The networks through Visa Checkout and Masterpass are partnering with the mobile Pay apps to be top of wallet among many others (such as with IT services companies for the Internet of Payment Things) helping further embed into the payments value chain while acquirers are partnering with dealers/developers to capture the integrated payments opportunity in SMB. Overall, partnerships seem to be a win-win in payments and we expect more focus on partnerships in the years to come helping increase the overall ubiquity of mobile payments.

#4 Focus shifting from gaining adoption to monetizing key assets

Mobile payment solutions have initially been centered on solving friction points (across in-store, online/mobile, an in-app), improving security (tokenization, NFC, biometric authentication), and driving acceptance/adoption by expanding the value proposition (rewards, convenience, lifestyle platform services). The platform approach provides cross-sell opportunities and helps monetize assets by driving engagement with other revenue generating offerings (e.g. Capital drives core PYPL volumes). As volumes grow, further monetization opportunities arise and the focus for at scale players such as PYPL with its Venmo asset have shifted (Pay with Venmo). P2P has been a significant acquisition tool particularly among millennials who tend to be much more engaged and valuable while the unique social experience Venmo provides helps drive a merry-go-round of payment opportunities. Pay with Venmo for merchants could provide a significant revenue opportunity for PYPL (helping offset take rate pressure) and we are conservatively estimating potential revenue growth contribution of ~1pt in FY18 (as merchant acceptance ramps) expanding to ~2.5pts in FY19 and 3.5pts in FY20. We estimate Pay with Venmo could contribute potential \$0.06 to EPS in FY18 and \$0.16 in FY19 expanding to \$0.28 in FY20 given transaction expenses could be lower than company average due to the funding mix (higher mix of ACH and Balance). In addition, companies like SQ can extend its data analytics platform to merchants driving higher-margin, recurring, subscription-based revenues on top of traditional payment processing functions.



#5 Networks opening their rails to deliver next-generation innovation

Networks, namely V and MA, are positioning themselves to be at the center of the next wave of digital innovation through a set of APIs and SDKs for internet players (not just traditional merchants) to accept payments on their platform. The networks are not choosing winners in the space, but allowing all potential winners to transact over their rails, with SDKs allowing for quick integration. APIs deliver plug-and-play payment acceptance, data & analytics services, and security protection in the customer's preferred experiences. In addition, the networks are enabling these payments across form factors, whether it be in-person (mobile wallets), in-app (AirBnb), or in-browser (Apple Pay for Safari) while payments get closer to customers via chatbots as well as loyalty/rewards programs. We believe the networks' ability to remain channel agnostic and, importantly, enable the next wave of payments innovation regardless of form factor puts them as solid structural winners in the mid- to long-term.

#6 Powering payments for the marketplace economy

End-to-end payment flows for the Marketplace economy introduce a whole host of challenges such as paying sub-merchants, identity verification, flexible transfer, tax reporting, and split transactions. However, given the exponential growth in marketplaces it opens up new payment avenues and accelerates the secular migration of electronic payments. We believe Braintree Marketplace, Stripe Connect, Adyen MarketPay, and WePay solutions, offer customized solutions. Lightweight APIs and easy on-boarding process lower friction while use of artificial intelligence to offer sophisticated fraud prevention tools. APIs are enabling the sharing economy's end-users to transact securely and globally while importantly allowing payments to be seamlessly split with the marketplace. Marketplace-based apps, like Uber and AirBnB, use APIs available through PYPL's Braintree and Stripe (among others) to scale their businesses with easy to integrate features like card-on-file capabilities (enables single-click payments), tax reporting and automated notifications. The gateways are now enabling purchases to happen not only at the marketplace, but in any channel – for example, with Uber in Facebook Messenger – allowing multi-channel expansion and customer exposure for marketplaces. We believe that lower friction and wider availability for checkout, made easily available by these payment players, are enabling not only the growth of marketplaces, but partnerships and the creation of new experiences.

#7 Connected & contextual commerce paving the way for digital payments

An expected 20.8bn connected devices by 2020 – over 3x the amount estimated in 2016 (6.4bn), per Gartner – will help drive the availability of connected payment experiences. From ordering toiletries on an Amazon Echo to hailing an Uber on Facebook Messenger, customers are interested in frictionless, convenient, and spontaneous ways to purchase goods and services. PayPal's acquisition of Modest is an example of successful contextual commerce experiences enabling such initiatives as Pinterest's Buyable Pins. In addition, the networks are at the center of Internet of Payment Things (IoPT) enabling next-generation technologies by partnering with a multitude of players in the market (such as Visa's partnership with Accenture/Pizza Hut on the connected car) and will continue to be the rails for the future of digital commerce experiences. Consumer electronics companies such as Samsung are facilitating connected commerce with a significant inventory of connected devices, which includes a refrigerator for automatically or manually ordering



groceries through Samsung Pay (platform-based approach). Overall, connected and contextual commerce both drive the secular shift to digital payments and help increase engagement in an increasingly connected digital commerce arena.

#8 Evolving P2P competitive landscape and real-time payment initiatives

Despite the myriad of alternative P2P payment solutions launching including Zelle, Square Cash, Facebook messenger, and the recent launch of Google Wallet's integration with Gmail, we believe Venmo continues to dominate, especially among millennial. Zelle's value proposition is in the real-time network infrastructure and bank partnerships, which allow for instant money transfer directly into the account. However, Square Cash offers competing Instant Deposits for merchants (charges a small fee of 1%) and PYPL's partnership with the networks is expected to allow for near instant transfer to customer's bank accounts by mid-year. We will continue to monitor the competitive risk, but believe the challenges with mass adoption and low current monetization benefit creates pain-points for new players. Banks are using real-time payments as a natural way to eliminate paper checks helping reduce processing costs as well as increase engagement with the cards to drive volumes. In addition, V/MA remain well positioned in B2C given the large network of merchant acceptance and brand recognition built globally, which is difficult to replicate.

#9 Tokenization the backbone of mobile payment security

Security concerns have been one of the key reasons cited for a lack of mobile payment adoption in the past few years. However, awareness of the significant security benefits is starting to grow and could help drive improving customer engagement going forward. In addition, online fraud has increased as EMV adoption in the US accelerates at the physical Point of Sale (POS) particularly among large tier 1 merchants (SMB, hospitality, and Petro remain in the works). Security is top of mind for most large retailers given significant data breaches in recent years and the global mobile payment security market is expected to reach \$3.11bn by then end of 2020, as per PYMTS.com. In addition, although EMV helps take a step forward on the security front, mobile payments utilizing tokenization and biometric authentication are even more secure and are faster than EMV cards being dipped (Square speeding up this process, V/MA also driving initiatives), helping to speed up the checkout lines while also providing enhanced security. Thus far, there are 15 certified token providers by EMVco, namely regional players, and we believe global players like V/MA through their VDEP/MDES token platforms are the token providers of choice helping further solidify their position in the mobile payments value chain.

#10 Blockchain powering B2B payments and back-office efficiency

Blockchain technology is most applicable for B2B transactions, while we believe C2B retail payments will continue to be dominated by the networks given the large and growing global network of merchant acceptance ("the network effect"), which is very difficult to replicate. Networks, namely V with B2B Connect (goes live this year), are helping further blockchain use cases through initiatives/partnerships of their own. Blockchain technology as an unalterable decentralized ledger has garnered significant interest in recent years due to the security benefits, speed/efficiency, and lower back-office



costs of transactions with a wide range of potential use cases. Private companies such as Chain are partnering with players to create B2B payment solutions with Ripple believing blockchain can reduce corporate payment costs by up to 50%. A key concern remains the transaction speed and scalability of a blockchain network, though partnerships like R3 (partnership of over 70 financial institutions) and the EEA are attempting to address these inefficiencies for enterprise level solutions by maintaining some transactional privacy while ensuring an unalterable ledger stores the data for everyone to share.

#11 Merchant acquirers focus on verticalized payments market

GPN and VNTV invested early in integrated payments through acquisition and partnership with ISVs/VARs for capturing the integrated payments opportunity. Although integrated payments leveraging the ISV/VAR partnership distribution channel have driven market share shifts and accelerated growth for VNTV/Mercury as well as GPN/OpenEdge, we believe there remains a significant runway. Integrated payments represent less than 10% of the merchant accounts while 49% of ISVs have yet to integrate payments. Traditional acquirers are also focusing on the bank referral channel and a secular shift to online/mobile through their eCommerce solutions helping drive cross-sell opportunities. GPN has further enhanced its integrated strategy in the US with the HPY acquisition and has turned its focus toward owning the software for enabling payments, which should help drive better margins and growth. FDC acquired Clover as part of its integrated payment strategy and is building its dealer/developer network organically while SQ built its integrated platform from the ground up providing a seamless end-to-end experience. Strategies have evolved toward verticalization where tailored industry specific solutions can be deployed (must have for mid market) enhancing the value proposition and creating a more sticky relationship. Vertical specific solutions are important for capturing the mid-market where SQ is attempting to gain share through solutions such as the recently launched Square for Retail solution. While spreads in core processing continue to face pricing pressure from commoditization, value added services embedded into integrated payment platforms are helping offset the impact. In addition, SQ is uniquely able to achieve positive dollar based retention across its seller base (unlike traditional acquirers, which see dollar based churn) due to the significant value proposition in its platform based approach and simplified pricing model even as the company moves up market into relatively larger sellers and we expect momentum to continue. Chase could potentially be the largest disruptor to the traditional acquirer model with its licensed instance of VisaNet (takes on role of acquirer, network, and issuer) and recent WMT-ChaseNet deal as well as the MCX acquisition (has access to the largest retailers). However, large merchants already command competitive pricing, and more importantly to watch will be Chase's potential plans to move down market into the more profitable SMB market where the growth and economics are being achieved.

#12 Continued global secular migration to secure, digital payments

Digital payments continue to have a secular tailwind not only in developed markets, like the US and Europe, where credit and debit card transactions are growing low double digits, but also in emerging economies driven by fiscalization, de-monetization (such as in India), and security initiatives around EMV (e.g. Japan ahead of the Olympics). In addition, the trend toward online and mobile transactions is helping further accelerate the secular migration to



digital. McKinsey forecasts eCommerce will account for 20% of total retail sales by 2020, up from ~10% currently. We believe the networks are well positioned to remain the backbone driving digital payments while PYPL is a key player in eCommerce. In addition, merchant acquirers like GPN/VNTV and FDC are pivoting to software-based, verticalized solutions increasing the value proposition to help merchants drive their business. POS providers, like PAY and ING, have long refresh cycles (~5-7 yrs, low visibility) and are increasingly challenged by cloud based software (SQ, Revel, Leapset) and low cost device manufacturers (such as in China where PAY is deploying a new generation of low cost devices) as well as in some emerging economies that are heavily dependent upon mobile devices, which are skipping card-based payments and jumping straight to mobile payments given the prevalence of mobile devices. Overall, we believe payment companies that have a solid, platform-based approach at scale are best positioned to gain share and benefit from the growth in digital payments. We will continue to monitor the ability for hardware providers, like Apple and Samsung, or global eCommerce giants, like Amazon and Alibaba (through Alipay), to capture more of the payments value chain potentially disintermediating payments players with low value propositions.

#13 China represents a large, untapped opportunity for the global networks

In mid-2016, the Chinese government released loosely defined rules that would allow payment networks, namely V and MA, to serve clients domestically in the country. China is one of the largest consumption economies in the world (closely tied to the US) and is growing faster with a significant population. The incumbent, China UnionPay, has a monopoly on the card networks and had ~\$8.8trn in volumes globally in 2015. However, it also faces challenges from third party payment providers, like AliPay and TenPay, who dominate the mobile payments space where China has more adoption than the US or Europe. While several obstacles still exist for networks, we believe V or MA can navigate the hurdles and leverage existing partnerships with key players to tap the opportunity. Importantly, access to domestic switching capabilities makes the V/MA card much more attractive to own, potentially driving increased cross-border volumes given the growth in Chinese international travel. By 2020, we estimate that China represents an incremental \$3bn opportunity for networks.

#14 PIN debit networks building PINless and signature capabilities

US signature debit is an important market for the networks particularly Visa given leading market share of ~61% accounting for ~2/3rds of its US debit volume. EFT networks have historically been losing share to signature networks, however players such as FDC with its STAR network are working toward developing PINless capabilities and signature (dual-message) networks in an attempt to take share in the debit market. FDC is targeting mid-single digit market share gains over the mid-term for its signature network, which can generate higher pricing on Durbin-exempt transactions (Durbin Amendment capped interchange rates to \$0.05 + \$0.21). Nearly 65% of US debit transactions and volumes as well as ~82% of network fees in 2015 were from dual-message networks, and we anticipate continued mix shift toward these networks given early EMV terminals rolled out were programmed to accept dual-message out of the box while single-message networks typically needed custom logic to work. PINless authorization potentially drives single-message network volumes in eCommerce, but is currently limited to lower



denomination purchases due to increased fraud risk. FDC recently announced the acquisition of Acculynk with its PaySecure technology for PIN debit web-based transactions along with its Payzur P2P payments service and government payment service. Opening signature networks also provides the capability to take share in this category previously exclusively controlled by V and MA. However, V and MA remain well positioned to retain or gain US debit market share, especially from smaller networks, driven by wide merchant and customer acceptance, pricing/volume incentives (FANF), and routing methods (PAVD).

#15 European regulations open domestic market opportunities

The MIF regulations (implemented December 2015) have capped the interchange in Europe potentially helping drive greater merchant acceptance (seeing positive early signs) while the other business rules (in place starting June 2016) such as separation of scheme from processing have helped to open the domestic processing opportunities for the global networks. Visa's acquisition of Visa Europe was very strategic allowing the company to capture the opportunity in Europe and the pricing was below value providing the opportunity to raise pricing toward MA levels overtime. MA is also capturing the UK B2B and government payments with its acquisition of VocaLink and will expand the ACH and real-time services globally. The B2B market globally has become a strong focus for many players including PYPL with its recent OroCommerce partnership helping penetrate the B2B eCommerce market projected to reach \$12trn (3x the B2C market) by 2020. While PSD2 (transposition into law over next couple years) may offer merchants the ability to connect directly with the bank account, the regulations would still require players to build an alternative switch (high upfront costs) and services would be priced appropriately.



Platform-Based Approach Best Positioned

Platform-based approach key to ubiquitous mobile payments

Payments that are integrated into a platform enhance the customer experience, helping to increase engagement and provide insights into customer behavior through data. Mobile payment apps, which leverage a platform-based approach supporting all tender types are best positioned, and we view PYPL as a leader as well as Visa and Mastercard with their technology capabilities and platform of products/services. Integrated payments at the POS utilizing a platform approach are also best positioned with SQ being a leader given its end-to-end solution. Consumers are increasingly making payments through platforms with the US Census Bureau reporting that Americans spend over \$102bn through digital payment platforms in 4Q16 alone. Platform-based approach also allows for a portfolio approach to pricing such as the case with SQ and PYPL while helping to drive incremental core volumes over these platforms. Value added services often command higher pricing and platform expansion into value add services bodes well for growth as well as margins. In this section, we discuss some of the important drivers of breaking down adoption barriers including the importance of a platform based approach, seamless checkout experience, and partnerships.

Mobile payments evolving – platform-based approach best positioned

As mobile payments attempt to go mainstream over the next several years, there is no shortage of competitors attempting to grab their fair share of the growing addressable market. The value proposition of mobile payments has been expanding from simply convenience and enhanced security (users finally starting to recognize the security benefits) toward the inclusion of loyalty/reward programs as well as gift cards and other valuable integrated services, which help to drive both consumer and merchant engagement. In addition, Pay apps have expanded from in-store and in-app to online creating a true omni-channel experience, all of which bodes well for accelerated adoption of mobile payments going forward. We believe a strong value proposition for the consumers/merchants is the key for achieving ubiquitous mobile payments and the players best positioned to deliver the most value are those focused on a platform-based approach such as PYPL while the networks will continue to be the rails benefiting from secular migration to digital payments. The platform-based approach is important in a crowded mobile payments market as it allows for a one-stop shop of securely integrated services for managing all payment related activities, helping to reduce the friction and drive engagement.

PYPL a clear leader in mobile through its platform-based approach

We believe PYPL has a strong platform-based approach, which is resonating well in the market with its full suite of value creating services for both the merchant and consumer. The company's platform includes PayPal Credit (Bill Me Later for consumers, Working Capital for merchants), Venmo for the socially shared payments (expanding beyond P2P to profitable merchant transactions), Xoom for online money transfer, and One Touch for a seamless



omni-channel checkout experience all integrated into Braintree providing the ability to seamlessly deploy upgrades across the platform for new features/functionality. In addition, PYPL acquired Paydiant for white labeling the mobile wallets and Modest for contextual commerce. The company has recently made strides on the partnership front with V/MA along with a multitude of issuers. The company's platform-based approach is driving meaningful contributions to volumes and merchant/customer engagement driven by the value proposition as well as the insights gathered through data. PYPL is adding ~5m active accounts per quarter with a total of +200m as of Feb 2017, and in 2016, processed \$354bn in payment volume with mobile accounting for +\$100bn, growing 55% (mobile accounted for 31% of 4Q16 payment volume, up from 25% in 4Q15).

Marketplace providers and device manufacturers utilizing platform assets

Alipay has been successful in the China market with its diversified platform of services and is focused on driving global payment acceptance for Chinese nationals by expanding in areas such as the US. Pay with Amazon also has a strong platform and is focused on customer centricity having built its online marketplace to solve a selection problem with potentially the most predictable and reliable delivery system in the market (eBay recently announced enhanced delivery capabilities), driving down friction, better user experiences, improved conversion for merchants, higher basket sizes, and net new customers. Pay with Amazon is now simply a new addition to the growing platform of services all geared toward improving the customer experience. Separate from the marketplaces are the device manufacturers namely Apple Pay and Samsung Pay where the key focus is utilizing their platforms to drive device sales through customer engagement and brand recognition.

Integrated payments resonating through platform approach

Platform-based approach for the point of sale in-store helps the merchants more efficiently and effectively run their business by allowing the merchant to focus on driving sales and engagement. In addition, the platform services themselves include tools such as customer relationship management and marketing as well as data and analytics for gaining insights into customer behaviors and driving growth. Square's cloud-based POS system is differentiated with its end-to-end platform of solutions catered to the needs of sellers and the company is expanding into vertical specific solutions namely Square for Retail, which has tailored functionality as it expands up market into larger sellers, which require more sophisticated solutions to run their business. FDC acquired software based POS provider Clover to penetrate the SMB market and is organically building its ISV distribution partnerships while traditional acquirers such as GPN and VNTV have leveraged a build/partner approach to driving success in integrated payments.

Invisible checkout delivers the best experiences and conversions

Payment experiences for the consumer are best when they are nearly invisible/seamless at the checkout, eliminating the friction and helping drive increased conversions. Mobile payment players such as PayPal with its One Touch and Amazon Payments have focused on the one-time check-in process storing the credentials for a seamless checkout experience, which we believe combined with a platform approach, is the best strategy.



[Solving for cognitive friction by focusing on check-in vs. checkout](#)

Consumers are increasingly facing challenges due to the large number of accounts they must manage creating cognitive friction, which hinders the checkout conversions. Companies such as PayPal with its One Touch and Pay with Amazon with its vast treasure chest of data, including not only the payment credentials, but the billing addresses and shopping preferences, are focused on the check-in process helping to reduce the friction when it comes to checkout. While the browser checkout is being crowded with buy buttons, these solutions store payment credentials and reduce the number of clicks/pages significantly increasing the conversion especially on mobile devices due to the smaller screens where One Touch is a clear leader.

[Working toward near invisible checkout experience](#)

Taking the notion of reduced checkout friction a step further, we believe the most seamless/frictionless payment experiences actually occur when payments at the checkout are nearly or entirely invisible. Uber is one of the best examples of near invisible payments at the checkout while Amazon Go is attempting to revolutionize the in-store retail buying experience, which has remained largely unchanged for decades by eliminating the checkout with its "Just Walk Out" Shopping experience. We believe the next generation of mobile payments will be focused on even further reducing the imprint at check out, which will likely create its own set of challenges and opportunities for players in the industry.

[Partnership based approach driving value to both sides](#)

Partnerships are a great way to accelerate the shift to electronic and mobile payments as well as reduce the friction in the industry, which benefits everyone in the ecosystem. The PYPL and V/MA partnerships were a key milestone and players best positioned to win will increasingly embrace a partnership based approach.

[Expecting partnership based approach to accelerate](#)

We believe taking the friction out of payments is the key to digital payment adoption and a partnership-based approach will help further accelerate these trends. The partnership between PayPal and the networks was a key milestone in 2016, helping drive the company's customer choice initiative with numerous issuer and other third-party partnerships following. In addition, many other players in the space are taking a similar partnership based approach helping to expand the service offering, increase flexibility in payment choice, increase accessibility/acceptance, enhance the user experience through greater value proposition, improve conversion rates, and ultimately drive digital volumes. Overall, the partnership-based approach helps the industry leverage each other's assets for driving digital payments forward benefiting all players in the ecosystem and we expect to see the industry continuing to evolve towards partnerships in the years to come.

[PYPL/network partnerships a key milestone](#)

PYPL partnered with the networks as part of its customer choice initiative, moving away from steering customers toward the more profitable funding sources, namely ACH, which the company believes will be a significant tailwind to volumes through increased customer activations and engagement more than offsetting the higher transaction costs overtime. The network partnerships open new opportunities for PYPL such as the ability to work with



the issuers (Discover, Citi) and other players in the ecosystem including Facebook, where PYPL is the primary payment provider as well as Google through the Google Pay Store and Alibaba. The company highlighted over 11 deals in the past ~11 months at the Mobile World Congress in late 2016 and is in active conversations with many other leading players in the market. The company has highlighted better-than-expected adoption of ACH, PYPL Balance, and PYPL Credit through its customer choice initiatives and the company has the opportunity to further expand the network partnerships internationally.

Issuer partnership interest in PYPL robust

Issuers want to partner with PYPL now that the ACH steering issue has been resolved because the company is one of the largest digital distributors globally, and this is a high growth area for them. PYPL offers the issuers access to +15m merchants globally and +200m active accounts including the merchants while the issuers help PYPL further promote its brand as a payment option across all the channels. PYPL has the opportunity to partner with the issuer for loading the debit card or making their cards default in PYPL and there could be further opportunity to add cards into PYPL from the mobile banking applications, which would benefit both sides given greater potential usage of the bank cards and potential discounts to PYPL from the issuers. We expect PYPL to continue signing up issuers and expanding its network of partnerships, which should help drive significant long term opportunities.

Partnerships open in-store opportunity for PYPL

PYPL gains access to the network tokenization platforms namely VDEP/MDES as part the partnership, which helps the networks accelerate the token efforts and allows PYPL access to the in-store opportunity (~90% of total retail spend) creating an omni-channel experience and expanding the data, which helps power targeted marketing initiatives. Although the in-store transactions are pass-through with no material economics provided to PYPL, the company is able to monetize the in-store presence through increased engagement. In addition, mobile payment technologies such as Bluetooth Low Energy (BLE) provide the opportunity to deliver in-store experiences such as rewards/targeted offers and could be monetized while order ahead offers similar economics to online transactions and companies such as Home Depot see significant volumes from online purchases for in-store pickup.

Connected Commerce Driving Invisible Check-Out

From a refrigerator reminding you that you are low on milk to Amazon dash buttons set-up for quickly repurchasing household items to being able to order food for pick-up from your car, the Internet of Payment Things (IoPT) is making it easier and more convenient for people to purchase goods when and where they want. In our view, the important drivers of IoPT adoption are the number of available devices, partnerships in the ecosystem, convenience, and security.

The proliferation of connected devices is driving new and innovative commerce experiences, helping to drive engagement and accelerate the shift to electronic payments. In some cases, payments become so seamless that they are invisible in the background and the platform approach becomes even more important, such as with Amazon's Alexa where the marketplace is at the fingertips of one's voice automatically using stored credentials to make purchases. There is a possibility for brand awareness issues across the



networks and issuers for instance, where the value proposition, such as incentives/rewards, becomes even more important as switching the credentials creates friction.

Connected devices accelerating at unprecedented rate

Commerce is increasingly being enabled through a multitude of connected devices from smart phones, tablets, and desktops to watches, refrigerators, cars, and more. Although estimates vary widely, the number of connected devices globally is reaching significant levels. Gartner estimates that there were 6.4bn connected devices in 2016, up +30% Y/Y from 4.9bn devices, and expects the number of devices to grow to 20.8bn by 2020. Other estimates, for example by IEEE, have projected as high as 50bn connected devices by 2020. Importantly, Gartner estimates that ~65% of the 20.8bn connected devices will be consumer devices, enabling future consumer purchases with connected devices. Powered by the likes of IBM and Oracle, with hardware and software from the likes of Amazon and Samsung, connected devices are gaining trust and becoming a more involved part of individuals' daily lives. In addition, 80% of the US households have broadband internet connection, according to Nielsen, which opens the door for increased usage of connected devices. The payment networks, namely V and MA, have placed themselves at the center of securing and enabling payment capabilities for connected devices by partnering with several large device manufacturers and cloud providers. As a result, we believe that networks remain well-positioned to take advantage of the growth in connected devices. In addition, PYPL is establishing itself as an enabler of contextual commerce opportunities (for example, ordering an Uber ride through Facebook) with its Braintree platform and recent deals with the issuers and networks position it to continue being a leader in this category.

Payments becoming invisible after check-in

Importantly, connected and contextual commerce enable payments to fade away after check-in, potentially reducing the customer brand awareness of networks and even PYPL. Historically, in online or offline digital commerce, a customer checkout experience is strongly associated with entering payment information at the point-of-sale or during the checkout process (for example, pulling out a credit card or entering payment information online). However, with the potential rise of connected and contextual commerce, after the initial set-up of a preferred payment vehicle, the check-out process becomes seamless, with the device remembering and authorizing a transaction with that preferred vehicle. However, we believe that the networks remain a crucial part of enabling payments through their rails and, as long as their rails continue becoming the preferred payment of choice (driven by issuer rewards and security offered), they will remain primary beneficiaries of the growth in digital payments. PYPL with its double-sided network at scale can potentially be the wallet of choice in contextual commerce situations though we will continue to monitor the adoption of other wallet providers, namely Apple Pay, Samsung Pay and Android Pay. Given PYPL's network effect as well as early investments and partnership in bots to enable contextual commerce on different messenger platforms, we believe that the company can maintain and even grow brand awareness.

Networks vying to be at the center of connected commerce

The payment networks, such as V/MA, want to be the rails for every digital payment and continue to embed themselves into the value chain. V/MA are channel agnostic and are enabling digital payments, over any platform, adopting a partnership-based approach to drive exposure and availability. Visa,



through Visa Ready, launched in 2013, has taken a partnership approach that helps IoT providers embed secure payments into connected devices using VDEP and VisaNet. In addition, the firm has partnered with IBM to enable payment services for the over 6k clients that currently use the Watson IoT platform. MasterCard's digital enablement programs MDES and Express are being used in partnership with semiconductor firms NXP and Qualcomm in MA's Commerce for Every Device initiative, which was announced in October 2015. More recently, on 27 February, it has partnered with Oracle to streamline digital payments, initially focusing on the retail and hospitality industries with order ahead and bill pay functionalities. It has also partnered with other players internationally to enable contextual commerce purchases, for example ordering retail goods through FB Messenger bots.

Market estimates for connected devices

Estimates of IoT devices vary tremendously among the research community, but Gartner estimated that, in 2016, 6.4bn total Internet of Things (IoT) devices, excluding smartphones, tablets and computers, were used worldwide, growing ~30% Y/Y from 4.9bn. In these devices, 4bn are expected to be in the consumer category, with the average annual spend responsible for each device at ~\$136. Gartner estimates that the number of devices will grow to 20.8bn by 2020. According to IHS, including smartphones, tablets and computers, there were 17.6b IoT devices in 2016 and estimates that it is expected to grow to 30.7bn in 2020.

How the payment networks fit in to IOT

Visa supporting IoT with Visa Ready and collaboration with IBM

Launched in 2013, Visa Ready is a partnership-based program that helps IoT providers embed secure payments into the connected devices. The company has partnered with Accenture, Coin, Fit Pay, Giesecke & Devrient (G&D), and Samsung. These partners act as subject matter experts on the payment side, provide technical support for integration, and are token requestors for internet-enabled payments. Visa is open to more partnerships with software or hardware solution providers as well as device manufacturers. Through Visa Ready, manufacturers of the IoT devices get access to V's development and marketing support as well as to Visa issuers (through VDEP) and VisaNet. Device manufacturers, such as Chronos and Pebble, will enable secure payments, certified by Visa Ready.

On 16 February, Visa announced a partnership with IBM whereby all IBM Watson IoT platform customers have access to Visa's payment services using the IBM Cloud. Rather than approaching these businesses one by one, Visa now has access to enable all of IBM's clients (currently over 6k) to maintain customizability, but also provide Visa payment services via Visa's Token Services through the Visa Ready program. IBM recently opened a \$200m global headquarters for Watson IoT business in Munich, Germany and Visa provides the tokenization technology. At Mobile World Congress in February, V expanded its *Everywhere Initiative* (a competition for startups) after having launched the initiative in 2015 in Europe to specifically develop IoT-related payment solutions with a cash prize of €25k for the winning solution. The company plans to launch similar initiatives globally in regions including Asia, Latin America, and North America.



MasterCard launches Commerce for Every Device

Announced in October 2015 and with working prototypes by partners displayed at the Money 20/20 conference, MA announced the launch of *Commerce for Every Device* by utilizing its digital enablement programs (MDES and Express) alongside technology partners NXP and Qualcomm to secure payments on a multitude of devices. Capital One was the first issuer to enable these programs on its digital wallet. In January 2016, Samsung announced its Family Hub refrigerator in the US with the Groceries by MasterCard app that allows grocery items to be purchased using a built-in tablet. The app integrates with FreshDirect and ShopRite to provide debit and credit card payment acceptance for purchases from 250 stores in the Northeastern United States and has rolled out to make more grocery stores available through MA's partnership with MyWebGrocer. In October 2016, MA announced a partnership with Fit Pay that enables manufacturers like Wearatec to enable MA card payments on their wearable devices through MDES and Express. Through the partnership, Fit Pay expects to enable 2.5m wearable devices in 2017 and 9m in 2018.

On 27 February, MA announced a partnership with Oracle to streamline digital payments with a focus on the retail and hospitality industries specifically addressing order ahead and bill pay functionalities. It also partnered with Getir, a mobile retailer in Turkey that has made over 1m deliveries since launching in July 2015, to introduce payment bots in FB Messenger that allows customers to make purchases without leaving a chat window.

Other players in IOT

PayPal enabling contextual commerce through partnerships

PayPal Commerce is a beta product that enables a merchant to sell a product agnostic of the channel, in which it is first encountered by the customer – emails, blogs, apps, social media, and more. The SDK-enabled service allows merchants to place a buy button within any of these interface and the merchant can even sync inventory with these buy buttons to ensure the product remains available. Braintree also enables buyable pins on Pinterest in 2015, which embeds payment functionality without entering payment information every time the customer selects an item to purchase. In addition, through a Braintree integration, PYPL now allows users to order an Uber ride through FB's messenger platform.

Amazon's foray into connected commerce

Amazon has been focused on remaining a customer champion since it began as an online retailer selling textbooks and has more recently introduced its Amazon Echo product and the Amazon Go retail location, which provide insights into the connected commerce capabilities it can enable. Amazon Echo, with its virtual assistant Alexa, allows users to connect to their Amazon account, which already has payment information and a preferred card stored in it, to purchase consumer goods on Amazon.com. Further, it lets you order from several apps that have built-in functionality to work on Alexa, including order a ride from Uber or Lyft, getting movie tickets on Fandango, or ordering pizza from Domino's. While customer satisfaction is not necessarily high for these functionalities – the Uber app for Alexa had 2.2 out of 5 stars on 153 reviews, as of 1 March 2017 – the potential exists for the apps to get better and increase functionalities.



Amazon Go debuted in Seattle in December and is currently being beta tested by its employees with a release originally expected early 2017. There is no check-out experience with the store, with customers simply walking out of the store with items in their bags and customers receiving a charge on their Amazon account afterwards. The experience introduces a check-in experience with the items added to a virtual cart, but no check-out experience.



APIs and SDKs Opening Digital Payment Opportunities

APIs and SDKs from different payment players have opened the doors for merchants, both online and offline, to accept digital payments on multiple form factors. Visa and MasterCard are at the center of digital enablement, with their own developer platforms, that provide issuers, acquirers, merchants, and developers with a set of easy to understand tool kits and codes to implement payment acceptance, security services, data analytics (using the respective network's data), and loyalty programs. Visa currently has 56 APIs compared to MasterCard's 23 and is also trialing microtransaction and fraud inquiry services through partnerships and open platforms with developers.

In addition to the networks, full stack payment platforms like Braintree, Stripe, Adyen and Klarna enable omnichannel payment acceptance with multiple payment types (credit cards, balances, financing options) as well as over various form factors (POS in-store, in-app, in-browser, one-touch capabilities). Having a network agnostic approach is beneficial for gaining merchant acceptance on these full stack payment platforms though the networks' set of APIs can enable even these players with additional customer data for fraud detection and deeper analytics.

Importantly, both networks and payment platforms are enabling merchants to begin accepting digital payments fairly quickly (Braintree reports onboarding takes 15 minutes) and scale payments along with their business, with most platforms accepting over 120 currencies. They also help with conversion through one-touch payments with remote card on file capabilities (PYPL's One Touch) as well as consumer financing options, which Klarna claims increases customer likelihood to complete a purchase by 30%.

Network developer platforms enabling digital payments

Both Visa and MasterCard have developer kits available to enable payment acceptance for their credit and debit cards. Users can either use the software developer kits (SDKs) made available by V/MA to integrate APIs into their experiences or directly access the APIs using the underlying protocols. V provides APIs for accepting payments, risk and fraud services, analytics, and loyalty programs as well as a trial kit that developers can experiment with and provide feedback. V has several APIs, including VDEP (token services) and Visa Checkout (similar to PYPL's One Touch). The company also plans to introduce a marketplace platform where developers can create solutions using its SDK and develop partnerships or gain sponsors. MA similarly provides APIs for payments, security and data services for a varying amount of users such as issuers, acquirers, merchants and other developers. Examples include MDES, which is MA's tokenization service, and Personalized Offers API for issuers that want to increase card engagement and usage by sending targeted rewards offers to customers using transaction level data. Google and Samsung uses MDES and VDEP to deliver MAV payment availability for their mobile wallets.



Below is a rollup and comparison of V and MA APIs currently available for live use or testing.

Figure 1: MasterCard Developer Kit

	# of APIs	Description
MasterCard	23	
Payments	8	Manage transaction/loyalty information, add funds to pre-paid cards, faster check-out (MasterPass), track consumer transactions
Security	8	Identify deceptive merchants as well as risky payment transactions prior to processing (MDES, Assurance IQ, Fraud Scoring for Merchants)
Data Services	7	Location services, market insights, industry insights, advertising analytics

Source: Company data, Deutsche Bank

Figure 2: Visa Developer Kit

	# of APIs	Description
Visa	56	
Payments	8	
CyberSource Payments	2	Authorize credit cards and settle credit card transactions
Visa Direct	4	Push payments from any channel (personal computer, mobile phones) to any source (bank account, payment cards)
Visa Checkout	2	Single sign-in service for online purchases
Risk and Fraud	26	
Visa Token Service	7	Replace sensitive account info with unique digital identifier
Visa Transaction Alerts	6	Near real-time transaction alerts for cardholders
Visa Consumer Transaction Controls	5	Allows issuers to offer cardholders to set controls and alerts on card usage
Mobile Location Confirmation	2	Provides geolocation of consumer relative to merchant to help with fraud decisions
Visa Risk Manager	1	Gives issuers access to V's fraud risk management features
Payment Account Validation	1	Pre-validates account to ensure validity and good standing
Visa Travel Notification Service	1	Helps issuers avoid declining txns when customer travels
Preauthorized Payment Cancellation Service	3	Helps issuers inform acquirers/merchants via a code that cardholder has requested a stop on payment
Data and Analytics	8	
Merchant Search	1	For issuers or developers desiring clean data about transactions at merchants
Merchant Locator	1	Helps issuers or developers search for merchants across merchant categories
Digital Card and Account Services	1	Allows issuers to offer cardholders account management features (changing name, address, etc.) and view account details
Visa Global ATM Locator	1	Gives cardholders ability to search for Visa/Plus ATM locations globally
Payment Account Attributes Inquiry	2	Provides access to general payment account info as well as information for fund transfers
Foreign Exchange Rates	1	Access to exchange rates
Merchant Measurement	1	Tracks merchant level metrics to quantify performance
Loyalty and Offers	4	
Visa Merchant Offers Resource Center	2	Central repository for issuers to promote merchant offers
Visa Offers Platform	2	Access to transaction data enabling timely loyalty and offers programs
Trials	10	
Microtransactions	9	For online and mobile apps to create payment solutions like points, virtual currency, or coupons
Fraud Inquiry	1	Compares your fraud metrics vs a peer benchmark

Source: Company data, Deutsche Bank



Braintree benefitting from integration with PayPal

Braintree, acquired by PYPL in 2013 for \$800m in cash, is a full-stack payment platform that merchants in the United States, Canada, Australia, Europe, Singapore, Hong Kong, Malaysia and New Zealand can utilize to begin accepting payments on their apps or webpages. Braintree allows merchants to not only accept V and MA cards but also other debit card providers, PayPal, reloadable pre-paid cards, and cryptocurrencies (like Bitcoin) among others. Braintree is PCI compliant and its SDK allows any merchant to implement it with only a few lines of code. Its v.zero SDK, released July 2014, made integrations even easier and allows PYPL to rollout new features or payment types (like Pay with Venmo) to its merchant base fairly quickly (under 15 minutes according to John Rainey). Braintree ended 4Q16 with 428m cards on file and over 1bn financial instruments on file.

The V.zero SDK allows PYPL to expand its platform of products to merchants leveraging a line of communication with apps and browsers that is both protected using tokens and direct. Web SDKs are based on Javascript while mobile SDKs are based on iOS and Android, and enables the developer to use a small amount of code to position the PayPal button in the checkout flow. There is also a Drop-in user interface (UI) that lets merchants use PYPL's optimized checkout experience for quick PCI compliance, lowers downtime, and supports languages for 23 countries on iOS and Android. The company also has available a Contextual Commerce feature that allows merchants to reach their customers in more distribution channels (order Uber on FB messenger, for example) while securing the payment transaction on multiple platforms.

Braintree Direct

Braintree Direct gives merchants the ability to scale given support for multiple payment types (cards, PYPL, Venmo, etc.) as well as with support for over 130 currencies while receiving payment within 2 business days in most cases. In addition, merchants can either use the Drop-in UI or build a customized checkout experience using Hosted Fields, which enables them to stay PCI compliant. It also gives merchants a back-end platform for managing transactions, enabling notifications, and setting up fraud protection tools.

Braintree Marketplace

Braintree Marketplace is specifically for marketplace businesses (like Uber or Airbnb) that connects consumer to merchants and is currently only available for US merchants. The platform allows the marketplace to specify sub-merchant data, customize the frequency of splitting transactions and paying the sub-merchants, and receive notifications for sub-merchant onboarding or funding issues. The sub-merchant can receive funding via cards, Apple Pay, Android Pay, ACH (two day delivery) and even Venmo. Further, the company provides automated tax reporting, delivering the sub-merchant pre-filled 1099-K form.

Braintree Auth

Currently only available to US merchants, Braintree Auth allows eCommerce service providers (such as invoicing, analytics, accounting) to connect with Braintree merchants and cross-sell services while also centrally storing card information across merchants to potentially help them with conversion.



Stripe a leading solution for mobile payments

Stripe was founded by brothers Patrick and John Collison in 2010 who left MIT and Harvard, respectively, to start the company. It now has over 650 employees, with 28% of them from outside the US, has raised \$440m of funding since inception, per crunchbase. In November 2016, it received \$150m in a Series D funding round from new investors Capital G and General Catalyst as well as existing investors, including Sequoia Capital, reaching a valuation of over \$9bn, per the WSJ. Stripe continues to grow strongly, processing billions of dollars per year for hundreds of thousands of merchants and we last estimated that Stripe generated \$30bn in volume for 2015 growing +100% in 2016.

Stripe, similar to Braintree, enables payment acceptance in over 135 currencies for online merchants (available in 25 countries) while also being able to design the checkout process using a pre-built interface (like the Drop-in UI) or a customized form. Importantly, integrating with Stripe provides PCI-DSS compliance that allows merchants to go to market without storing sensitive customer card data in its own servers. Once a merchant account is setup, the merchant can choose to receive funds every 2 days or less frequently (weekly or monthly). Along with accepting payments, Stripe has several other APIs for recurring billings, platform based solutions, connected commerce, fraud identification, and helping new businesses launch making it a full-stack solution. Below is a list of some APIs offered by the company.

Subscriptions

For subscription based services with recurring billing streams, Stripe has an API for adjusting billing amounts even for metered billing, per-seat pricing, customizations and multiple subscriptions per customer while keeping card info on file. It also provides tools within the API for targeted advertising campaigns using discounts and trial periods as well as saving card data for customers that allow billing to continue despite card numbers changing or expiring. Furthermore, the merchant can integrate Stripe with third-party applications and export metadata.

Connect

Made for marketplace apps, with clients like Lyft and Shopify, Stripe Connect provides payment capabilities for marketplaces (similar to Braintree Marketplace). Importantly, Connect lets the marketplace provide customized charges for sub-merchants. It also allows sub-merchants to receive an instant payout, which costs 1.5% of the payout amount, with a minimum \$0.50 fee. Lyft, the first platform to integrate Instant Payout in November 2015 has already sent \$500m to its drivers using the function.

Relay

Stripe Relay allows merchants to sell their goods on other mobile platforms using a buy button. The merchant simply provides product info and SKUs to the third-party app (Twitter, ShopStlye, etc.) and when an order is confirmed, Stripe sends the order information to the merchant.

Atlas

Stripe Atlas was created to allow online merchants to begin an international business at anytime by incorporating as a US company, with a US bank account. Once setup, the merchant can accept payments using Stripe while



also getting tax and legal guidance from Orrick and PwC. The service costs \$500 during sign-up, which typically takes under one week, while the companies pay the 2.9% + \$0.30 per transaction.

Radar

Recently released in Oct 2016, Stripe Radar is Stripe's attempt to use machine learning and analytics techniques to stem eCommerce fraud. It utilizes behavioral information from the over 100k companies that use Stripe to detect fraud. It also allows merchants to implement their own fraud rules and review potential red flags. If a transaction is flagged or blocked, the information is made available to the merchant who can also comment on specific transactions and make Radar adapt to this input information.

Adyen delivering an omnichannel solution

With \$90bn processed in 2016 (+80% Y/Y), supporting over 150 currencies, and generating over \$350m in revs in 2015 (+100% Y/Y), Adyen is arguably one of the largest full-stack payment providers. It serves over 4.5k businesses and connects to over 250 different payment types, including V and MA. Clients include FB, Uber, NFLX, and Spotify. The company, similarly to Stripe and Braintree, offers eCommerce payment acceptance (both mobile and desktop) but also has offline payment acceptance through EMV enabled payment terminals with Adyen software already installed. New features are rolled out directly to the terminals, requiring less time for training and maintenance. An integration available with POS providers gives Adyen even more flexibility to be a full-stack, end-to-end omnichannel payment solution.

Adyen's global acquiring business provides an end-to-end processing system, which allows it to push new payment types and data analytics capabilities directly to merchants. It also connects directly to V and MA, with Forrester Consulting finding an average 1.4% revenue uplift for merchants working with Adyen through RevenueAccelerate.

End-to-end infrastructure unique to Adyen

Adyen has a single platform solution for the entire payment flow including from the point-of-sale acceptance all the way to the disbursement of funds to a business' bank account. The platform boasts little downtime (despite product releases rolled out every 3 to 4 weeks) which bodes well for global companies accepting payments without any issue. Additionally, due to its direct connection with V and MA, the company can provide granular payment level data to businesses, so that they can improve go to market strategies with targeted advertising campaigns and by improving internal fraud techniques. Adyen is one of the only payment stacks with both online and offline acceptance capabilities and can reformat payment request to match banks' specific preferences (Smart Issuer Logic), increases efficiency of routing (finding most efficient route or rerouting approval to different connections in the case of an outage), and update card data real-time even in the case of lost or stolen cards.

Expanding omnichannel payment capabilities internationally

In 2016, Adyen expanded its omnichannel capabilities to the US, Brazil, Hong Kong and Australia with shoppers having the ability to make purchases online and pick up in-store (Adyen states this generates ~5% of incremental sales volume amongst Europe customers), purchase online and return in-store, or



order out of stock items while in-store. In China, the company added local payment method WeChat Pay (400mn users) in late 2016 and, given the payment method is enabled across the entire platform, WeChat Pay customers can use the payment method at locations across Europe and US where Adyen provides processing services. These moves enable a large cross-border opportunity for Adyen.

Partnerships

Adyen has partnerships with E-commerce platforms (Magento, Salesforce Commerce Cloud), Billing providers (Aria, Zuora), POS providers (Aptos, K3 Group), and Travel providers (Amadeus, Sabre, Navitaire) that integrate with its payment solution through plugins allowing those companies customers access to Adyen's solutions.

Managing risk with 3D Secure and RevenueProtect

Using a combination of industry data and machine learning, Adyen lends merchants fraud detection tools to minimize time spent on manual reviewing purchases while improving conversion rates for low-risk customers. Each merchant can also customize fraud review capabilities using pre-defined criteria (benefits from granular data available through direct V/MA connections) through a Risk Engine Optimizer and protect up to 25% of charge backs automatically using RevenueProtect (which analyzes risk through the entire payment flow).

Extended reporting capabilities given omnichannel presence

Given Adyen's presence both online and offline as well as its direct connection with V and MA networks, the company can aggregate granular customer data for merchants to gain insights into reasons for approvals/declines across different channels or geographies. Merchants are then able to use this data to improve conversion by creating personalized experiences across geographies or different sales channels. Its back-end dashboard also allows merchants to drill down to how many transactions were attempted, approved, and denied at each step of the payment flow, helping identify areas of improvement across the payment stack. Merchants can use this data, along with predefined KPIs available in its dashboard, with other tools like RevenueAccelerate or RevenueProtect to fine-tune and improve conversion across channels.

WePay expanding outside North America

Founded in 2008, WePay first began as an application for peers to donate or exchange funds (popularly used in the Occupy Wall Street movement) but has since pivoted to support use of its payment API, which it launched in 2011. The company subsequently discontinued its donation services in 2014 to focus on the payment API product for marketplace apps and crowdfunding sites as well as small business software companies. The company last raised funding in May 2015, closing a \$40m Series D round led by FTV Capital. It has used the funding to expand globally, most recently launching a point-of-sale solution in the UK in May 2016 (first step outside of North America), while also adding capabilities to support Apple Pay and Samsung Pay on the web in March 2017.

Similar to the other payment platform providers, the company offers an easily customizable checkout experience that comes compliant ready. It also offers fund settlement services, transaction-level reporting capabilities, mobile one-touch enablement, and customizable customer on-boarding tools. While it



accepts card payments from major networks like Visa, MasterCard and American Express it does not currently accept card payments from Discover. WePay is processing over \$1bn in transaction volume annually and charges 2.9\$ + \$0.30 for transactions, similar to Braintree and Stripe.

Solutions for business tool providers and marketplaces

WePay provides on-boarding services for software business tool providers making it easier to get their clients (other businesses) payments and begin using their services. Solutions include event ticketing (accept and settle fees), invoicing, marketing automation, and business management software. Importantly, the company provides all overhead services related to payments, like risk management, regulatory compliance, business licensing, PCI and other security related services and even sends tax documentation to a platform's sellers. For marketplaces, the company also provides an API that can seamlessly integrate payments into that company's app, improving conversion, with settlements being complete in ~48 hours. The company claims a 64% improvement in user retention from platforms that use WePay.

Fraud capabilities

WePay claims it has industry leading fraud detection capabilities using social media data and machine learning algorithms to detect fraud. Similar to Klarna, the company takes on fraud liability for its merchants, allowing the companies to focus on their business without worrying about fraud liability.

Klarna improving conversion with financing at checkout

Swedish company Klarna (founded in 2005) has ~1,500 employees and offers a two sided platform that lets customers make purchases using borrowed funds (if unavailable) while merchants can accept payments from any source through simple API plugins. Klarna works with 45mn consumers and over 65k merchants across 18 markets and charges a flat rate for each type of transaction. Money is deposited into a merchants account within 2 business days while customers are given the ability to get on payment plans with 6 to 36 month financing options.

Impressively, the company boasts an ~10% market share in Northern Europe with a quarter of all purchases using Klarna Checkout being made through mobile. In September 2015, the company rolled out its payment solution to the US and doubled its US users to 2mn (up from 1mn in first four months) as of Nov 2016, with an average ticket size of \$120.

Improving conversion with Klarna Checkout

Klarna Checkout simplifies the checkout experience on mobile and desktop for eCommerce merchants by requiring customers to simply enter their email and delivery address one-time (details remembered for subsequent checkouts). The checkout experience also includes financing options for customers. Klarna claims giving the customer a financing opportunity (similar to PayPal Credit) increases the purchasing power of its customers with a 58% higher average order value and 30% more customers. The company also states that eCommerce merchant conversions improve by ~20% on desktop and ~40% on mobile.



Absorbing payment risk with Klarna Payments

To alleviate merchant concerns of fraud or inability to pay, Klarna takes on the fraud or payment risk, passing along payment to the merchant before, and regardless of if, the customer makes a payment. Customers are given financing options at checkout, such as pay after delivery (test a product before paying for it) or monthly payment installments. With an easier checkout experience that improves conversion and reduced fraud risk, platforms like BigCommerce, Magento and Shopify are enabling Klarna Payments as a financing option at checkout.

Launching in-store capability

In May 2016, the company expanded to an omnichannel solution, with in-store customers providing the retail location with a mobile number, from which they receive a text message and complete the transaction on Klarna's web portal. The company launched the in-store service in Stockholm and plans to expand it internationally while considering adding additional functionalities like contactless payments via NFC and digital wallets (like Apple Pay).

Pricing comparison

Pricing is relatively standardized across the industry with many of the additional features outside of transaction acceptance provided as an additional service. However, there are some differences in cross-border payments, accepting cryptocurrencies, or even with ACH transactions. Below we show some of the standard pricing offered by some of the larger providers of payment services (excluding V and MA).

Figure 3: Pricing for Payment APIs

	Standard	ACH	Charge-backs
Braintree	2.9% + \$0.30	Same as standard	\$15
Stripe	2.9% + \$0.30	0.8% (\$5 cap)	\$15
Adyen	\$0.10-\$0.12 processing fee + 0.48%-0.60% commission (Interchange++)	\$0.25	\$17.50
WePay	2.9% + \$0.30	1% + \$0.30	\$15
Klarna	Not public		

Based on latest available data. Source: Company data, merchantmaverick.com



Focus Shifts to Monetization - Sizing Pay with Venmo

The focus for many players has started to shift from driving adoption to monetizing important assets, which have garnered significant traction in terms of user base and merchant acceptance. PayPal's Venmo asset is a key example, which has helped attract a new customer base (significant customer acquisition tool), namely the millennials, with its socially shared payment experience, who transact more frequently (2-3x a week on average compared to 2-3x a month for core PayPal users) and are overall more valuable. Pay with Venmo has been rolled out to all of the Venmo users and is in the process of being rolled out to the merchants with material benefit to the overall model, expected to primarily come in 2018 and beyond. The rollout of Pay with Venmo will drive incremental revenues and help offset the take rate pressure. In addition, Venmo tends to have higher mix of ACH and debit, which could help further offset take rate pressure and drive margins. We estimate the Pay with Venmo monetization efforts could deliver potential ~1pt of incremental revenue growth in FY18 expanding further to ~2.5pts in FY19 and ~3.5pts in FY20. We estimate the EPS contribution could potentially represent \$0.06 in FY18, \$0.16 in FY19 and \$0.28 in FY20.

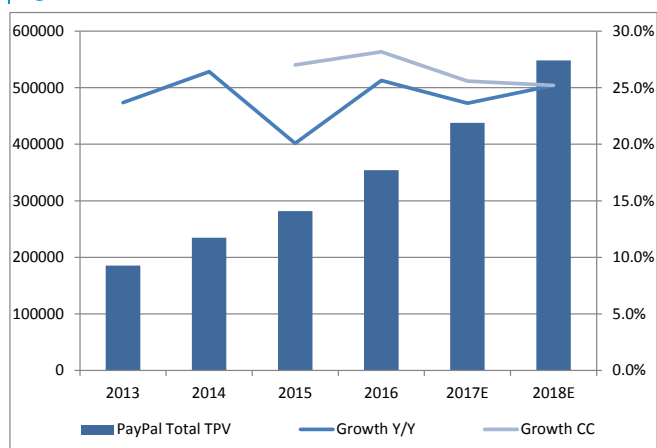
PayPal continues to gain market share despite competition concerns

PayPal at its core growing significantly

PayPal total TPV has been on an accelerated growth trajectory, reaching \$354bn in 2016 representing 26% Y/Y growth (28% cc) and we expect the momentum to continue projecting 24% Y/Y growth (26% cc) in FY17 and 25% Y/Y growth in FY18 to \$548bn in total company TPV not including any contribution from incremental volumes associated with Pay with Venmo at the merchants.

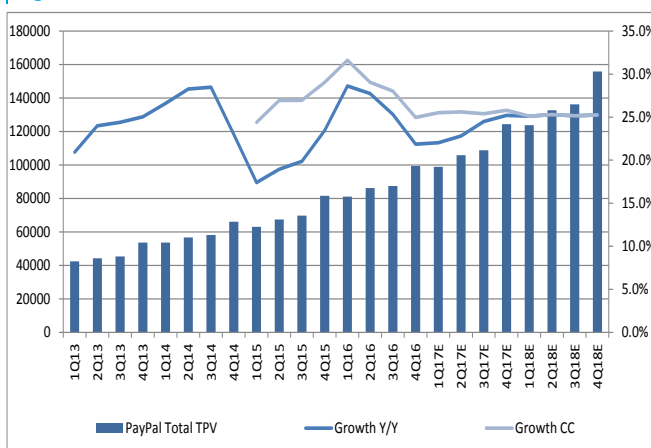


Figure 4: PYPL total TPV (2013-2018E)



Source: Company data, Deutsche Bank estimates

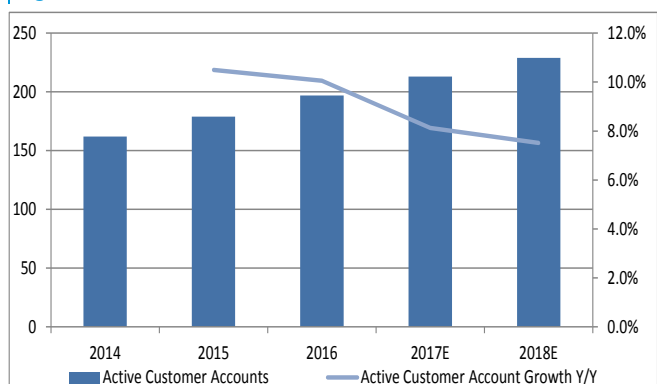
Figure 5: PYPL total TPV (1Q13-4Q18E)



Source: Company data, Deutsche Bank estimates

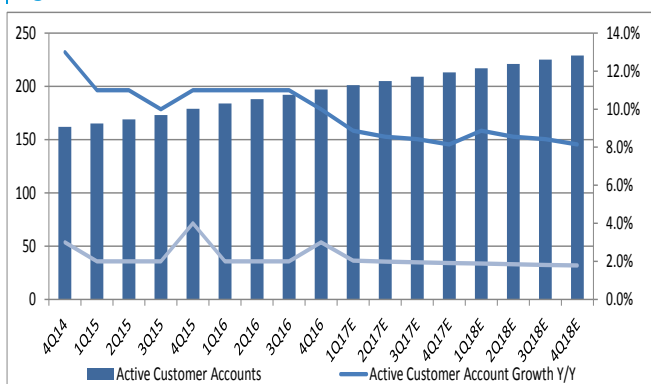
In addition, the active accounts continue to grow in the low double digits annually with PYPL adding over 5m active accounts in 4Q16 alone reaching ~197m in 2016 (surpassed 200m as of Feb 2017), which represents ~10% Y/Y growth driven by core PYPL as well as Venmo. We expect at least high single-digit growth going forward with the potential to reach ~229m active accounts by 2018.

Figure 6: Active accounts (2014-2018E)



Source: Company data, Deutsche Bank estimates

Figure 7: Active accounts (4Q14-4Q18E)

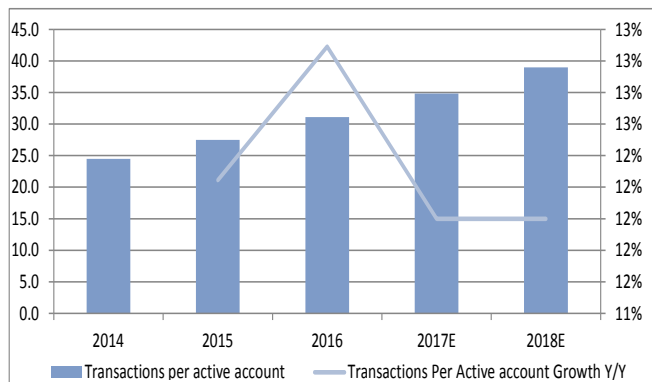


Source: Company data, Deutsche Bank estimates

Alongside the strong active account growth, PYPL continues to drive increased engagement as evidenced by the strong growth in transactions per active account, which reached 31.1 in 2016, and each quarter since separating from eBay, the company has seen double-digit growth in both active accounts and engagement.

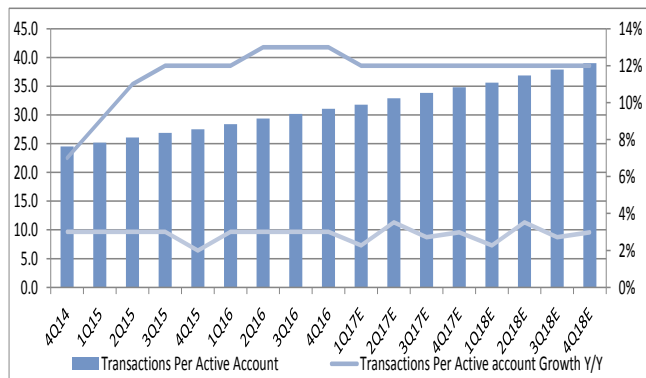


Figure 8: Transactions per active account (2014-2018E)



Source: Company data, Deutsche Bank estimates

Figure 9: Transactions per active account (4Q14-4Q18E)



Source: Company data, Deutsche Bank estimates

The active accounts are made up of the PayPal merchants and the PayPal buyers. The number of PayPal merchants continues to expand as well as the number of buyers as outlined below, which is based on information provided by PayPal in public forums along with our estimates.

Figure 10: PayPal merchants and buyers

Millions	3Q15	4Q16	1Q16	2Q16	3Q16	4Q16	Feb-17
PayPal Merchants	~13m	+13m	+14m	~14.5m	~15m	~15m	~15m
PayPal Buyers (Active accounts - PYPL Merchants)	160	166	170	174	177	182	185

Source: Company data, Deutsche Bank estimates

Braintree V.zero common infrastructure delivering speed to market

Driving incremental value through a common infrastructure

PYPL uses a common infrastructure across multiple services namely Braintree's V.zero stack, which enabled the company to quickly deploy One Touch across its user and merchant base and is being utilized for the rollout of Pay with Venmo. The core PYPL is integrated fully into V.zero, which is the company's mobile led platform and PYPL has similarly integrated newly acquired assets such as Xoom.

The following data was compiled through historical PayPal earnings conference calls and shows the significant speed at which the company has been able to rollout One Touch across its user and merchant base, and we believe the rollout of Pay with Venmo across the merchants could follow a similar trajectory.

One Touch was launched in 3Q15 and PYPL highlighted over 1m merchants being enabled along with +50% of the internet retailer 500 and ~7m consumers. PYPL was able to accelerate the adoption to +5m merchants as of 4Q16 and +40m consumers. As of February 2017, One Touch was enabled at +5m merchant accounts globally and +50m consumers had opted-in to use One Touch across 203 markets with over 75% of the internet retailer 500 having One Touch enabled.



Figure 11: One Touch merchant and consumer adoption

Millions	3Q15	4Q16	1Q16	2Q16	3Q16	4Q16	Feb-17
One Touch Merchants	+1m	+1m	+2m	+2m	+4m	+5m	+5m
% of total PayPal Merchants (est.)				14%	27%	33%	33%
Internet Retailer 500	+50%					75%	75%
One Touch Consumers	~7m	+15m	~21m	+25m	+32m	+40m	+50m
% of Total Active Accounts	4%	8%	11%	13%	17%	20%	25%

Source: Company data

Pay with Venmo rollout

PYPL has now rolled out Pay with Venmo to all of the Venmo users, and expects for Pay with Venmo to be rolled out across the merchant base throughout FY17 with volumes at merchants starting to come on in FY17 ramping into 2018 and 2019.

Merchants accepting Pay with Venmo today include Boxed, chariot, delivery.com, dolly, foodler, GameTime, Jane, kiwi, Munchery, ParkingPanda, PoshMark, Priv, and White Castle. According to the Venmo website, users can only Pay with Venmo in the partner apps today.

Venmo differentiation as a social platform driving engagement

Compelling value proposition to the millennial

Venmo has become a verb in the P2P payments arena, with particular success among the millennial age group who have embraced the social payment platform in their daily lives for paying rent, splitting bills, and numerous other use cases. While the average PYPL user transacts ~2-3x per month, Venmo users are significantly more engaged (4x more than core PYPL users), transacting ~2-3x per week with the most engaged users transacting daily if not multiple times per day, and PYPL believes the P2P users are 2x more valuable than the platform average. The Venmo platform is differentiated from the core PYPL platform as it leverages social media for driving engagement among the user base. In addition, similar to how One Touch was rolled out using the company's Braintree V.zero mobile led platform, Pay with Venmo is expected to leverage the platform for the rollout to merchants and is already rolled out to the entire Venmo user base.

- **Venmo open network:** Roughly 90% or more of the Venmo transactions are open to the user's friend network for viewing each other's transactions, making it a social platform that creates incremental engagement.
- **Core PayPal engagement growing:** Average PYPL user transacts ~2-3x per month, and PayPal has a goal of driving further engagement through its full suite of value add solutions targeting 2-3x per week with the most engaged PayPal users today transacting at these levels.
- **Venmo engagement significant:** Venmo users are much more engaged (~4x more so than the PYPL user base) with the average users transacting 2-3x per week and the most engaged Venmo users transacting daily, if not multiple times per day. Heavily engaged Venmo users deliver ~67% more transactions than the average PYPL user. Furthermore, P2P users are 2x as valuable versus the platform average, according to PYPL.



Figure 12: Key stats from the 2016 PayPal Analyst Day

2016 Analyst Day Stats	
Average PYPL users	Transact 2-3x per month, wants to move toward 2-3x per week
Most Active PYPL users	Already transacting 2x per week
Average Venmo users	Transact 2-3x per week
Most engaged Venmo users	Transact daily, often multiple times per day
Venmo user base	4x more engaged than PYPL user base
Avg PYPL users versus heavily engaged Venmo user	67% higher number of transactions for heavily engaged Venmo users
Customer lifetime	P2P users are 2x as valuable versus platform average

Source: Company data, 2016 PayPal Analyst Day

Forecasting the Pay with Venmo monetization opportunity

Venmo has proven to be a significant customer acquisition tool with an engaged user base that has the potential to add incremental profitable volumes at merchants to the company's overall platform. Venmo processed \$5.6bn in volume for 4Q16 alone growing 126% Y/Y, and in December 2016, processed +\$2bn in volume with the annualized volume approaching \$20bn. Venmo processed \$17.6bn in payment volume for 2016.

In addition, the average Venmo user is significantly more engaged and PYPL has been in the process of launching Pay with Venmo to monetize the large and growing user base with expectations for meaningful contribution potentially primarily starting in FY18 and beyond. Monetizing the Venmo asset will help to slow the company's transaction and overall take rate decline as the significant P2P volumes have historically been a drag to take rate while also accelerating the revenue and earnings growth. In this section, we provide a detailed analysis of the potential impact from rolling out Pay with Venmo.

Overview of our Pay with Venmo estimates

eMarketer estimates the total US adult mobile phone P2P payment users in 2016 at ~45.8m and P2P payment volume at \$59.42bn. Venmo processed \$17.6bn in payment volume for 2016 implying ~30% market share or ~13.5m US adult mobile phone P2P users. We estimate ~1,760m Venmo transactions for 2016 at an average transaction value of ~\$10 given the Venmo users transact ~2-3x per week on average according to PYPL. Pay with Venmo will charge 2.9% of the transaction amount and \$0.30 per transaction. We are conservatively estimating an average of ~3.5 transactions per Venmo user at merchants in FY18 expanding to ~8 in FY19 and ~10.5 in FY20. We estimate the Venmo user base will grow 31% Y/Y in 2017 to ~18m, 27% Y/Y in 2018 to ~22.5m, ~24% Y/Y in 2019 to ~28m, and ~21% Y/Y in 2020 to ~34m. We expect the average transaction value on Pay with Venmo transactions at the merchants to be roughly in line with the core PYPL average of ~\$58, representing potential Pay with Venmo volumes at merchants of ~\$270m in 2017 growing to \$4.4bn in 2018, \$12.6bn in 2019, and \$20.3bn in 2020. Overall, we estimate the Pay with Venmo monetization efforts could contribute potential ~1pt toward revenue growth in FY18 expanding to ~2.5pts in FY19 and further to ~3.5pts in FY20. We estimate potential EPS contribution of \$0.06 in FY18, \$0.16 in FY19, and \$0.28 in FY20.

Venmo monetization to help offset take rate pressure

Given the merchant fees for Pay with Venmo are in line with the core PYPL transactions, the rollout of Pay with Venmo should help to alleviate some of the take rate pressure, which has been driven by the growth in P2P payment

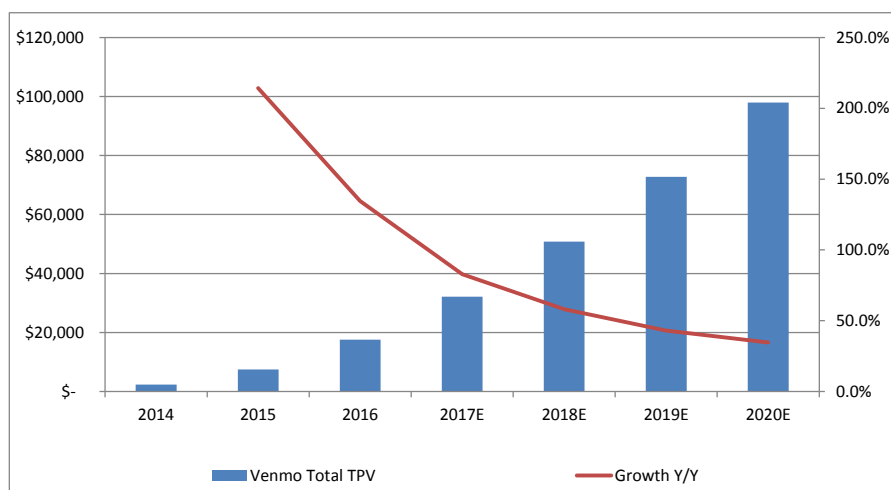


volumes, which have a zero take rate as well as the company's push into larger merchants and the Braintree mix shift. In addition, given that the Venmo users are setup with ACH for the P2P payment transactions, and have a tendency to hold a PYPL Balance, both of which come on at higher margins given the lower transactions costs associated, the Pay with Venmo monetization efforts could further benefit the take rate.

Venmo volumes forecast

Venmo processed \$5.6bn in volume for 4Q16 (126% Y/Y) and for FY16 processed \$17.6bn (+135% Y/Y). The growth has remained robust albeit moderating from significant levels, and we expect continued momentum, forecasting +80% Y/Y growth in FY17 to ~\$32bn in volume, ~60% Y/Y in FY18 to ~\$50bn in volume, ~40% Y/Y in FY19 to ~\$70bn, and ~35% Y/Y in FY20 to \$100bn which does not include our estimates for incremental volumes as it relates to Pay with Venmo at the merchants.

Figure 13: Venmo volume forecast (excludes Pay with Venmo)



Source: Company data, Deutsche Bank estimates

Estimated number of Venmo users and transactions

In the following table we have laid out our assumptions for arriving at an estimated Venmo user base, which we believe could be over 13.5m users as of 2016. PayPal reported \$17.6bn in Venmo volume for 2016 and the average Venmo user according to PayPal transacts 2-3x per week. At the midpoint of 2.5x, this would imply ~130 Venmo transactions per year on average per user (2.5 multiplied by 52 weeks in the year).

In addition, eMarketer estimates a total of 45.8m US adult mobile phone P2P payment users in 2016 and P2P value of transactions at \$59.42bn for the year. Given the Venmo volume of \$17.6bn, this would suggest ~30% market share or ~13.5m US adult mobile phone P2P users on the Venmo platform. In addition, we believe the Venmo average transaction value is roughly \$10 per transaction which would equate to ~1,760m Venmo transaction in 2016 given \$17.6bn in volume and given Venmo users on average transact 2-3x per week this would imply ~13.5m users.



Figure 14: Core PYPL and Venmo user base forecast

	2016	Assumptions
Total Venmo volume	\$ 17,600.00	Source: PYPL
Average Venmo user transacts	2-3x/week	Source: PYPL
Estimated number of Venmo transactions per user	130	2.5 multiplied by 52 weeks in the year
Estimated number of Venmo users (MM)	13.5	-eMarketer estimates 45.8m US adult mobile phone P2P payment users in 2016 -eMarketer estimates P2P value of transactions at \$59.42bn in 2016 -Venmo volume of \$17.6bn suggests ~30% market share or 13.5m US adult mobile phone P2P users
Estimated average Venmo transaction value	\$ 10	~13.5m Venmo users suggests ~\$10 average transaction value
Estimated total number of Venmo transactions	1,760	Number of users multiplied by average transaction value per users

Source: Deutsche Bank estimates, eMarketer, Company data

We estimate the Venmo users grew 43% Y/Y from 9.5m in 2015 to 13.5m in 2016 and estimate the average transaction amount per user grew from ~\$6 in 2015 to ~\$10 in 2016.

Figure 15: Core PYPL and Venmo user base forecast

	2015	Assumptions
Total Venmo volume	\$ 7,504.00	Source: PYPL
Average Venmo user transacts	2-3x/week	Source: PYPL
Estimated number of Venmo transactions per user	130	2.5 multiplied by 52 weeks in the year
Estimated number of Venmo users (MM)	9.5	-eMarketer estimates 31.5m US adult mobile phone P2P payment users in 2015
Estimated average Venmo transaction value	\$ 6	~9.5m Venmo users suggests ~\$6 average transaction value
Estimated total number of Venmo transactions	1,229	Number of users multiplied by average transaction value per users

Source: Deutsche Bank estimates, eMarketer, Company data

Venmo fee breakdown

PayPal is charging the standard 2.9% of the transaction amount and \$0.30 per transaction for Venmo merchant transactions, in-line with the core offering.

Figure 16: Merchant fee breakdown for Venmo

Merchant Fee Breakdown	
Percentage of Transaction amount	2.90%
Per transaction	\$0.30

Source: Company data

With merchant fees in line with the core PYPL, traction for the Pay with Venmo rollout should help reduce take rate pressure from the growing P2P volumes, push into larger merchants and Braintree mix shift. In addition, the Venmo users are setup for ACH with the P2P transactions while also having a tendency to hold PYPL Balance, both of which are more profitable than card based transactions.

Venmo funding mix estimates

Venmo transactions are more prominently funded by higher margin sources such as ACH and PayPal Balance. The following table shows our estimates for the Venmo funding mix as well as estimated transaction expense.



Figure 17: Venmo estimated funding mix

Venmo Estimated Funding Mix	Estimated Funding Mix Split	FY16 Venmo TPV (Billion)	Estimated Interchange Expense	Estimated Network Fees	Estimated Processing Expense	Estimated Total Expense Rate	Estimated Transaction Expense
Volume	100%	\$ 17,600					
ACH	50%	\$ 8,800			0.08%	0.08%	\$ 7.04
Balance	30%	\$ 2,640			0.02%	0.02%	\$ 0.53
Debit Card	10%	\$ 264	0.45%	0.18%	0.05%	0.68%	\$ 1.80
Credit Card	5%	\$ 13	2.00%	0.20%	0.05%	2.25%	\$ 0.30
PayPal Credit	5%	\$ 1			0.09%	0.09%	\$ 0.00

Source: Deutsche Bank estimates

Revenue and earnings contribution forecast from Venmo

We estimate that the number of Venmo users will grow off our estimated ~13.5m in 2016 to ~18m in FY17 (31% Y/Y), to ~22.5m in FY18 (27% Y/Y), to ~28m in FY19 (24% Y/Y) and to ~34m in FY20 (21% Y/Y). Based on the pace of merchant rollout for One Touch, we expect 2.25m merchants to be enabled for Pay with Venmo in 2017, 5.25m in 2018, 8.5m in 2019, and 11.5m by 2020. In addition, we are conservatively estimating ~3 transactions per Venmo user at merchants in 2018 expanding to ~8 in 2019 and further to ~10 in 2020. We estimate a total of ~5m transactions at merchants using Pay with Venmo in 2017 growing to ~75m in 2018, +200m in 2019, and further to +350m in 2020. Assuming the Pay with Venmo average transaction value at merchants will be roughly in line with the core PYPL average of ~\$58, we estimate Pay with Venmo volumes in 2017 of \$266m growing to \$4.4bn in 2018, \$12.6bn in 2019, and \$20.3bn in 2020. Overall, we estimate Pay with Venmo could contribute potential ~1pt toward revenue growth in 2018 expanding to ~2.5pts in 2019 and ~3.5pts in 2020. We estimate Pay with Venmo could potentially contribute \$0.06 to EPS in 2018, \$0.16 in 2019, and at \$0.28 in 2020.

Figure 18: Venmo monetization revenue and earnings forecast

	2014	2015	2016	2017E	2018E	2019E	2020E	Assumptions
Venmo total estimated TPV (MM)	\$ 2,388	\$ 7,504	\$ 17,600	\$ 32,167	\$ 50,848	\$ 72,763	\$ 97,933	2014-2016 Venmo volume provided by PYPL
Growth Y/Y		214.2%	134.5%	82.8%	58.1%	43.1%	34.6%	Moderating growth profile overtime as Venmo gains scale.
Estimated Total Venmo Transactions (MM)		1,229	1,760	2,482	3,449	4,657	6,007	2016 transaction est. based on ~\$10 transaction value and ~13.5m users.
Growth Y/Y			43%	41%	39%	35%	29%	Assuming growth moderates overtime as Venmo scales.
Estimated merchants enabled for Pay with Venmo (MM)			0.25	2.25	5.25	8.5	11.5	Assuming similar rollout trajectory as One Touch.
Estimated number of Venmo users (MM)		9.5	13.5	17.7	22.5	27.9	33.8	Est. ~13m in 2016 based on eMarketer data and Venmo volume share.
Growth Y/Y			43%	31%	27%	24%	21%	Assuming moderating growth overtime as Venmo scales.
Estimated # of txns at merchants per user per week				0.005	0.065	0.15	0.2	Modest adoption projections for transactions at merchants overtime.
Estimated # of txns at merchants per user per year				0.26	3.38	7.8	10.4	Modest adoption projections for transactions at merchants overtime.
Estimated Merchant Venmo Transactions (MM)				4.6	76	218	351	Number of users multiplied by number of estimated transactions.
Estimated Value per transaction		\$ 58	\$ 58	\$ 58	\$ 58	\$ 58	\$ 58	Assuming merchant transactions are in-line with core PYPL given use cases.
Estimated Pay with Venmo Merchant TPV (MM)			\$ 266	\$ 4,397	\$ 12,583	\$ 20,301		Transactions multiplied by average value of each transaction.
Estimated Potential Revenues (MM)			\$ 9	\$ 150	\$ 430	\$ 694		Assuming 2.9% of the transaction amount and \$0.30 per transaction.
Estimated Potential Revenue Growth Contribution				0.07%	1.02%	2.51%	3.5%	Revenue contribution as a percentage of total PYPL revenues.
Estimated Transaction Expense (MM)			\$ 1	\$ 10	\$ 29	\$ 47		See Venmo Estimated Funding Mix Analysis Table.
Estimated Operating Expenses (MM)			\$ 4	\$ 57	\$ 155	\$ 236		PYPL core op expense as % of revs at ~49% in FY16, we est. Pay with Venmo slightly lower.
Estimated Operating Expenses % of Revs			40%	38%	36%	34%		Expect operating leverage as it continues to gain scale.
Estimated Operating Income (MM)			\$ 5	\$ 83	\$ 246	\$ 411		Pay with Venmo Operating Income.
Estimated Operating Income Margins			53%	55%	57%	59%		Pay with Venmo Operating Income Margins.
Estimated Potential EPS Benefit			\$ 0.00	\$ 0.06	\$ 0.16	\$ 0.28		Assuming similar margins and tax to core PYPL.
Estimated Share count			1217	1218	1218	1218		PayPal Sharecount estimated.

Source: Deutsche Bank estimates, Company data



Monitoring competitive dynamics in P2P

Square Cash making strides in P2P payments

Square Cash is the company's P2P payments application introduced in 2013. The company now processes over one billion dollars in P2P payments annually for individuals and businesses in the US. For businesses, the company charges 1.5% and deposits funds directly into the bank account.

Square has also introduced \$Cashtags for businesses, which is a unique identifier allowing the organization to more broadly accept payments from individuals outside of their personal network without sharing personal email addresses or phone numbers.

In addition, Instant Deposit was added in August 2015 and in 3Q16 the company highlighted that over 200k sellers of the millions of sellers in SQ's client base have completed ~4m Instant Deposits (~20 deposits/seller), which compares to 150k sellers having completed over 2m deposits in 2Q16. Instant Deposit allows the users to extract funds to their account instantly for a 1% fee. Instant Deposit is the fastest growing and highest margin product in the Software and Data segment and the company launched Scheduled Instant Deposits in 3Q16 with similar pricing.

SnapChat went public 2 March 2017 and has a strong user base of 158m active daily users as of the end of 2016 with an average of 2.5bn "snaps" created each day. In 2014, SnapChat partnered with Square and launched Snapcash for P2P payments. Square handles the debit card check-in and stores the card information as well as the payment processing.

Facebook Messenger P2P payments

Facebook entered the P2P payments market in March 2015 through a pilot, and by mid-July 2015, expanded the solution to the entire US market. The P2P service is offered through the Messenger app whereby users can send money to friends and family through a linked Visa or MasterCard debit card. Facebook does not support the credit cards similar to Venmo due to the fees (Venmo charges 3% for credit cards on P2P payments) as well as the potential for fraud. Facebook recently introduced new functionality in September 2016 called "chat assist" enabling machine learning, which for payments on Messenger, allows for automatic payment prompt when triggered by specific words typed. In February 2017, TransferWise added Facebook Messenger chatbot, which will enable international money transfer as per Reuters. Facebook is another example of a platform based approach where payments are used as an added value service to users on the platform.



Real-time Payments & P2P Competition

Accelerating demand for real-time payments globally

Real-time payment networks expanding globally

There are an increasing number of real-time payment systems and infrastructures being rolled out to meet the growing business and consumer demand for transaction speed along with convenience backed by security globally. While the various banks and real-time networks are working diligently to meet the consumer and business demand, multiple government agencies (such as NACHA and the US Federal Reserve) and other private sector ventures are also increasingly pushing for real-time payment infrastructures. Real-time payments continue to primarily focus on person-to-person (P2P), business-to-consumer (B2C), and government-to-consumer (G2C) payments and not for the consumer-to-business (C2B) payments and consumer-to-government (C2G) payments. Banks are using real-time payments as a way to eliminate paper check payments, helping to lower the processing costs.

Roughly 90% of the \$10trn estimated US real-time push payments market is reliant on cash, checks and ACH for money transfer, according to PYMTS.com. In addition, insurance payments, healthcare reimbursement, merchant settlements, loan disbursements, and payments to workers represent \$9trn while the remaining \$1tr is focused on traditional P2P payments. ACH accounts for 50% of all electronic payments across the world's top 50 countries, according to MasterCard.

P2P payments market heating up

There are many third-party providers of P2P payments services from PayPal's Venmo to Facebook, Square Cash, SnapCash, Google Wallet, Dwolla, and clearXchange's Zelle, leveraging its real-time network to enable banks to provide the service. Although the P2P payment services are generally offered for free, many companies are leveraging P2P payments as a customer acquisition tool, with PYPL being a prime example using the Venmo asset.

In addition to P2P payments, the networks are working on real-time and P2P payment initiatives to capture the large addressable market. Visa Direct recently partnered with Early Warnings's clearXchange and MasterCard acquired VocaLink, a provider of the underlying technology powering the majority of electronic payments in the UK. Partners of the Visa Direct platform also include Fiserv with its Popmoney P2P offering as well as Ingo Money and Square. In addition, through the Visa partnership announced mid 2016, PayPal and Venmo will leverage the Visa Direct network to enable real-time payments.

Networks well-positioned in C2B

The networks remain well positioned to capture the real-time payment opportunity globally across B2B, gov't and P2P. On the C2B side, we believe that the payment networks are also well-positioned given the extensive global acceptance that the network companies have built.



P2P competitive dynamics with the Zelle launch

Early Warning acquired clearXchange and renamed its P2P payments network to Zelle. It provides banks with a competing P2P payment service and first launched on Bank of America early this year, with expectations for a more broad launch across the ~20 bank partners throughout the year. Zelle is expected to become one of the largest faster payment networks in the US with over 76m mobile banking users nationwide having access to the service. Zelle has over 100m users on the network with 70m having the ability to send money and is processing \$175m in transactions per day. The bank partnership-based network is a key differentiator as it allows for real-time money transfer from account to account without having to hold a balance in the wallet. Overall, we view Zelle as a competing solution for the banks, which have been losing share to FinTech companies and will be used to drive engagement for the purpose of increasing the use of other more profitable services.

Venmo well-positioned to drive further engagement

Although Zelle is differentiated with its direct bank account access, Square Cash provides P2P payments and introduced Instant Deposit for quick transfers from the wallet balance to the bank account for a 1% charge per deposit and PayPal's recent deal with the networks is expected to allow for near-instant transfer to the bank account by mid-year. We believe that PayPal is well-positioned with its Venmo asset to continue capturing new users, given the significant demand, particularly from the millennial category through its socially open network, which is resonating in the market as well as its full suite of payment solutions for driving further engagement. We expect Pay with Venmo to be a material contributor to overall revenue growth in the future.

Visa enabling real-time payments

Visa recently announced an expanded reach for its Visa Direct platform including additional financial institutions, developers, and partners for the purpose of providing access to the real-time network. Early Warning is an industry leader in real-time payments and signed an agreement with Visa in August 2016 to enable P2P payments on its clearXchange network using the US issued debit cards through the Visa Direct Platform.

The clearXchange platform reaches over 100m online banking and 70m mobile banking users and in combination with Visa will be able to reach the majority of the 200m debit cards issued by Visa in the US.

Visa's goal is to remove the friction in these markets, such as P2P/B2P, by improving the speed of the transaction while continuing to provide enhanced security helping to capture the \$10trn addressable market.

MA's acquisition of VocaLink strategic

Revisiting the acquisition details

MA announced the acquisition of 92.4% of VocaLink at the end of July 2016 for £700m (~\$920m) including a £169m (~\$220m) earn-out based on performance targets. The acquisition is expected to be ~\$0.10 dilutive for 24 months post close. The company now expects the transaction to close in the spring of 2017 per its 4Q16 earnings call. Upon announcing the deal, MA had reiterated its three-year margin guidance of +50%.



Strong strategic rationale

We believe that the acquisition of VocaLink was strategic as it allows the company to move beyond card-based payments, helping to capture the ACH and real-time payments (RTP) market in the UK and globally. The addressable real-time and ACH market globally represents ~50% of all electronic payments across the top 50 countries. MA will gain access to the large B2B, gov't, and P2P payments market. In addition, the asset would provide MA greater exposure to the European market, given VocaLink's significant presence in the UK, which could benefit from PSD2 regulations opening the market. In addition, MA could potentially look to use the acquisition as a tool for capturing share of the debit market in the UK.

CMA approves measures taken to alleviate VocaLink deal concerns

VocaLink operates the technology platforms for UK payments schemes namely Bacs, Automated Clearing House (ACH), Faster Payments (real-time account to account), and LINK (UK ATM network). Britain's Competition and Market Authority (CMA) raised concerns over the deal due to the infrastructure services provided to the LINK network of automated teller machines (ATMs) which connects over 70k cash machines in the UK as VocaLink and MasterCard are two of the three providers. MA and VocaLink have addressed the concerns by VocaLink making its existing network connectivity available to a new supplier of infrastructure services to LINK which could allow a competitor to use VocaLink's connectivity to members of the LINK ATM network. VocaLink will transfer to LINK the intellectual property rights related to the LINK LIS5 messaging standard used by members to communicate when customers use the ATMs. In addition, MA will contribute to the cost to LINK members for changing to a new supplier. On April 11, 2017 the CMA approved the measures and the two companies are working toward closing the transaction within the next few weeks. The VocaLink deal was originally expected to be dilutive for 24 months post close by \$0.10 due to investments for growth.

Monitoring competitive dynamics from Zelle launch

Zelle positioning for broad launch

Early Warning completed the acquisition of clearXchange in early 2016 and in August 2016 renamed the P2P payments network to Zelle, which is its faster payments network enabling US consumers and businesses to send and receive money.

Zelle first launched on Bank of America in February 2017 and is expected to launch more broadly across the bank partners throughout the year. Zelle will be embedded within the mobile banking applications. In addition, a separate consumer facing standalone app for P2P payments will also be launched by mid 2017.

Zelle is expected to be one of the largest faster payments network in the US, with over 76m mobile banking users nationwide having access to the service. Zelle has ~20 partner banks as well as over 100m users on the network with 70m having the ability to send money without downloading anything and is processing \$175m in transactions per day.

The key differentiating factor of Zelle is the significant bank partnerships where consumers hold their funds and have long-standing relationships. The Zelle



network is able to perform real-time money transfer into the bank accounts. We believe that Venmo remains well positioned given its significant foothold in the P2P market and platform-based approach whereby PayPal's full suite of value-add solutions can be used to further engage with customers.

Venmo well-positioned to retain and gain share

Zelle's purpose is to provide the banks with a competing offering in P2P payments to the likes of Venmo. However, we believe that Venmo is well-positioned, given its early lead, having been founded in 2009 and processed \$17.6bn in transactions for 2016. In addition, consumers/users of Venmo, especially among the millennial age group, have deeply embedded the offering into their daily lives, making it very sticky and difficult to disrupt.

However, Zelle does have a strong advantage given partnerships with the large banks. The Zelle network also allows users of P2P payments to receive the transferred funds into their banks accounts within minutes versus having the funds in the Venmo wallet and having to later transfer out the balance and wait for the processing time.

Square Cash also provides P2P payments, which allows for free deposits in 1-2 business days; however, it charges for its newly introduced services, such as Instant Deposit (1% for each deposit), when customers want fast access to their funds. In addition, PayPal's recent deal with networks, such as Visa and MasterCard, is expected to allow for near instant transfer to the users accounts by mid-year.

Furthermore, a key element of Venmo's success is the social network aspect where friends can view each other's transactions, which creates incremental demand and drives further volumes. In addition, the Venmo brand has become a verb among its users and although Zelle will launch its own branded stand alone solution, the banks, which use the network for P2P payments in their mobile applications, will not have the Zelle branding.

We will continue to monitor the potential for share gains as Zelle is rolled out more broadly. Over 13bn checks are written each year for over \$1trn. Importantly, we do not believe that Zelle poses disintermediation risk to the networks, but instead it replaces the checks and ACH for individuals and businesses.

Partnerships and recent announcements

In late November 2016, Jack Henry & Associates announced a strategic alliance with Early Warning to resell its Zelle network to financial institution partners, which will add 3k to the network. FIS expanded its real-time P2P payment solution offering in late November partnering with Early Warning to enable financial intuitions to offer faster P2P payment services over the Zelle network and in late October Fiserv and Early Warning alliance announced several new banks joining the network.

Zelle partners include Ally, Bank of America, Bank of the West, BB&T, BECU, Capital One, Chase, Citi, Co-Op Financial Services, Fifth Third Bank, First Bank, First Tech Federal Credit Union, First Tennessee, Fidelity Information Services, Fisev, Frost, Jack Henry & Associates, MasterCard, Morgan Stanley, PNC, USAA, US Bank, Visa, and Wells Fargo.



Zella has also partnered with NuData Security, which is a behavioral biometrics provider, for enhancing the security of the bank real-time payments and NuData Security expects to power a number of products from Early Warning.



Mobile Wallet Overload – What's Next?

After the launch of Apple Pay over two years ago, there has been a significant uptick in mobile wallets across mobile phone manufacturers and technology companies, mobile carriers, retailers/merchants, payment processors, and banks/financial institutions. In addition, mobile wallets are expanding their functionality to include value propositions such as loyalty, rewards, coupons, and targeted offers. Perhaps the most notable mobile wallet app introduced in 2016 was Chase Pay. While the conversation was initially dominated by mobile phone providers such as Apple Pay, Android Pay, and Samsung Pay, financial institutions, merchants, and third party providers are looking to take their fair share to help increase customer engagement. Overall, the market for mobile wallets is arguably becoming over crowded, however, we don't believe the trend of new and expanding mobile wallet solutions will dissipate in 2017. We expect to see more partnerships and continue to believe PayPal, as well as Visa and MasterCard, is the best way to play mobile payments. In addition, the mobile payments offer significant value for the online and in-app payments however the in-store mobile payments continue to struggle and could be limited to offers/coupon redemptions or order ahead. Order ahead is a significant growth opportunity and according to PYMTS.com is expected to grow from 50k locations in the US for 2015 to 180k locations in 2016 and further to 300k locations by the end of 2017.

Each type of mobile wallet provider has something to offer. Companies such as Apple, Google, or PayPal have a technology advantage, potentially able to roll out better user experiences and new features faster. PayPal in particular, with its acquisition of Paydiant, is also a provider of white label mobile wallets across the ecosystem. Financial institutions including players such as Chase or Wells Fargo provide customers a feeling of security given their long standing reputation for providing secure banking services and can also create immersive mobile banking solutions with bill pay, P2P, transfers, and loan requests while also being well positioned given exposure to a broad swath of customers. Retailers including Starbucks, Wal-Mart and Kohl's have the ability to drive digital engagement with their brand. Each provider offers customers a specific reason to engage with its wallet, and there is plenty of runway left with FDC estimating <2% of mobile phone users in the US consistently using a mobile wallet. Although currently 77% of the 785 people surveyed by First Annapolis in its *Study of Mobile Banking & Payments* are using Apple Pay, PayPal, Google, or Samsung as their current mobile wallet provider, 40% of those respondents would prefer to use a mobile wallet offered by a bank, while 55% of people not currently utilizing a mobile wallet would also prefer using a bank solution.

PayPal processed \$354bn in payment volume for 2016 and mobile accounted for over \$100bn, growing 55%. The company has built a full suite of value add solutions, which continues to drive significant engagement, and we believe PayPal will continue to be a leader in mobile going forward. In addition, the networks namely Visa and MasterCard are the token providers of choice with their VDEP and MDES platforms helping embed into the evolving ecosystem. The networks continue to pursue being the rails for mobile wallet transactions rather than building their own competing mobile wallet as their goal is to have



the cards be at the top of every mobile wallet, and we believe Visa and MasterCard will be key beneficiaries of mobile payment adoption.

Overload of mobile wallets saturating the customer experience

Mobile wallets are being launched by FinTech players as well as device manufacturers, banks, and retailers inundating the market with options. Consumers are likely to utilize multiple mobile wallets for each of their value propositions, however will gravitate toward the platform approach where an ecosystem of financial services awaits providing convenience in their daily lives. The networks will continue to be the rails embedded into the value chain, and we view PYPL as a leader in mobile given its platform approach. Apple Pay adoption in-store continues to hang on merchant acceptance of NFC while in-app and online have garnered more success. Samsung Pay is differentiated with MST technology and its latest rewards programs while Android Pay co-existing with the new Google Wallet comes pre-installed on carrier devices and is complementary to Samsung's strategy of increasing electronics sales. Chase Pay has large retailer buy in and Alipay continues to dominate the Chinese market.

Inundated with mobile wallets – platforms to attract the most consumers

With a multitude of mobile wallets being introduced to the market across technology companies to retailers and banks, each with their own value proposition, we view the market as crowded and potentially confusing to the consumer. Although consumers will likely adopt multiple mobile wallets given the varying value propositions in some cases exclusive to using a specific wallet, we believe the platform-based approach such as with PayPal and other players including Samsung Pay and Amazon Pay will deliver the most value in a one-stop shop to the consumers driving mobile payment adoption. Acceptance of some mobile payment technologies namely NFC continue to hinder the in-store adoption, while players such as Samsung Pay utilizing its unique Magnetic Stripe Technology (MST) have a leg up on acceptance as well as QR codes, which are widely recognized by retailers and do not require expensive upgrades to existing technology. PayPal remains the dominant player in mobile outside of China while Alipay continues to focus on the Chinese consumer while Visa and MasterCard are the rails for mobile payments vying to be at the top of every wallet. Overall, we believe PayPal, as well as Visa and MasterCard, remains the best way to play the mobile payments wave.

Networks playing to be at the top of every mobile wallet

The networks, namely Visa and MasterCard through their VDEP and MDES token platforms, are the token providers for the mobile wallets embedding themselves into the payments value chain. Visa and MasterCard both have their own online payment solutions namely Visa Checkout and MasterPass, which have garnered significant traction. Visa Checkout now has +20m enrolled accounts and +300k merchants representing +\$173bn in addressable volume including Best Buy, Starbucks, Papa John's and StubHub. MasterPass has 340k online and in-app merchants across 34 countries and 6m locations across 80 countries for contactless payments. Importantly, V/MA have been partnering with the mobile wallets to include Visa Checkout and MasterPass as a payment option and their goal is to be at the top of every mobile wallet rather than having their own competing wallet. The companies should benefit



from customer choice initiatives as a result of the PYPL partnership. In addition, Visa recently announce its mVisa services using QR codes, which went live in India, Kenya, and Rwanda with plans for rollout to Egypt, Pakistan and other developing countries helping to accelerate digital payments. MasterCard has announced a partnership with Oracle for streamlining digital payments across stores and restaurants for order ahead. We believe V/MA remain well positioned to benefit from the secular migration to digital payments.

PayPal the leader in mobile payments

PYPL remains the most widely used digital wallet outside of China and is used 5x more than competing checkout options. Mobile accounts for roughly one third of PYPL's total payment volume of \$354bn in 2016 growing +55% Y/Y and more than half of the active account base transacted using a mobile device in the past twelve months. PYPL has +200m active accounts compared to Amazon Payments, which has 33m customers and is growing at ~5m per quarter. Importantly, we believe PYPL has a strong platform based approach, delivering significant value to the merchants through higher conversion rates particularly with One Touch across mobile devices and to the consumers with its full suite of value added services from online money transfer with Xoom to PayPal Credit (including Working Capital for merchants), Venmo social P2P platform (primarily mobile user base), and the acquisition of Paydiant allows the company to white label mobile wallets for third parties, all of which is powered by the Braintree V.zero platform, enabling fast and efficient upgrades of features/functionality and rollout of new solutions. Furthermore, the company's customer choice initiatives including the partnerships with V/MA coupled with ramping issuer and other third party partnership bode well for increasing the engagement. We believe PYPL should introduce a loyalty program, which could help further drive engagement with the platform and expect the company to continue gaining share overtime.

Apple Pay expanding globally

As the industry shifts toward EMV and NFC enabled POS devices across the US and globally, Apple Pay acceptance in-store continues to grow, now accepted at 35% of retailers representing 4m locations (up from 4% at the launch over two years ago). As per Boston Retail Partners, Apple Pay has the highest merchant acceptance of any mobile wallet accepted at 36% of merchants with 22% planning to adopt Apple Pay in the next 12 months and another 11% planning to adopt the solution in 1-3 years. In addition, Apple Pay has expanded beyond in-app and in-store to the Safari browser creating an omni-channel experience. Furthermore, Apple Pay has partnered with Blackhawk for integrating the gift cards, e-gifts, loyalty and rewards programs and is available with several loyalty cards namely Dunkin Donuts, Walgreens, Coke, Kohl's, and Panera while also accepting store-branded cards including BJ's, Kohl's, Ulta, Meijer, and JC Penny. Apple Pay has tripled its user base over the past year with hundreds of millions of transactions and billions of dollars in purchases for the December 2016 quarter alone. However, the significant growth seen has been primarily driven by the company's expansion into new countries with a total now of ~14 markets served including Australia, Canada, China/Hong Kong, France, Japan, New Zealand, Poland, Russia, Singapore, Spain, Switzerland, the UK, and the US with Taiwan expected soon. We believe the repeat usage remains lackluster particularly in-store where acceptance remains a challenge while in-app and browser are likely to deliver more near-term growth.



Senior Director of Product Marketing and Management for Apple Pay and iCloud, Baris Cetinok, discussed Apple Pay's accomplishments at ShopTalk this year over the past ~2.5 yrs. Merchant value proposition is resonating (conversions 2x higher when Apple Pay is deployed) with Macy's having seen a 50% uplift in conversions online and is expected to integrate Apple Pay into its mobile app. Over the holiday season, 60% of visits came from mobile and two-thirds of mobile orders were from an iPhone/iPad driving 30% conversion lift. Baris highlighted that 90% of contactless transactions are Apple Pay and the company continues to expand online/in-app. Online Apple Pay transactions can now be authenticated with Touch ID on the latest Mac Books while private label and co-brand cards can be automatically selected when paying at the retailer.

[Samsung Pay focused on rewards and online](#)

Samsung Pay acquired LoopPay, which provided the company with its Magnetic Stripe Technology (MST), and now Samsung Pay is accepted at 90%+ merchants globally in-store. Samsung Pay also uses NFC and will take the more secure route automatically at the POS upon detecting an NFC equipped terminal. We believe the strong merchant acceptance globally for Samsung Pay coupled with the company's platform of connected electronics (Internet of Payment Things helps drive further engagement) and expansion of its value proposition through the introduction of its own rewards program bodes well for consumer adoption. Samsung Pay has not only partnered with Blackhawk for the gift cards, e-gifts, and loyalty/rewards programs, but the company has also introduced its own rewards program where users can redeem points for Samsung products, helping drive its goal of increased devices sales. The incremental rewards are on top of the rewards users would receive from the merchant program and issuer incentives, making for a strong value proposition. In addition, Samsung Pay is just getting started online. Samsung Pay is very popular in countries such as Korea given the strong demand for its consumer electronics.

[Android Pay pre-loaded onto devices across major carriers](#)

The Google Wallet introduced in 2006 garnered limited success due to the carriers in the US who previously owned Softcard/Isis wallet (acquired by Google) blocking use of the Secure Element. Given the demand for specific features of the Google Wallet such as money transfer and the payment information the company had already collected and stored, Google has broken out the mobile payment and money management into two apps meant to co-exist namely Android Pay and the new Google Wallet. The Google Wallet handles the P2P payments and Android Pay handles the in-store NFC-based mobile payments. Android Pay is differentiated through the acquisition of Softcard/Isis as well as the partnership with the carriers that allows the app to be pre-installed on all the Android phones in the US across Verizon, T-Mobile, and AT&T including the Samsung devices. Android Pay has expanded to include loyalty rewards programs for merchants such as Walgreens and Coke. The company is focused on driving engagement and positive user experiences among the Android user base. We believe Samsung Pay and Android Pay can co-exist on the mobile devices as Samsung is using its Pay app as a way to enhance the user experience and drive incremental electronics sales with the inclusion of Android Pay only increasing the customer choice.

[Chase Pay leveraging large retail relationships](#)

Chase Pay officially launched in late November 2016 and with the prior MCX partnership has access to the large retailers with acceptance at 7,500



Starbucks locations and 1,400 Best Buy locations across the US, along with plans to roll out the solution across Phillips 66, Conoco, 76, Wal-Mart, ShopRite, The Fresh Grocer and Shell locations to name a few. Chase Pay will leverage the company position as the #1 card issuer and # acquirer in the US by volume with Chase volumes tripling over the past two years and expectations for the volumes to double in 2017 for penetrating the mobile payments market. Chase Pay offers no network fees, no acquiring fees, card present credit card rates and zero fraud liability, making it an attractive payment solution to the merchants. Chase Pay works with QR codes, which has the benefit of greater merchant acceptance over the NFC-based mobile payments and ability to integrate with the retailer's rewards/loyalty programs. We will continue to monitor Chase Pay's success as well as the company's ability to disrupt the merchant acquiring landscape.

Amazon Payments leveraging platform-based approach

Amazon is leveraging a platform-based approach for penetrating mobile payments, focusing on the check-in to create a seamless check-out experience. The company's platform includes its online marketplace as well as other solutions geared toward solving needs in the market. Pay with Amazon has had 33m customers using the service since 2013 for making a purchase, which represents significant traction, given its short existence (roughly half the customers are members of Amazon Prime). Although the company has not disclosed the merchants, which accept the services, according to Digital Transactions this has more than quadrupled over the past two years. Amazon has the ability to collect important data including not just the payment credentials during the check-in process, but also the shipping address and shopping behaviors. Pay with Amazon has been used across 170 countries with ~32% of transactions completed on mobile. The payment volume nearly doubled in 2016, and the company launched its Global Partner Program for developers and web designers. Amazon Payments business is also looking to disrupt the typical retail experience through Amazon Go, which is a new store allowing customers to scan their mobile device on the way in while completely skipping the lines and checkout on the way out. Amazon announced this week an integration with eCommerce platform BigCommerce for Amazon Pay supporting over 50k eCommerce merchants. Amazon is also rolling out Amazon bookstores (five so far) where users can use a smartphone to scan quick response codes to get information on books.

Alipay driving its lifestyle app

Alipay has had significant success in the Chinese market, given that Alibaba Marketplace spun off from the company in 2011. Alipay is arguably ahead of the mobile payment players in the US in terms of functionality with the ability to manage bills, investment accounts, receive credit for purchase, etc. However, it is geared only toward the Chinese consumer today. Alipay is looking for acceptance in the US and globally for purposes of allowing the Chinese consumer to travel abroad. Alipay uses QR codes, which are less expensive in terms of technology upgrade and more widely accepted than NFC-based payments. Alipay has ~450m active accounts, well above PayPal's +200m, in addition to ~185m PayTM users.

Other notable recent pay app launches

Wells Fargo Pay and Capital One Pay were recently launched while IBM Pay was announced at the Money 2020 conference in 2016 as a white-label retailer solution. Additional retailers are following Wal-Mart Pay's lead as Kohl's Pay was recently announced and is only focused on Kohl's private label card



Charge leveraging 25m active cardholders (60% of card store purchases). UnionPay also launched its QuickPass app, CUP's competing service to Alipay and Tenpay in China, and is attempting to gain traction.

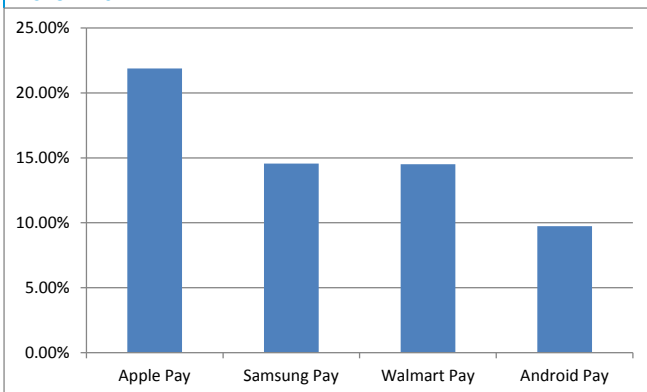
Mobile wallet adoption across key players

PYMNTS/Infoscout conducted a large survey of 7,655 thousand consumers with the ability to make a mobile payment transaction, with 40% highlighting satisfaction with their current payment method, namely plastic credit and debit cards.

In addition, according to PYMNTS/Infoscout, the in-store adoption overall for mobile payments has been lackluster (we believe online and in-app hold more promise), with new adoption rates dwindling and in case of Apple Pay even declining.

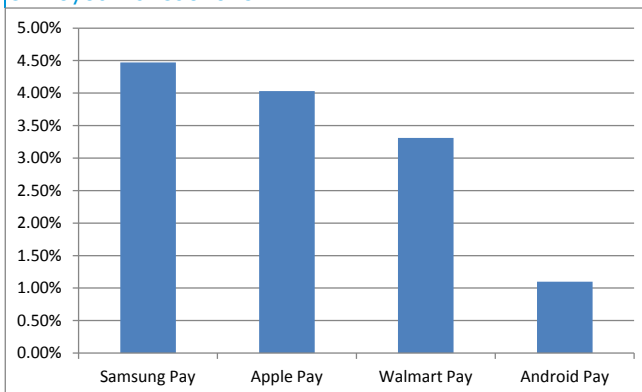
Less than one in 20 consumers who have one of the main wallets – namely Apple Pay, Samsung Pay, and Android Pay – use it when possible. Apple Pay has showed the best adoption rate at 21.9% compared to Samsung Pay at 14.6%, Wal-Mart Pay at 14.5%, and Android pay at 9.7%. However, Apple Pay has been in the market the longest. In addition, in terms of actual usage, Samsung Pay is the leader by a small amount, potentially due to the better merchant acceptance through the MST technology and the new rewards program. Wal-Mart Pay data from PYMNTS/Infoscout show a lead building when looking at the app in the same time of its lifecycle.

Figure 19: Have you ever tried these mobile wallets?
 March 2017



Source: PYMNTS/InfoScout

Figure 20: Have you used the mobile wallet for the surveyed transactions?



Source: PYMNTS/InfoScout

Importantly, we believe the consumer adoption will come from areas such as incentives and rewards where Samsung Pay is arguably leading the charge with its latest reward program rollout.

In addition, mobile payments for orders ahead have gained significant traction with players such as Starbucks being the best example, as it solves the consumer problem of waiting in line, similar to ridesharing or paying at the pump.



Partnerships key to adoption

Consumers and merchants both need a value proposition to transact and accept mobile payments, as their current electronic payment methods, namely credit and debit cards, are working well. In addition, consumers want an all-in-one solution where their payment credentials, transactions and history, rewards/offers, and other features/functionality such as money transfer can be accessed easily, securely, and effortlessly – not an unmanageable number of mobile wallets without connectivity to each other. However, many of the mobile wallet providers, such as retailers, are building their own secluded solution and even disabling the ability for competing wallets to be used in their stores. For example, although Target was one of the first retailers to accept Apple Pay within its iOS mobile application, the company has no intention of accepting Apple Pay or any other mobile wallet in store as Target is working on rolling out its own in-store mobile payments through its mobile app. This is expected to be introduced later this year, similar to Wal-Mart's strategy with Wal-Mart Pay. Understandably, the retailers want to control the data and consumer experience and have the ability to do that in their stores, unlike for instance the banks and technology companies, which are also launching their own mobile wallets, but have more incentive to partner. We expect to see more partnerships going forward and believe this will be key to driving overall mobile payment adoption.

For example, JPMorgan Chase with its Chase Pay is actively partnering with retailers and technology companies such as recent partnership announcements including Level Up, which allows Chase Pay users the ability to order ahead at thousands of restaurants. The Level Up merchants are able to drive customer engagement across a large base of customers with targeted offers, which for example create value to both the merchants and consumers. Chase Pay had also previously partnered with large retailers and restaurants including Best Buy (1,400 locations) and Starbucks (7,500 locations). Chase uses its large array of customer data to analyze customer buying habits and identify potential partnerships with the most opportunity. In 2017, Chase expects to partner with fuel stations such as Shell. We believe the partnership strategy will prevail as one that provides the most value to both the merchant and the customer, helping drive adoption of mobile payments.

Expansion of loyalty rewards and offers

One of the key value proposition tools to drive mobile payment adoption among consumers is the expansion of loyalty, rewards, coupons, and targeted offers. These initiatives increase customer engagement, drive repeat visits to the store or site, and overall drive volumes and ticket sizes, which benefit the merchants. Starbucks is the most widely used example in mobile payments for a rewards program that has driven significant success and adoption of mobile payments. The company has the most widely used digital payment app in the US with over 10m users. Samsung Pay has a new rewards program; in January 2017 it said that Samsung Pay transactions nearly doubled since Samsung Rewards was introduced six weeks earlier. The Samsung Rewards program allows users the ability to rack up points for purchases using Samsung Pay, which are redeemable for Samsung products – a win-win-win for consumers, merchants, and Samsung. We believe programs such as this will be key for driving the next leg of the mobile payment adoption. Apple Pay is leveraging Blackhawk Network to integrate gift cards, e-gifts, loyalty and



rewards programs. Apple Pay is able to house store-branded cards such as BJ's, Kohl's and JC Penney, as well as the loyalty cards from places such as Dunkin Donuts and Walgreens. The store-branded cards provide the customers with rewards such as cash-back on purchases and free shipping such as with Target's Redcard, and the retailers benefit as the cards are typically cheaper to process.

Expanding layers in the mobile payment stack

Mobile wallets have several key layers, which have an important function. Hardware companies such as Apple and Samsung provide the mobile device while operating systems such as iOS and Android run the software and applications. In addition to these two fundamental layers, applications such as Uber sit on top while mobile wallets help to facilitate the payment functionality by accessing the customer's designated funding source, whether it is a bank account, credit/debit card, or a unique funding source such as with PayPal's Balance. Importantly, we believe there could be opportunities in mobile payments to add incremental layers with strong value propositions such as a layer for financing, which consolidates card payments and/or comparative services, which help optimize costs across vendors.

For example, Goldman Sachs has introduced a new online platform that offers unsecured personal loans to consumers called Marcus by Goldman Sachs. The company offers no-fee personal loans of up to \$30k for periods of 2-6 years, allowing consumers an easy way to manage their credit card bills and potentially save on interest. Marcus offers fixed rates, no hidden fees, flexible payment dates, and US-based dedicated loan specialists. This is one example of a potential layer that can be housed on mobile devices.

Merchant acceptance

Benefits of accepting mobile payment for merchants

Although the consumer usage of mobile payment today is relatively low and hence the value proposition for merchants to accept mobile payments is low, we believe that as adoption grows, merchants that accept mobile payment could materially benefit from higher volumes. This is especially true for merchants that deploy loyalty, rewards, coupons, and targeted offers into the mobile payment experience, which can further help propel volumes and increase the ticket sizes. However, these are just some of the long-term benefits that merchants can achieve through accepting mobile payments.

Another important benefit is the potential to reduce costs through things such as order ahead, where the customer and merchant employee interaction is reduced. Merchants can also lower fraud costs as well as processing costs through acceptance of mobile payments. Mobile payments also have the ability at the POS to move customers through the checkout lines more quickly, helping reduce the friction and employee costs. However, most importantly, we believe is the potential to increase consumer engagement by providing new experiences and conveniences.

According to a recent survey by Square, accepting mobile payments can help to increase sales. Most of the survey respondents indicated a likelihood to actually seek out stores that accept mobile payment technology, and the



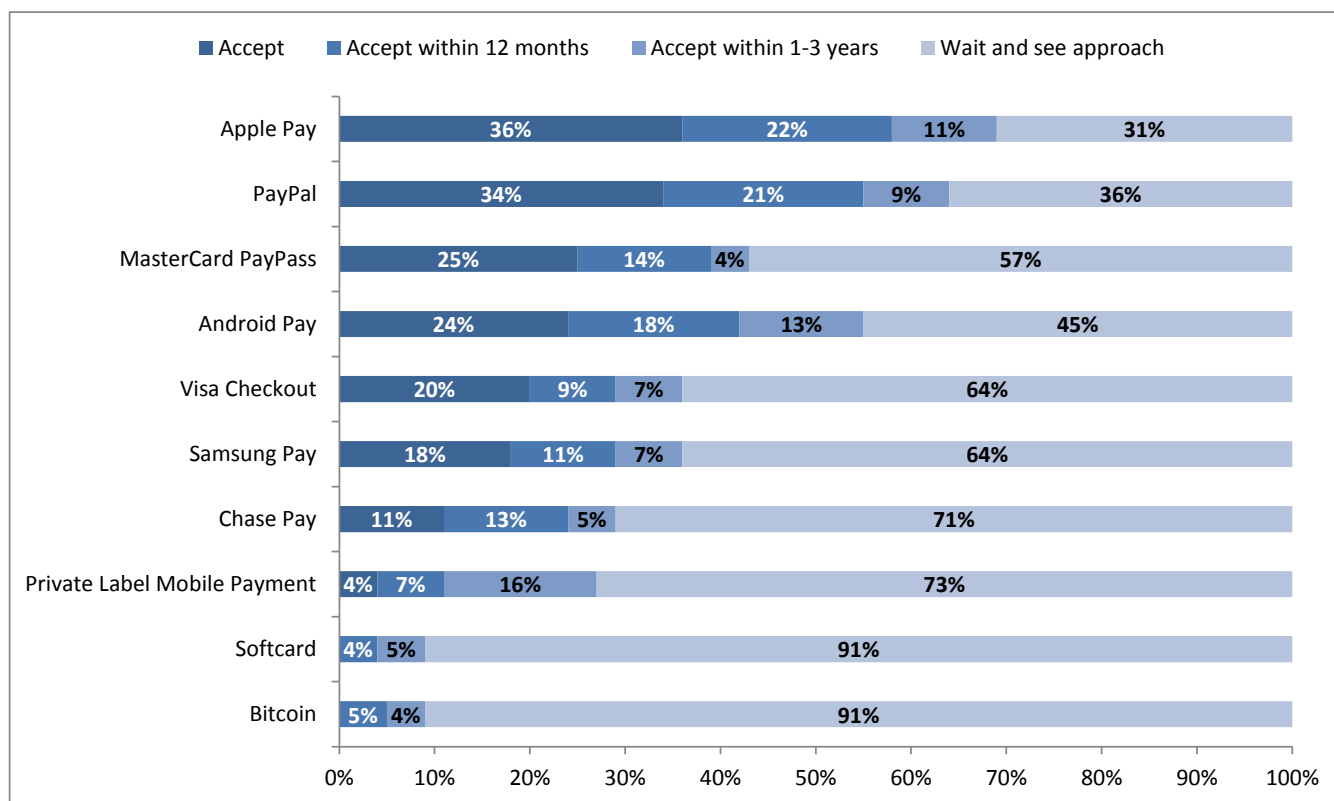
majority say that they usually spend more and tip more when they use mobile wallets to pay.

Merchant adoption of mobile wallets by provider

Roughly 24% of respondents in a Boston Retail Partners survey of the top 500 North American retailers said that they accept mobile payments, with 9% of those surveyed using digital coupons or promotions and another 7% using a digital loyalty program. Importantly, just 11% of retailers surveyed had no interest in accepting mobile payments, with the remaining 65% of respondents representing a greenfield opportunity to expand the acceptance.

Apple Pay is the most adopted mobile payment service in North America, per the survey published in February by Boston Retail Partners. Roughly 36% of the top-500 North American retailers currently accept Apple Pay, up from 16% last year, with an additional 33% planning to accept it within three years. Comparatively, PayPal is accepted at 34% of retailers with 30% planning on accepting it in three years, MasterCard PayPass is accepted at 25% currently, with 18% of the merchants planning to accept it in three years, and Android Pay is currently accepted at 24% of retailers, with 31% planning on adding it.

Figure 21: Acceptance of mobile payments by wallet provider



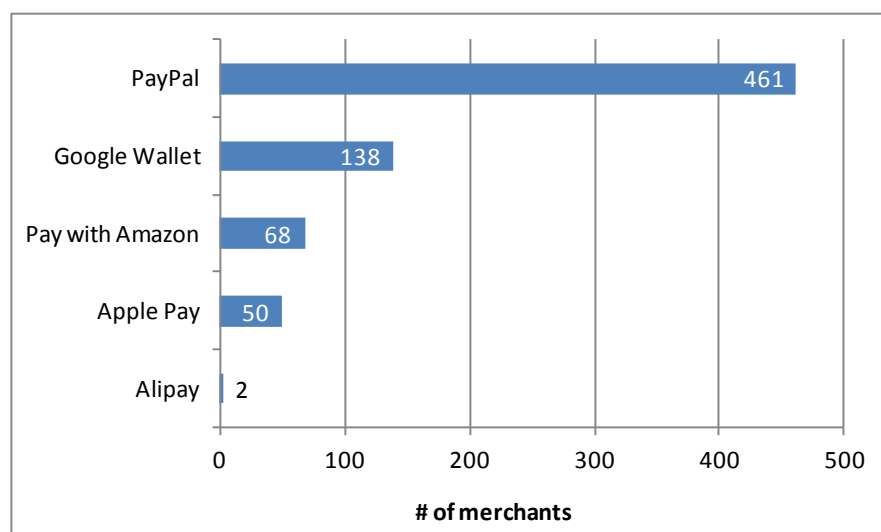
Source: Boston Retail Group

PayPal leading North America online merchant acceptance

PayPal dominates acceptance in North America as 461 of the top 1k online merchants in the region accept it, per Internet Retailer. In comparison, Google Wallet is accepted at 138 retailers while Pay with Amazon is accepted at 67 followed by Apple Pay at 50 and Alipay at just two of the top 1k.



Figure 22: Payment options acceptance by top 1k retailers



Source: Internet Retailer 2016 Top 1,000 Guide

In addition, PayPal is the most well-known alternative payment method in the US with strong brand awareness in Europe as well as emerging markets such as India and Brazil, which represent significant opportunities. However, Alipay and WeChat have a stronger foothold in China, although PYPL competes on cross-border transactions. Alipay has 450m consumers, given its significant presence in China. PayPal in comparison has +200m and Pay with Amazon has 33m. Using its cloud in Southeast Asia, Alipay has been adopted by 232 merchants, as noted in the Internet Retailer 2016 Asia 500 guide.

Consumer engagement

Consumer behavior takes time to change, and switching from traditional payment methods, namely credit and debit cards, to mobile payments is no different. We have seen a slow uptick in the consumer adoption of mobile payments; however, the shift is likely to accelerate as consumers become more aware of the convenience and security benefits.

Security has been one of the deterrents to the adoption of mobile payments by consumers, due to the skepticism and unawareness of the significant security benefits. Mobile payments tend to be the most secure type of payment, given they typically use NFC technology for the in-store transactions with the mobile payments, utilizing sophisticated security layers such as tokenization and cryptograms as well as biometric authentication through fingerprint identification technology. Security benefits include some of the following:

- Lost or stolen mobile phones require a password or biometric authentication to access the phone
- Tokenization is used for mobile payment, which replaces sensitive payment credentials with a unique identification number essentially useless to fraudsters

In a recent Square survey, 77% of respondents cited not adopting mobile wallets namely Apple Pay, Android Pay, or Samsung pay due to security concerns as the main reason. Respondents who use NFC-based mobile



payments say that it is their ideal payment method compared to credit cards. NFC adoption rates are as high as 45% among millennials (age 18-34) and 26% among non-millennials (age 35+). The main reasons cited for continued use of mobile payments is convenience, security, speed and utility as a backup wallet.

Innovation reducing friction and enhancing engagement

QueueHop mobile self checkout startup

At Shoptalk 2017, we heard from QueueHop, which offers a mobile self checkout solution with anti-theft tagging for in-store use; it was launched at nearly the same time as Amazon Go. The offering is a scalable solution for any merchant and has been launched across 11 retailers including Rebecca Minkoff, which presented later in the day and highlighted the solution's success especially among millennials. QueueHop has a proprietary tagging system for products in the store and allows users to skip the traditional checkout for a self checkout option, where they pay for the goods on mobile and the tags are released. The solution helps drive merchant revenues by decreasing abandonment and charges on a transaction basis. The tagging solution is also automated, helping save 90% of traditional tagging time.

Visa commerce solutions enabling merchant growth

Visa Commerce Network provided a demo of its card-linked technology for the first time at Shoptalk. Millions of customers participate in reward programs and Visa is connecting merchants in mutually beneficial ways by allowing for consumer rewards to be earned at multiple merchant locations. Real-time credits are rewarded to the consumer with email and push notifications. Visa had partnered with Uber where the riders were able to earn Uber ride rewards on purchases across multiple merchants, for example. In addition, Visa provides merchants with valuable insights into consumer behavior by leveraging its massive network of data across merchants and consumers globally.

Google Assistant driving customer engagement

Google showcased Google Assistant at Shoptalk, which is creating new ways to engage customers and improve their daily lives. Importantly, Google Assistant drives more personal experiences and is similar to Amazon's Alexa, which leverages Amazon Pay for voice-enabled transactions focusing on the check-in to drive invisible checkout. Google Assistant is envisioned to provide this type of functionality in the future likely through its Android Pay. We believe voice-enabled payments have the potential to gain traction, particularly in certain use cases such as for goods that need to be regularly replenished and do not need visual decision-making. Google Assistant has the potential to also provide information on products through voice and can help consumers locate nearby stores through Google Home transferring directions to their Android device.

Chain introduces Brandcoin for merchant loyalty/reward programs

At Shoptalk, Chain announced a new blockchain network for merchant-issued digital currencies. Chain has partnered with players such as Visa and Nasdaq for creating secure financial solutions replacing old centralized systems with its de-centralized solutions. Brands and retailers issue financial assets in the form of loyalty and reward points, and the systems which track these are siloed. Chain has used the blockchain to re-imagine loyalty/reward programs and



introduced its concept called Brandcoin. The company's vision is to put all merchant currencies into the same format. Brandcoin allows for rewards to be spent across multiple merchants. Once the reward points are earned, the Brandcoin app shows the spending power in dollars, which varies depending on the merchant redeeming the points. Merchants that want to acquire new customers can provide higher dollar-based rewards per point, while the merchants that issue the rewards are able to offer their customers a better rewards program, helping drive initial spend in their stores to earn rewards. The technology utilizes QR codes, but can be adapted for any mobile payment technology. Chain is testing the solution in the market with multiple merchants to gauge demand.

[DocuSign partnering with mobile players](#)

DocuSign is a global e-Signature and digital transaction management company which saves businesses time and resources with the ability to collect payments and signatures in one simplified step. DocuSign partnered with Stripe, enabling users to pay using Android Pay, Apple Pay, and major credit cards. The company plans to continue integrating with new partners such as Authorize.Net, Braintree, and PayPal. In addition, ACH payments as well as recurring payments and other features/functionality are expected to be launched this year.

[V and MA vying to be at the top of every mobile wallet](#)

VDEP and MDES, the networks' respective token services, enable the company to be embedded into any mobile wallet application so that the provider can begin accepting V/MA payments. Visa and MasterCard want to be at the top over every mobile wallet as a form factor for the mobile payments. Visa and MasterCard are also gaining traction with their online checkout solutions Visa Checkout and MasterPass.

Visa Checkout now has +20m consumer in over 23 countries and 1.5k FI partners, up from 15m consumers in 21 countries and ~1.4k FIs in 4Q16, with +300k online merchants now representing over \$173bn in addressable volume. MasterPass added five markets in 2016 for a total of 34 and added 80k merchants for the year with a total of 340k for online and in-app, as well as more than 6m locations in about 80 countries for contactless payments. It continues to make progress on digital enablement with MA Send for the marketplace economy/commercial payments and digital partnerships with leading wallet providers.

Importantly, Visa and MasterCard are the rails for mobile payments with Visa Checkout and MasterPass, making it easy for consumers to sign up and complete purchases on mobile devices. The companies are opening the offerings to clients and partners for integrating their digital wallets. MasterCard cardholders will be able to use Microsoft Wallet, Samsung Pay or Android Pay for online transactions utilizing MasterPass, beginning in 2017. The issuers as well as the digital wallet and payment app providers will be able to access a streamlined set of APIs to easily integrate Visa Checkout. Players such as Android Pay will take advantage of the new open platform offering Visa Checkout to customers for online purchases.

At the recent 2017 Mobile World Congress (MWC), Visa announced its mVisa services using QR codes, which went live in India, Kenya, and Rwanda with



plans for a rollout in Egypt, Pakistan and other developing countries. mVisa helps to accelerate the shift to mobile payments across developing countries, given the significant presence of mobile phone infrastructure. The QR codes are ideal for developing countries, given no incremental investment is needed at the register for upgrading to new technologies such as NFC. In India, mVisa will allow for in-home purchases from the Tata Sky wireless services provider and in Mumbai for paying heating gas bills from Mahanagar Gas. The services support card accounts issued by Visa and MasterCard as well as RuPay Credit Card in India, with support expected for American Express. We expect material traction, particularly in regions such as India, given the recent demonetization by the government.

MasterCard also announced a partnership with Oracle at the MWC in 2017 for streamlining digital payments for stores and restaurants. The partnership will help to expand Oqr! With MasterPass, which is an order and pay ahead application across mobile devices.

The key benefits from the PYPL deal for V/MA are customer choice, maintaining brand presence, increased volumes through the elimination of steering, and access to data. The PYPL partnerships present new opportunities for V/MA to expand their eCommerce penetration, accelerate cross-border growth, and increase volumes as PYPL's ACH transactions move toward card. Visa Checkout and MasterPass will be incorporated into the Braintree SDK in early 2017, allowing merchants to integrate with these payment methods, which should help improve acceptance.

PayPal the clear leader in mobile payments

According to a recent Forrester Research study, PYPL remains the most widely used digital wallet (we believe the study excludes Chinese third-party wallet providers) and is used 5x more than competing checkout options, given its brand name and consumer trust.

In comparison to Amazon's payments business, which most recently announced 33m customers, PayPal's user base is significantly larger, at +200m active customer and merchant accounts as of Feb 2017.

In addition, Mobile accounted for one-third of PayPal's overall payment volume in 4Q16. The company processed 6.1bn payment transactions in 2016 (24% Y/Y), representing a total payment volume (TPV) of \$354bn with over \$100bn from mobile volume, growing at 55% Y/Y. More than half of PayPal's active account base transacted on the PayPal platform using a mobile device over the past 12 months. PayPal is focused on building a platform of services and becoming a payment partner of choice for the merchants globally, capturing the shift to multi-channel retail experience centered on the mobile phone.

One Touch, now available to +5m merchants, 75% of the internet retailer 500, and +40m consumers, has been a strong engagement tool due to the convenience for the consumer and decreased shopping cart abandonment for the merchants. Importantly, One Touch is mobile-driven as the traditional checkout pain points, namely entering credentials on a small screen, is replaced with a simple, secure, and fast checkout.



PayPal purchased Paydiant for white-labeling the mobile wallets. Paydiant licenses its technology platform to banks and retailers for creation of their own branded mobile wallets. The acquisition of Paydiant is important as it provides PayPal the ability to become the more widely accepted payment method across the mobile payment applications.

PayPal has a full suite of value-add solutions at its disposal to drive increased customer engagement including Xoom online money transfer and Venmo. The Venmo volume is now approaching \$20bn annually, and the company is in the process of rolling out Pay with Venmo to monetize the significant Venmo user base, which is primarily mobile.

The Braintree V.zero platform is a key differentiator for PayPal, which has allowed for the tremendous speed in deployment of One Touch and enables new features and functionality to be deployed quickly with little to no incremental work from the merchant. The technology platform will be used to roll out Pay with Venmo.

The recent V/MA deals have allowed PayPal to deploy customer choice initiatives, which should help increase engagement while also allowing for partnership with players in the ecosystem, namely the issuers. PYPL gains access to in-store contactless payments with the deal as well as the tokens. PYPL recently signed deals with Citi and FIS as well as Discover. The Discover partnership allows the PayPal Wallet to be closely linked to the Discover cardholders, acquirers, and merchants. PayPal customers with a linked Discover card have access to purchases online, in-app and in-store at contactless locations across the US. In addition, Discover Cash Back Bonus rewards will now be available for use in the PYPL wallet for online purchases. PYPL expects rewards points to become another funding source for customers. At the end of 2015, Discover had 52.7m credit cards outstanding in the US (~8.7% of total), per the Nilson Report.

Apple Pay gaining traction through global expansion

Apple Pay uses NFC technology for in-store payments, which require contactless capabilities and is available online in the Safari browser as well as in-app. Apple Pay now supports most of the major credit and debit cards from nearly all of the US banks. In addition, at the Code Commerce conference in San Francisco in late 2016, the company highlighted that Apple Pay is now accepted at 35% of retailers representing 4m locations, which is significantly higher than the 4% at launch over two years ago.

On its 1Q17 earnings call held on January 31, 2017, Apple Pay was highlighted as having tripled its user base over the prior year, with hundreds of millions of transactions and billions of dollars in purchases in the December quarter alone. Transaction volume grew 500% Y/Y, but was primarily driven by expansion into new countries including Japan, Russia, New Zealand, and Spain; the total now stands at 14 markets globally.

Apple Pay on the Web is performing well and will likely be a key driver of growth along with in-app payments. There are now ~2m small businesses accepting invoice payments with Apple Pay on the Web through Intuit QuickBooks Online, FreshBooks, and other billing solutions, which are partners of Apple Pay. The Services segment revenues in 4Q16, which include Apple



Pay, Apple Music and the iOS App Store, grew 18% Y/Y to \$7.17bn. In addition, Apple announced that Comcast customers will be able to pay their monthly bill in a single touch with Apple Pay.

According to Boston Retail Partners, Apple Pay boasts the highest merchant support (from the top-500 retailers in North America) among all mobile wallets in the market. It is accepted at 36% of the merchants, 22% plan to adopt it in the next 12 months, and another 11% plan to adopt it in one-to-three years.

Apple Pay uses NFC for mobile payments at the physical POS and uses tokenization to protect the sensitive payment credentials. Apple Pay does not share the data and uses Touch ID biometric authentication for transactions. Apple Watch Wrist Detect must be enabled for transactions being made with the watch, meaning each time the watch is taken off a password is required to activate the watch again. For online or in-app payments, Apple Pay receives the encrypted transaction and re-encrypts it with a developer-specific key before the transaction information is sent to the developer or payment processor. This allows the app or website to access the encrypted payment information.

Apple Pay users can receive rewards from their cards when using them for purchases. Apple Pay has partnered with Blackhawk for integrating gift cards, e-gifts, loyalty and rewards programs and is available to multiple store-branded cards (BJ's, Kohl's, Ulta, Meijer and JC Penney) as well as loyalty cards (Dunkin Donuts, Walgreens, Coke, Kohl's and soon Panera).

Urban Airship Reach will support enhanced rewards experiences with Apple Pay by wrapping loyalty rewards with business support and allowing merchants the ability to deploy rewards programs at the POS, on the web, or in-app. A recent survey by Urban Airship of 1k US and 1k UK adults shows that 82% of smartphone users are more likely to join a loyalty program if they had the option to join during the checkout process, without having to fill out forms, and 85% of survey respondents with a household income of over \$60k are more likely to join a loyalty program under the same circumstances. In addition, over 90% of iPhone consumers of age ranging 18-54 are likely to join with no forms needed to be filled out.

Apple Pay is accepted in ~14 markets including Australia, Canada, China/Hong Kong, France, Japan, New Zealand, Poland, Russia, Singapore, Spain, Switzerland, the UK, and the US, with Taiwan expected soon. Apple Pay recently teamed up with Square, whose sellers are able to take advantage of up to \$350 in transaction fees if they set up an Apple Pay compatible reader and the various marketing materials.

Samsung Pay leveraging unique technology and reward programs to drive acceptance/engagement

Samsung Pay is the most widely accepted mobile payment method in the market due to the technology called MST. In addition, Samsung has a significant mobile device universe as well, where the company can leverage the Internet of Payment Things (IoPT) in an ever-connected world, creating a strong position in the market, in our view. We believe Samsung Pay has a strong platform and is using mobile payments as a way to engage its customers, helping to drive incremental brand loyalty and device sales.



Magnetic Stripe Technology (MST) was obtained through the acquisition of LoopPay, which allows for mobile payments to be made at mag-stripe terminals. As a result of the unique technology, Samsung has coverage at 90%+ merchants globally in-store, with the final ~10% being delayed due to outdated software/firmware, with the gap likely to close over time.

Samsung Pay also allows for NFC-based mobile payments and has the ability to detect when a transaction is being made on an NFC-equipped terminal and will go the more secure route. NFC is still gaining traction in countries such as the US, which has been laggard in the EMV upgrade of terminals.

Globally, there has been a push for EMV and hence NFC will likely gain traction over time. Countries such as Canada for instance have nearly full adoption of EMV and NFC, while magnetic strip terminals have been decommissioned. Other countries in Europe and Australia for instance also have strong adoption of EMV and NFC-based terminals.

Samsung Pay has seen strong adoption in places such as Korea, given the small technology savvy-contained market where the Samsung brand is dominant and continues to expand into new countries. Samsung Pay is accepted in over ten countries such as the US, China, Brazil, Singapore, Thailand, Malaysia, and Korea, with two western European countries expected to be added this year among others with a focus first on the countries with the best bank and network coverage along with the ability to manage tokenized transactions.

In addition, Samsung Pay is just getting started online and in-app, and the company is rolling out unique loyalty/rewards programs to help drive engagement and the merchant value proposition.

Similar to the other mobile wallets, Samsung Pay leverages tokenization to protect the sensitive card credentials as well as biometric authentication. It does not share the data, while lost or stolen phones can be wiped of the Samsung Pay account. In addition, Samsung Knox adds incremental security by monitoring the phone and encrypting the card information in a separate and secure vault. Samsung has MST and NFC technology and takes the more secure route where possible.

Gift cards can be stored on Samsung Pay and can also be purchased on the app. In addition, Samsung Pay users can send or receive the gift cards through the app. Samsung Pay has partnered with Blackhawk for the integration of gift cards into the app. In addition, nearly any membership and rewards cards with a barcode can be stored on Samsung Pay, while targeted offers are also enabled, allowing for discounts and incentives to be pushed to the users as they shop. In addition, Samsung Pay with a new rewards program that allows users to accumulate points through every Samsung Pay transaction redeemable for Samsung products and/or gift cards. The rewards program is in addition to the rewards consumers would receive on their respective credit cards for purchases. Users of Samsung Pay are rewarded the more they use the app. For example, members get 1x points while silver status gets 2x points and requires five purchases per month. The gold status requires 20 purchases per month and users receive 3x points, while the platinum requires 30 purchases per month and users receive 4x points.



Samsung Pay currently supports +650 banks and credit unions and continues to partner with more. In addition, Samsung Pay is accepted in over ten countries. The company has partnered with MasterPass and Visa Checkout for online payment and express checkout. Samsung Pay is partnering with American Express for its launch in India, which is expected in 1H17 according to NFC World. After a pilot in October 2016, Samsung Pay is being rolled out across Thailand, helping to accelerate the electronic payment initiatives in the country.

Android Pay and Google Wallet partnering with major carriers

Google Wallet was introduced in 2011 and had limited success due to the carriers who previously owned the Softcard/Isis wallet in the US blocking use of the Secure Element and preventing the wallet from being installed on the hardware. Users of Google Wallet utilized it for features such as money transfer with a number of users still having their payment information stored. Google split the mobile payment and money management into two Apps: Android Pay (for mobile payments) and the new and improved Google Wallet (for money management). Android Pay handles all the in-store (utilizing NFC) and in-app purchases, while the new Google Wallet handles P2P money transfers.

Google acquired Softcard (formerly ISIS) from the carriers (Verizon, T-Mobile, and AT&T) and partnered with the carriers to pre-install Android Pay on phones in the US. The key reason why consumers adopt Android Pay is because the app comes pre-installed in the new phone across Verizon, T-Mobile and AT&T, even on Samsung devices. We believe Samsung Pay and Android Pay can coexist in this manner due to the alignment of interests. Samsung Pay just wants users to adopt its phones by adding incremental value and promoting Samsung Pay is a way to achieve this while also allowing customers choice of Android Pay.

Android Pay leverages NFC technology and can be used at millions of merchant locations globally where contactless payments are accepted similar to Apple Pay. Google recently launched Android Wear 2.0 and added support for the mobile payments; however, currently only the LG Watch Sport works with Android Pay. Android Pay is now available to users in the US, UK, Ireland, Poland, Singapore, Australia, Hong Kong, Japan and New Zealand and can be downloaded to supported devices that run on Android KitKat 4.4 or more recent versions. Android Pay does not charge fees and is an economically neutral platform driving engagement and positive experiences among the Android user base.

Android Pay uses tokenization similar to the other mobile wallets, helping increase the security of mobile payment transactions. Android Device Manager can be used to lock the phone when it is lost or stolen and secure it with a password or wipe out its personal data.

Android Pay allows for earning and redeeming loyalty points automatically, which is available for Walgreens Balance Rewards and Coke MyRewards cards. In addition, users can benefit from rewards earned on their cards when using Android Pay.



Android Pay recently partnered with Visa Checkout and MasterPass, allowing Android Pay users the ability to pay at thousands of new sites where these solutions are accepting. Android Pay now has the ability to link with MasterPass and Visa Checkout, which enables Android Pay users to checkout online where these services are offered using their already stored credentials with Android Pay.

Chase Pay leveraging large merchant relationships to gain a foothold

After a delay from its originally expected launched date in mid-2016, Chase Pay officially launched in late November 2016. JPM has gathered partnerships with multiple retailers with acceptance at 7,500 Starbucks locations and 1,400 Best Buy locations in the US and has plans to roll out the mobile wallet across Phillips 66, Conoco, 76, Wal-Mart, ShopRite, The Fresh Grocer and Shell locations. Wal-Mart will accept Chase Pay on Wal-Mart.com as well, as within Wal-Mart's mobile application and in-store through the Wal-Mart Pay application.

Chase recently announced in February 2017 that customers will soon be able to use Chase Pay with HMSHost, a leading food and beverage provider for travel venues (~2k restaurant locations in 80 NA airports and 99 motorway service centers, also partners with +300 traveler preferred brands), and Parkmobile, which enables payments for parking in cities around the country. The company also recently partnered with Atom Tickets, allowing customers to pay for tickets and pre-order concessions at +15k US screens in addition to movie-related merchandise. In December 2016, Chase announced a partnership with LevelUp to enable order ahead and purchases at thousands of quick services restaurants.

Chase Pay could gain its fair share of the mobile payment market, given its significant scale as a card issuer. Chase is the #1 card issuer in the US and the #1 acquirer in the US by volume. Chase volumes have nearly tripled over the past two years, and the company expects volumes to more than double in 2017.

In addition, Chase Pay offers no network fees, no acquiring fees, card-present credit card rates and zero fraud liability, which are key differentiators. Chase is likely to benefit from increased acceptance of Chase Pay, and we estimate Chase Pay charges a fixed flat fee for MCX merchants of ~\$0.10 for debit and \$0.30-\$0.30 for credit, depending on the volumes, which replaces interchange and is not tied to the transaction amount.

Chase Pay will be a separate app, integrating retailer rewards and loyalty programs and be QR code-based with plans for NFC capabilities in the future.

MCX is Chase's premier partner and consortium of large merchants, which decommissioned its own mobile wallet CurrenC last year after cutting nearly half its workforce and focusing on providing support to financial institutions such as Chase. MCX merchants such as Wal-Mart have developed their own mobile wallet apps, and Wal-Mart will also support Chase Pay.

Chase Pay volumes will ride on ChaseNet, which is the company's closed loop network licensing a version of Visa's VisaNet network (10-yr deal with Visa in



2013) essentially taking on the role of the acquirer, network, and issuer. Chase recently extended its relationship with Wal-Mart to process Chase Visa card transactions at 5k Wal-Mart and Sam's Club locations in the US and at Sam's Club ecommerce. Chase is spending \$3bn a year on forward-looking technology that includes the payment ecosystem as well as other areas including general ledgers, data sciences, and cloud.

Amazon Payments focused on resolving friction points

Amazon started its payment business in 2013 and is a formidable competitor to players such as PayPal, Apple Pay, Android Pay, and Samsung Pay. With VP of Payments Patrick Gauthier leading the charge, Amazon offers its payments platform to other merchants via an API plug-in or SDKs. The solution allows customers to login to their Amazon account and access its pre-loaded cards (stored with Amazon) to purchase goods at the merchant of choice. Pay with Amazon started off as the payments solution driving Amazon.com and the company, in February 2017 announced that over 33m of its customers have used Amazon Payments since 2013 to make a purchase, up from 23m reported in April 2016. Although Amazon has fewer customers than PayPal, the company has strong assets from which to compete with, primarily around credit card and shopping data. Pay with Amazon solves the merchant pain points for checkout by reducing friction most notably from filling out card credentials, shipping, and other information needed to make a purchase. It can also benefit numerous merchants from a check-in perspective in the same manner. Insurance companies, for example, can use the up-to-date information from Amazon's large user base for signing up new customers. Amazon also enables recurring payments through the data it stores.

In addition, with Pay with Amazon proliferating to other merchants, customers in over 170 countries (up from 150 in April 2016) used the payment solution with ~32% of transactions being completed on mobile. In August 2016, Gauthier in a media interview noted that cart conversion with Pay with Amazon is 70% (compared to PYPL's 87% and the industry average of ~44%).

Its payment volume nearly doubled in 2016 and the company launched its Global Partner Program—a partnership with developers and web designers to help them gain exposure to Amazon's merchant base and cross-sell Amazon Pay – in the US, Germany, UK and Japan through which 50 service providers signed in the first eight months (including Shopify, PrestaShop, and opencart). Along with core growth, Amazon Payments enabled support for additional verticals, namely government payments, travel, digital goods, insurance, and entertainment. As a result of these efforts, active merchants grew over 120% Y/Y in 2016. Furthermore, Amazon has enabled in-store use of Amazon Payments in its own stores, like Amazon Books, as well as in luxury retailer Moda Operandi. Important to Amazon's own flywheel effect, over 50% of Pay with Amazon customers are Prime members.

Amazon Pay economics are very similar to other payment solutions, charging a domestic processing fee of 2.9% and authorization fee of \$0.30. However, it also charges a cross-border fee of 3.9% (authorization fee still applies) and chargeback fee of \$20. On refunds, the authorization fee and dispute chargeback fee are non-refundable, although the processing fees are. Payments are disbursed daily to the merchant's bank account.



Alipay, the dominate force in China

Alipay, which was spun off from Alibaba in 2011, is the core payment platform for BABA and is the largest revenue generator for Ant Financial, a private company valued at nearly \$60bn (potentially going public this year per several media outlets). Alipay has a full suite and is a lifestyle app with all the user's information at one location. In our view, Alipay is ahead of the US mobile payments in terms of functionality with the ability to manage bills, investment accounts, receive credit for purchases, etc. Today, Alipay is built for the Chinese national consumer with no wallet for the US market. The company's goal is to provide Chinese consumers with all of their daily lifestyle needs, and the company is working to gain acceptance in markets such as the US for enabling payment capabilities with Alipay when the Chinese consumer travels abroad. Alipay utilizes QR codes, which are less expensive from a technology integration standpoint and are used across all devices with applications unlike NFC, which requires both an NFC-equipped mobile device and POS terminal.

Alipay can be accepted online via mobile or PC, in-app or in-browser, and also in-store. The company boasts an impressive 450m active accounts (including 185m PayTM users), which is over double the size of PYPL's active user base. iResearch estimates online third-party payment GMV in China reached ¥4trn (~\$580bn) in 1Q16 with Alipay having ~43.3% share (~\$251bn). On the Singles Day alone, China's equivalent of the Black Friday holiday season, Alipay processed over 1bn transactions for a GMV of \$17.8bn (+24% Y/Y), with 82% of the dollar value transacting over mobile. This compares to \$8.4bn (+17% Y/Y) of US eCommerce GMV, per Comscore, between Thanksgiving through Cyber Monday in 2016. In addition, ~70% of total users transact via mobile (either in-store or in-app/browser), while the remaining 30% transact via desktop.

Figure 23: Alipay Annual Single's Day GMV (\$bn)

	2016	2015	2014	2013	2012	2011
GMV	17.80	14.30	9.30	5.14	3.04	0.82
y/y growth	24%	54%	81%	69%	271%	N/A

Source: Company data, Deutsche Bank

Alipay primarily receives a take rate from transaction volumes, similar to PYPL. For online cross-border merchants transacting under ¥1mn monthly, the rate is 3% of the transaction volume with a tiered discount, as shown in Figure 24, applicable for higher volumes. Alipay also negotiates a lower rate for merchants with high volumes.

Figure 24: Alipay transaction fees

Monthly txn volume (RMB mn)	Fee (% of monthly txn volume)
<1	3.0%
1-3	2.5%
3-10	2.2%
>10	2.0%

Source: Company data



More recently, in October 2016, Alipay began charging customers for transferring their balance back to their bank account. The fee of 0.1% applies to transfers over \$3k. The company is also in the process of acquiring MoneyGram, a sign it is diversifying its revenue source. The traditional money transfer market provides the opportunity for disruption and the MoneyGram assets will likely be a part of this strategy. Alipay will likely work toward funding the wallet through money transfers globally.

For customers, Alipay offers privacy protection, 24/7 monitoring and security through PCI compliance as well as V/M/A verifications. It also offers 100% reimbursement for unauthorized transactions, a 90-day payment protection, with a timely response time (5 business days within filing a claim). For merchants, the payment solution allows for in-store or online payment acceptance as well as cross-border support with over ten currencies supported, including the USD, EUR, JPY, GBP, and HKD.

Alipay has several engagement tools to retain and onboard loyal customers. Customers can earn AliExpress Member Club points on transactions, leaving the order feedback/review, or even if orders are cancelled due to security reasons. These reward points determine the tier of benefits a customer receives (five tiers, ranging from A0 to A4) and is based on the aggregate points received in the trailing 365-day period. Rewards points anoint customers with an AliExpress member logo and provide them with additional services, namely price-cut notifications as well as expedited claims and refunds. Points can also be exchanged for products available on the BABA rewards site (similar to the Chase rewards program) or for a daily revolving balance of coupons. Customers can redeem coupons or discounts on BABA websites or with partner merchants, where applicable.

As discussed previously, Alipay got its start as the core payments platform for China's eCommerce giant Alibaba. Ant Financial, the parent company of Alipay, has several other business units, including wealth management, insurance services, online banking, and credit origination. In China, the company has pushed its offline presence with partnerships with Didi (equivalent of Uber) as well as grocery stores and department stores to enable mobile payments. In addition, the company is attempting to be a lifestyle app, with the ability to register for marriage licenses or order food from the platform. While the company's major market is still China, it is aggressively pursuing international expansion using partnerships with FDC and PAY, given these partners' understanding of local markets, which helps tailor Ant's go-to-market strategy. Introducing Alipay remains the focus in these markets, and the company believes its primary value proposition is introducing incremental Chinese customers to foreign merchants while marketing is another value-add service.

Other notable recent Pay app launches

Wells Fargo Pay through Android devices using NFC and Capital One Pay for NFC-enabled Apple or Android devices have recently launched in the market and are beginning to gain consumer interest. In addition, IBM Pay was recently announced at the Money 2020 conference in 2016 as a white-label retailer solution. IBM acquired Promontory Financial Group and is adding IBM Pay to its Watson Commerce unit. IBM is working to bring access to a gateway, tokenized vault, and marketing cloud analytics capability, while OmnyPay is bringing a retailer payment platform that integrates with loyalty and rewards.



In addition, more retailers are following Wal-Mart Pay's lead as Kohl's Pay was recently announced and is only focused on Kohl's private label card Charge, with its key differentiator being automatic integration with offers and rewards. Kohl's Pay is leveraging its 25m active cardholders (60% of card store purchases), is QR code-based and leverages OmnyPay.

UnionPay also launched its QuickPass app, CUP's competing service to Alipay and Tenpay in China, and is attempting to gain traction. While already available in several stores as a contactless payment service, it recently expanded to include Wanda properties, which includes several hundred of the developers' plazas, department stores, hotels, theme parks and partner merchants. In addition, CUP's subsidiary Shanghai Lianyin Investment acquired a portion of the Wanda Internet Technology Group, which includes its third-party payment app 99Bill. CUP can leverage its vast card user base, with which it processed ~33bn transactions in 2015 and \$1.9trn in volume while being available at, we believe, ~10m merchants in China.



Mobile Payments Working Toward Mainstream Acceptance

Enhancing the experiences and value proposition with mobile payments

The key to achieving mainstream mobile payment adoption is the value proposition with mobile payment players working to expand this through the introduction of gift cards, loyalty/rewards programs, and layering additional value-added services through a platform approach.

Mobile payment adoption nearing an inflection point

Mobile payment adoption is still in the early stages and continues to work toward ubiquity with several key drivers helping to achieve this goal namely the proliferation of connected devices, secular shift to electronic payments, POS terminal upgrades to EMV and NFC globally, international penetration, and importantly expansion of the value proposition. We view the value proposition as the most important driver of mainstream mobile payment adoption in the years to come. Mobile payment players, such as Apple Pay, Android Pay, and Samsung Pay, have expanded their value proposition to include gift cards in the wallets most notably through partnerships with the leading gift card network HAWK and have also started to introduce loyalty/reward program integration as well as their own rewards programs. Samsung Pay, for example, allows for rewards to be earned on each Samsung Pay transaction, which can be redeemed for Samsung merchandise and is on top of the rewards the user would receive from the merchant or their card issuer and we believe PYPL should similarly introduce its own reward program. As the merchant acceptance continues to growth and the value proposition expands, we expect mobile payment adoption to gain significant traction across online, in-app, and in-store.

EMV wave driving adoption of NFC-based mobile payments

Mobile payment adoption thus far has arguably been lackluster in-store partially due to the limited acceptance of technologies such as near field communication (NFC), while in-app and online have garnered better initial success. However, the EMV adoption wave in the US and globally is steadily driving greater merchant acceptance of NFC-based mobile payment and Apple Pay is now accepted at 35% of retailers, representing 4m locations, up from 4% at the launch roughly two years ago. Apple Pay tripled its user base over the past year with hundreds of millions of transactions and billions of dollars in purchases for the December 2017 quarter alone, with transaction volume growing 500% Y/Y. However, the growth has been primarily driven by expansion into new countries including Japan, Russia, New Zealand, and Spain now having 13 markets globally while the repeat usage continues to be relatively low. We believe that the introduction of loyalty/rewards as well as other value-added services through a platform-based approach could drive significant repeat usage in the years to come. The wallet needs to become a one-stop shop for all the financial services and we believe PYPL is well-



positioned given its suite of solutions. Further, the potential to expand the stack exists, such as Goldman Sachs, which introduced a new online platform offering unsecured personal loans to consumer called Marcus by Goldman Sachs for managing credit card bills and potentially save on interest.

PayPal a clear leader in merchant acceptance

Roughly 24% of the top 500 NA retailers accept mobile payments, with 9% using digital coupons/promotions and 7% using a digital loyalty program and only 11% of the retailers have no interest in accepting mobile payments, according to a recent Boston Retail Partners survey. Apple Pay and PayPal are the most widely adopted mobile payment services in NA with ~36% and ~34% acceptance across the top retailers. However, in the online space, only across North America, PayPal is the clear leader with 461 of the top 1k online merchants accepting PayPal and the closest competitor is Google at 138 merchants. Alipay and WeChat have a stronger foothold in China though PYPL competes on cross-border transactions. Alipay has 450m consumers given its significant presence in China. PayPal in comparison has +200m and Pay with Amazon has 33m.

Projecting the future of mobile payment growth

The fastest-growing segment in eCommerce has been mobile, which represents 26% of the total online sales and 1.2% of the total retail sales, growing +56% Y/Y to \$88.5bn in volume last year. mCommerce is expected to grow at a +22% CAGR through 2020, reaching \$242bn in volume and representing 41% of total online sales as well as ~4.5% of total retail sales, as per eMarketer. Proximity mobile payments are also gaining traction with ~38.4m Americans aged 14 and over using a mobile phone for at least one in-store transaction over the past six months, representing ~19.4% of the smartphone users across the US and is expected to reach 33.1% by 2020, per eMarketer. In addition, Proximity mobile payment transactions were expected to grow ~183.3% in 2016 to \$27.67m doubling to \$52.49bn in 2017 and reaching \$314.13bn by 2020. The majority of proximity mobile payment users today are in the 25-34 year age group, accounting for 31% of the total in 2016, equating to ~11.9m people. By 2020, the number is expected to reach ~21m, though the share is expected to decrease to 27.8% as older folks more quickly adopt mobile payments.

Key drivers of future mobile payments growth

The payments industry continues to see a secular shift toward mobile, driven by the proliferation of mobile devices around the world and financial technology companies, banks, retailers, etc., pushing for new form factors to engage customers. Although the mobile payment adoption is still in the early stages, we believe that there are several key drivers of future growth for mobile payments from secular trends such as cash/check to electronic, increasing usage of mobile devices and expansion of connected devices, growth in physical terminal acceptance capabilities, and increased value proposition across the ecosystem. Key future growth drivers include:

- **Proliferation of connected devices:** mobile phones, watches, tablets, and other
- **Secular shift to electronic payments:** Underpins the potential growth for digital payments



- **Payment terminal upgrades:** EMV shift driving mobile payment acceptance, such as NFC technology
- **Penetration of new market:** New markets internationally to fuel overall growth and global awareness
- **Expansion of the value proposition:** Through digital loyalty, rewards, coupons and targeted offers

We continue to view Visa and MasterCard as well as PayPal as the best way to play the mobile payments wave. Visa and MasterCard are the rails for mobile payments and have developed the token platforms while also diligently working to stay ahead of new payment technologies in an ever-connected world of devices. PayPal is the dominant player in mobile payments, with one-third of its volumes coming from mobile and having developed a strong suite of solutions through its platform-based approach for driving engagement while also partnering with the networks for capturing the in-store opportunity and opening up relationships with the issuers to drive incremental volumes. We also believe that Square is well-positioned with its mobile-centric payment solutions for small merchants in the US and latest EMV chip card and NFC readers along with a full suite of other value-add solutions catered to the meet the many demanding needs of its sellers. In addition, the traditional acquirers, such as Global Payments, Vantiv, and First Data, are beneficiaries of the secular shift to electronic payments, propelled by mobile payment adoption. We will continue to monitor the rapidly changing landscape going forward, and expect strong growth in mobile payments for the foreseeable future as well as a continued shift toward platform-based approaches in the market place coupled with payments at the checkout becoming near invisible and frictionless.

Secular shift to electronic payments

Around the globe, the shift from cash/check to electronic payments continues to unfold creating significant opportunity for a multitude of players in the payments industry. One particular event that has been closely monitored is the recent demonetization in India, which is helping accelerate the shift to electronic payments in the country. Other countries globally are also increasing the use of electronic payments through various fiscalization initiatives and security initiatives such as with EMV in Japan ahead of the Olympics.

Demonetization in India

On 8 November 2016 India's Prime Minister Narendra Modi announced that on all 500 and 1,000 rupee notes, which accounted for 86% of the currency in circulation, would cease to become legal tender. The purpose of the demonetization efforts is to decrease the usage of cash for illegal purposes, digitize the economy, and importantly, help to increase the taxability of income and the exchange of value for goods and services. As part of the plan, the currency taken out of circulation was to be replaced by new 500 and 2,000 denomination notes, but would be slowly circulated. Prior to this initiative, ~95% of all transactions in India were made with cash and 90% of merchants had only the ability to accept cash. In addition, 85% of employees were paid only with cash and half of the population was without a bank account. The residents in India were given 50 days to redeem the banknotes and the redemption period ended on 30 December 2016.



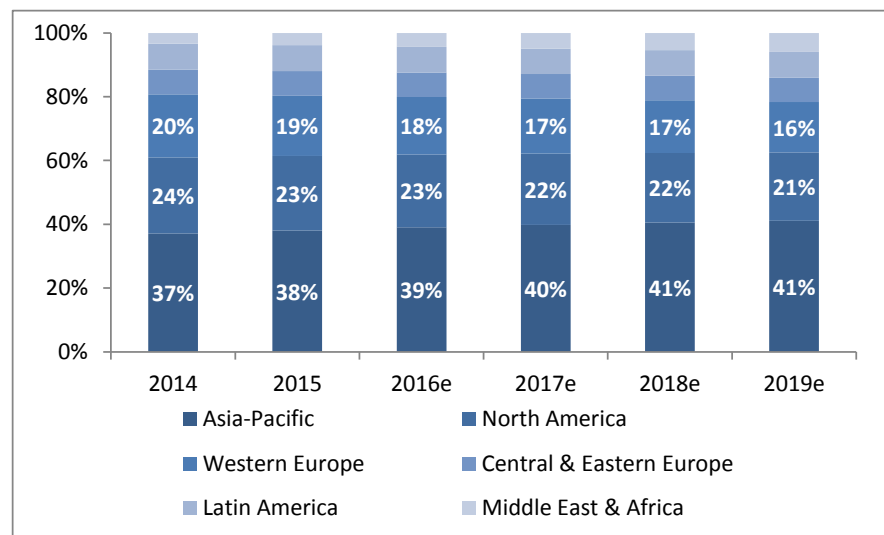
Visa reported a 75% increase in payment volumes with transactions growth +2x from the demonetization efforts on its 1Q17 earnings call while MA also reported similar 75% increase in purchase volume, which is expected to continue ramping as the government initiatives drive acceptance. The state-run banks as well as several private players agreed to waive transaction charges on debit cards until 31 December 2016 while providers such as the National payments Corporation of India waived the switching fees and Visa/MasterCard waived the surcharge on debit cards. The secular shift to electronic payments bodes well for the networks along with the adoption of mobile payments given the proliferation of mobile phones in the country.

Forecasting the mobile payments addressable market

Retail sales growth projections

Worldwide retail sales grew 5.5% Y/Y in 2015, per eMarketer and are expected to grow at a 4-yr CAGR of 5.5% driven by 21% growth in eCommerce offset by 4% growth in other sales. By region, eMarketer forecasts that the Asia Pacific region will have the largest amount of spend (up to 41% by 2019 vs. 38% in 2015). North America is the second largest region, though share is expected to decline to 21% in 2019 from 23% in 2015. The third largest region is Western Europe, expected to account for ~16% of the retail sales share in 2019.

Figure 25: Retail sales by region (2014-2019E)



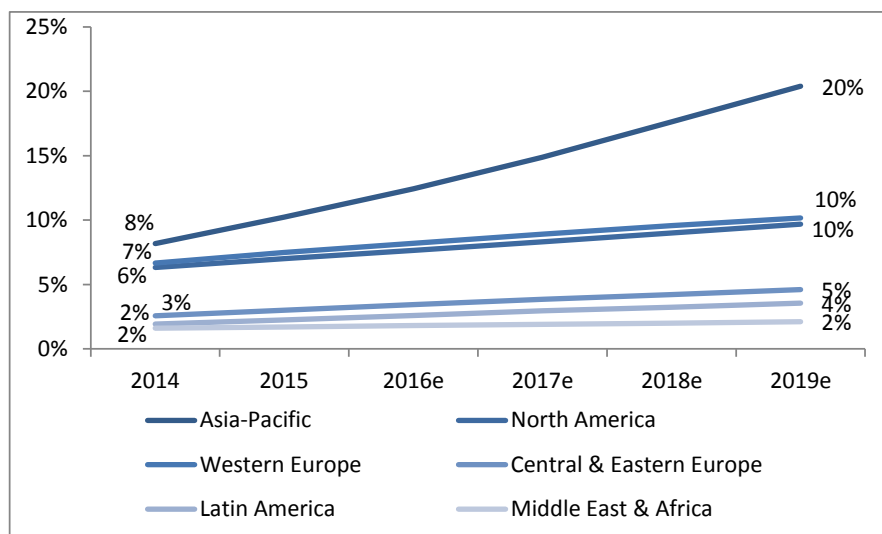
Source: eMarketer

eCommerce projections

eCommerce sales totaled ~\$1.7bn and represented ~7% of total retail sales in 2015 (up from 6% in 2014), per eMarketer, and is anticipated to grow at a 4-yr CAGR of 21% through 2019, representing ~13% of total retail spending. The Asia-Pacific region is expected to have the highest exposure to eCommerce as a percentage of total retail sales (~20%) and already has 10% of retail sales come from eCommerce. North America and Western Europe have the second largest exposures at 7% each, and are expected to grow to 10% by 2019. Emerging regions like Central and Eastern Europe, Latin America, the Middle East, and Africa have less than 3% exposure to eCommerce, as of 2015, and are expected to still have less than 5% exposure to eCommerce by 2019.



Figure 26: Percentage of eCommerce sales by region (2014-2019E)

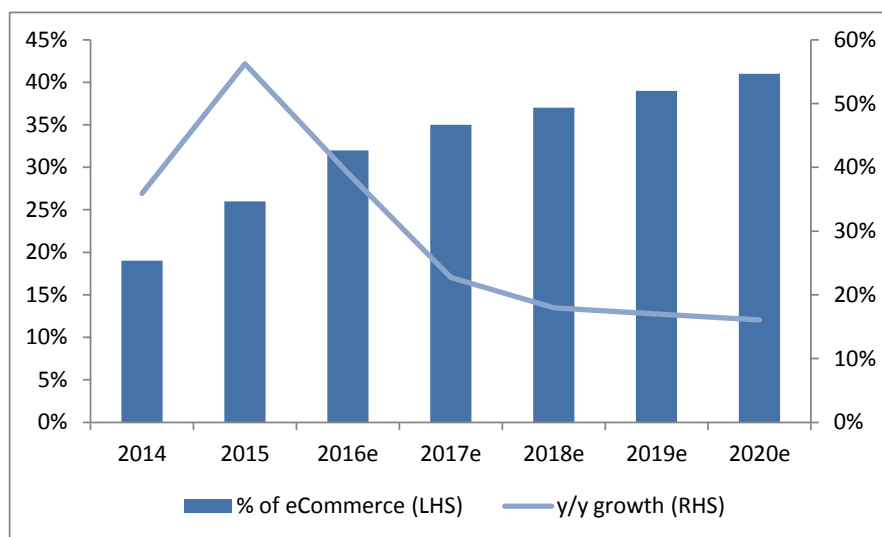


Source: eMarketer, Deutsche Bank

mCommerce projections

In the US, mCommerce has been the fastest growing segment in eCommerce, growing to \$88.5bn (+56.2% Y/Y) and was 26% of total eCommerce sales and 1.2% of total retail sales. By 2020, eMarketer estimates that mCommerce sales will reach \$242.1bn (+22% 5-yr CAGR) and represent 41% of eCommerce spend as well as 4.5% of the total.

Figure 27: US mCommerce sales as % of eCommerce (2014-2020E)



Source: eMarketer, Deutsche Bank

According to Coupofy, global mCommerce is expected to grow at 31% Y/Y in 2017 compared to 15% Y/Y for eCommerce growth. The fastest growing developed markets in 2015 were Japan (+50% Y/Y), the UK (45% Y/Y) and South Korea (+44% Y/Y). In 2014, the fastest growing emerging markets for mCommerce were India (+63% Y/Y), Taiwan (+63% Y/Y) and Malaysia (+46% Y/Y). China has the largest number of mobile shoppers with 68% of the population purchasing an item using a mobile device. Highlighting the need for



rewards and incentives helping drive adoption, mobile coupon users are anticipated to grow from 560m in 2014 to 1.05bn in 2019 with the dollar amount of these redemptions expected to grow from \$16bn to \$31bn in the same time period. Finally, within mobile devices there is a global preference to shop in-app vs. in-browser with some of the top reasons being convenience with payments, speed, and instantaneous payment confirmation.

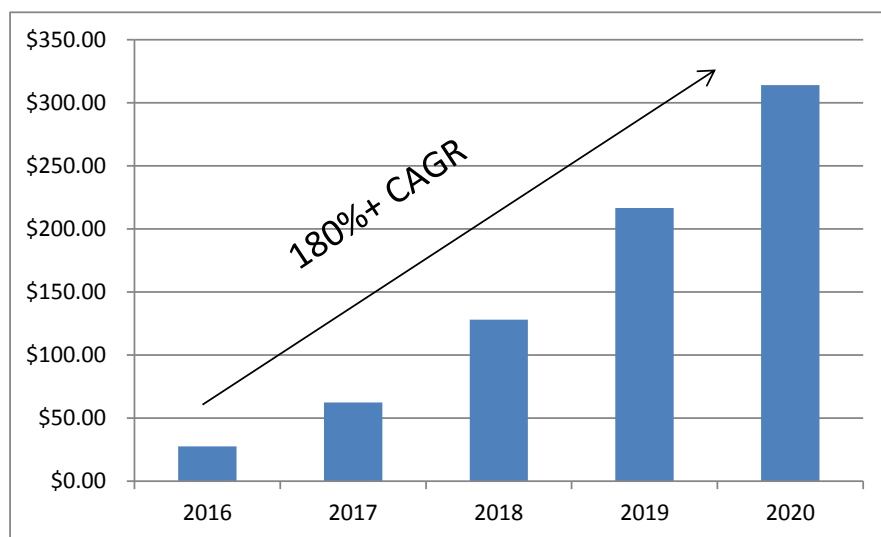
Proximity mobile payments

In 2016, ~38.4m Americans aged 14 and over used a mobile phone to pay at the point of sale at least one time in the prior six months, which is ~19.4% of the US smartphone users, according to eMarketer. This percentage is expected to increase to 33.1% by 2020. Although there continues to be hurdles to adoption, namely security concerns, merchant acceptance, and lack of a solid value proposition, our beliefs are in line with eMarketer's views that over the next several years, these issues will be solved to a much larger degree.

The terminal upgrade cycle in the US driven by the EMV liability shift has propelled the payment terminal acceptance of NFC and other payment technologies while consumers are increasingly becoming familiar with the enhanced security aspects of mobile payments such as tokenization and the Pay apps and branded apps are starting to develop better value propositions in the form of loyalty, rewards, coupons, and offers.

Proximity mobile payment transactions were expected to grow ~183.3% in 2016 to \$27.67m, doubling to \$52.49bn in 2017 and reaching \$314.13bn by 2020.

Figure 28: Proximity mobile payment transactions (2016-2020E)

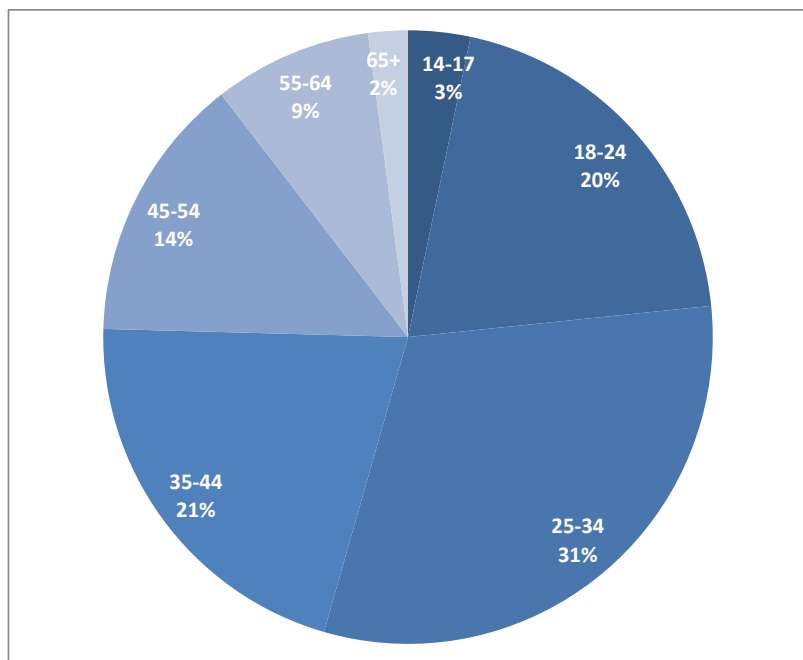


Source: eMarketer, Deutsche Bank estimates

The majority of proximity mobile payment users today are in the 25-34 year age group, accounting for 31% of the total in 2016, equating to ~11.9m people. By 2020, that number is expected to reach ~21m, though the share is expected to decrease to 27.8% as older folks more quickly adopt mobile payments.



Figure 29: US proximity mobile payment user share by age (2016)



Source: eMarketer

According to FDC, of the 200m US smart phone users, less than 2% are regular mobile payment users, with 60% citing security and privacy concerns as top reasons to not adopt mobile payments. Over 50% of users, in a digital payments survey by Accenture in July 2015, suggested they'd adopt mobile payments for an improved shopping experience or more loyalty programs.

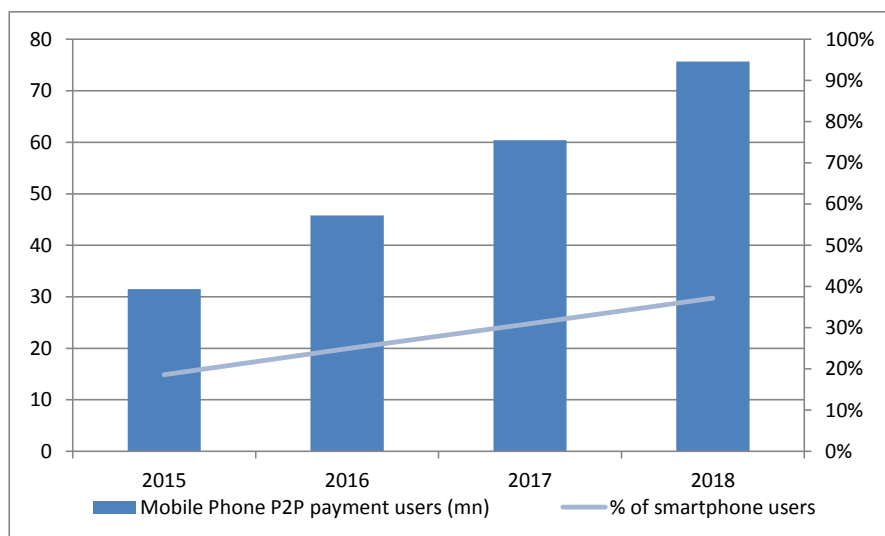
P2P mobile payments

Person-to-person (P2P) payments are starting to gain significant traction with players such as PayPal's Venmo processing \$5.6bn in payments (+126% Y/Y) for 4Q16 alone. P2P payments have proven to be a strong customer acquisition tool for mobile payments and PYPL is in the process of monetizing its Venmo user base by rolling out Pay with Venmo across its merchant base.

Roughly 25% of US adult smartphone users send and receive money via their electronic devices at least monthly in 2016, which is expected to increase by 32% in 2017 and a further 25% in 2018.



Figure 30: US adult mobile phone P2P payment users



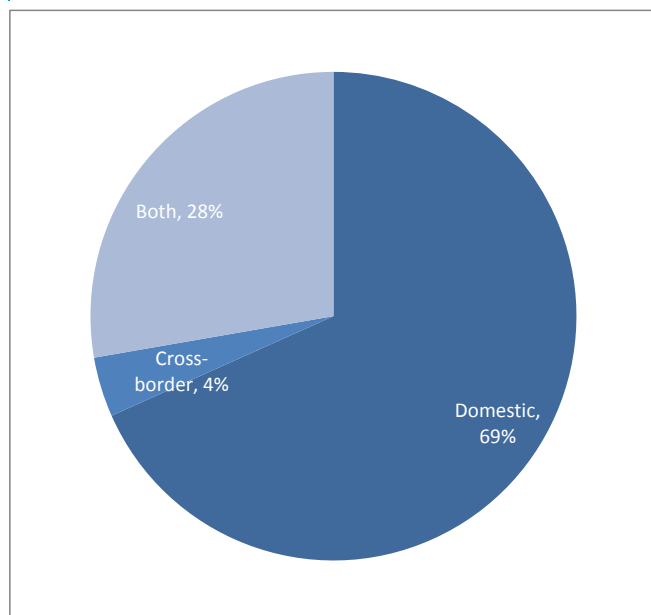
Source: eMarketer

Importance of cross-border

Digital buyers represented roughly 77% of the US internet users in 2016 according to eMarketer. Cross-border shopping in the US is less prominent than in some other countries due to the competitive domestic market.

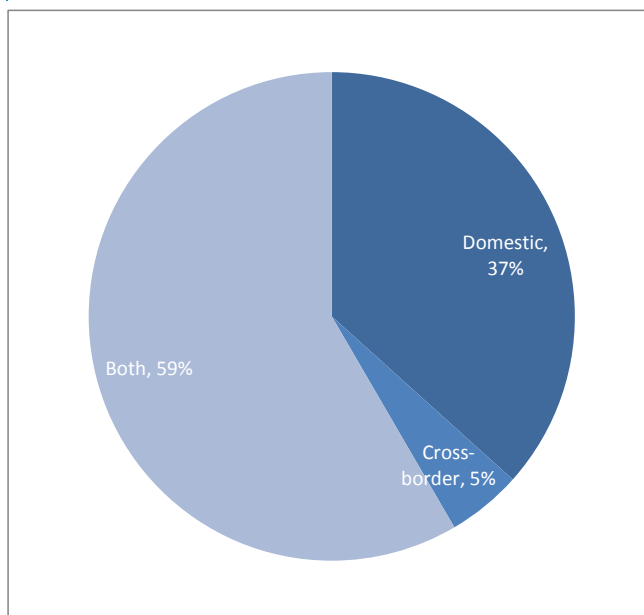
Only 32% of US digital buyers engaged in a cross-border digital purchase over the October 2015 to October 2016 period compared to 64% of digital buyers in Canada.

Figure 31: US digital buyers (2016)



Source: eMarketer

Figure 32: Canada digital buyers (2016)



Source: eMarketer



The top cross-border shopping destinations for Canada and Mexico is the US and China while the US cross-border is geared toward China and the UK. Brazil cross-border is most prevalent in China and the US. Overall, the US and China dominate the global markets in terms of cross-border demand for their goods and services.

Cross-border is a strong driver to the network model given the significantly higher revenue and profit contribution. For Visa, we estimate cross-border is roughly one third of the revenues despite being a much smaller contribution to overall volumes compared to domestic. In addition, we believe cross-border could be 6-7x more profitable than domestic. Cross-border is also important for players such as PayPal, and overall, the cross-border trends have been strengthening. PayPal has highlighted in April 2017 that more than \$400bn in cross-border purchases have been made on its platform. In 2016, PayPal saw 9.8m merchant active accounts sell at least one item and 106m consumer active accounts purchase at least one item cross-border via PayPal. In addition, the transactions spanned over 19k global trade corridors, 45 verticals, and 25% with ~60% of the transactions processed between countries outside the US.

Regions with the largest mobile payment penetration and/or growth opportunities

China

Chinese third-party mobile payments tripled to 38trn yuan (\$5.5trn) in 2016 as per the People's Daily and ~60% of the Chinese consumers using mobile payments do so on a weekly basis, primarily for smaller value transactions, according to China's Payment and Clearing Association. In addition, ~86% of Chinese consumers paid for online transactions with mobile apps, per Nielsen.

India

India represents a significantly large opportunity for mobile payments especially after the recent de-monetization by the government and strong support for electronic payments coupled with a lack of traditional payment terminal infrastructure, but a proliferation of mobile devices.

National Payments Corporation of India (NPCI), MasterCard, and Visa in February 2017 introduced standardized QR codes for mobile payment in India allows for payments using the BharatQR, which is low cost payment solution backed by the government. The services are also supported by American Express along with 14 national banks, with more banks expected to follow. The integration and implementation of the BharatQR standard is expected to be seamless with no needed merchant changes to the existing QR codes.

Africa

Africa has seen significant adoption of mobile payments given the various dynamics in the market where mobile phones are the most accessible form of electronic payment method. Kenyans moved a record \$33bn in mobile payments for 2016 from \$27.8bn in the prior year, as per the Central Bank of Kenya. In addition, the mobile money usage peaked at \$3.1bn per month in December 2016.

Japan

Japan is undergoing structural changes to its payment industry as it gears up for the Olympics and works toward upgrading its payment infrastructure to



EMV, which should also propel the introduction of NFC mobile payment technology.

Australia

The NFC penetration in Australia is significant, and according to the PayPal Inaugural Australian mCommerce Index report published in September 2016 measuring the state of mobile commerce, roughly 71% of the Australian consumers are using mobile devices to make payments. However, only 49% of the businesses are accepting mobile payments. The average mCommerce spend is \$330 per month with 22% spending more than \$500 per month and ~11% spending more than \$1,000 per month. The report shows that over one third of Australians are making mobile payments on a weekly basis while ~22% make payments more than once a week. In addition, Australians are using mobiles for bill payments (74%), tickets (53%), clothing and accessories (43%), and travel (38%). Furthermore, the social commerce is expanding with 11% of consumers having purchased through a social media platform, and of those who make a purchase, 75% have done so via Facebook. Roughly 7% of the business accepts payments through social media platforms while 34% don't use social media at all and 18% have purchased something after seeing it on social media.

Roughly 80% of the Australian population over the age of 18 has a mobile device, making it one of the most penetrated markets globally. However, 51% of the businesses say they are not optimized for mobile sales and 31% have no plans to change. Given the significant adoption by Australian consumers, we believe Australia will continue to lead in mobile payments and will gain further traction over the years to come.

M-Pesa driving mobile payment adoption

M-Pesa was launched in 2007 by Vodafone for Safaricom and Vodacom, which are the largest mobile network operators in Kenya and Tanzania. M-Pesa allows the users to deposit money into their account, which is stored on the mobile device, and to send funds to friends, family, and businesses through PIN secured text messages. Western Union allows for remittances from the US to M-Pesa accounts.



Focusing on Secure Ubiquitous Payments Globally

Security, efficiency, and overall costs are frequently associated with the ability to accept virtual payments. More transactions continue to shift online, while security standards enabled by the EMV standards make it even harder to steal card information at the point of sale or from new chip cards. EMV is more secure than traditional debit and credit cards due to unique encryption of the account information each time it is accessed. Global online fraud is expected to top \$25bn by 2020 driven by improving standards in card-present transactions, per Juniper Research, which also estimates 65% of the fraud will come from eCommerce with another 27% from banking. Equally concerning is that revenue lost from falsely rejecting a transaction is 13x greater than revenue lost to actual fraud. The rise of unsecure payment methods online has likely perpetuated this increase in fraud.

That brings us to the roles of tokenization, a security solution for virtual payments, and blockchain, a decentralized ledger that if implemented correctly, can enable efficient, low cost, and secure B2B payments. Authentication methods for mobile payments potentially involves biometric authentication, such as through fingerprint scans (Apple iPhones) or retinal scans, while also including tokenization services as another layer of security. While blockchain and tokenization have garnered significant attention for the varying use cases, we believe the payment networks, namely V/MA, are well positioned to take advantage of the retail opportunity given the advancements they have made in promotion tokenization and EMV standards.

The liability shift in the US has driven the EMV upgrade cycle, which is still working its way through SMB, hospitality, and Petro while global government initiatives are driving electronic payments and EMV adoption helping to increase security. Mobile payment leverage tokens helping to hide the sensitive card details with the networks being the token service providers of choice through their VDEP and MDES platforms while biometrics help to further strengthen the security. Overall, consumers are starting to better understand the security benefits of mobile payments, which have been one of the key reasons cited by many surveys for the lack of adoption.

[EMV wave sweeping the globe driving NFC acceptance in-store](#)

EMV has been more slowly adopted in the US compared to other developed regions, like Europe, and even Asia. EMVCo reported that EMV accounted for 42.4% of global card present transactions in 2Q16 with Europe and Asia having significantly higher penetration than in the US. In addition, EMVCo reported that 394m chip cards were deployed in the US, while 1,081 were deployed in Europe, and MA announced ~80% of its US consumer credit cards were chip enabled by end of 2016, while V noted 65% of credit cards and 45% of debit cards are chip enabled as of 24 October. As EMV continues getting adopted, merchants have the option to enable contactless payments via mobile devices or dual chip cards. While Asia is the largest adopter of contactless solutions, driving significant volumes over mobile wallet solutions



like Alipay, we believe we are still in the early innings in the US and in the middle innings in Europe with PYPL and other mobile wallet providers, like Apple Pay, vying for share and acceptance in a potentially growing market. We view other contactless solutions, like QR codes or MST, as less secure. They also don't require an EMV upgrade, and despite this, we are not seeing significant traction compared to NFC solutions.

EMV adoption pushing fraud to other channels

As EMV is adopted in-store, fraudsters are finding it harder to steal payment information at the point of sale. As a result, they are moving to less secure locations like Petro stations, which have delayed EMV implementations given the merchant liability date for Petro in the US was pushed out to October 2020, or even online where small eCommerce merchants have less sophisticated fraud detection standards and sometimes keep cards on file (where a data breach can result in lost card data). Global online fraud is expected to surpass \$25bn by 2020, per Juniper Research. In addition, as reported in the Federal Reserve Payments Study 2016, remote fraud accounted for 46% of fraud in 2015, though remote fraud skews higher in countries with higher chip adoption, with the report citing declines in counterfeit fraud at the point of sale. We believe, this trend likely continues as EMV adoption continues in the US, making it increasingly important to address security challenges both online and offline.

Platforms driving scalable security

Tokenization for payments is the effort to replace sensitive data, like credit card numbers and PINs, with a unique identifier that can only be authenticated, decrypted, and translated (to get the sensitive data) from the token provider. Tokenization is the primary mechanism being used to protect cardholder data in a contactless transaction (both in-store and online). Importantly, we believe tokens are essential in avoiding mass data breaches, like the ones in Target and Home Depot, given actual card data can be replaced with secure tokens minimizing the size and scale of a data breach. There are several EMVCo authorized token service providers (TSPs), though we believe V and MA remain best positioned to be the primary token providers for credit transactions given their global acceptance and best-in-class security standards. While there may be regional competitors, like China Union Pay in South East Asia, we believe these TSPs can coexist, enabling their own customers to use contactless solutions.

Biometrics adding extra layer of security for mobile payments

In addition to tokens, hardware providers like Apple and Samsung are introducing biometric authentication (like fingerprint and retinal scans) at the point of sale, providing additional authentication at the point of sale. 60% of customers surveyed in a study conducted by FDC cited security and privacy concerns as a top reason for not adopting mobile payments. We believe the added biometric security may help accelerate mobile adoption, easing customer's security concerns, helping them feel safer using mobile device for proximity and mobile eCommerce purchases.

Tracking the EMV adoption wave

Globally, 42.4% of card present transactions were EMV, according to the latest statistics from EMVCo, reported as of 2Q 2016, which analyzes data across American Express, Discover, JCB, MasterCard, UnionPay, and Visa.



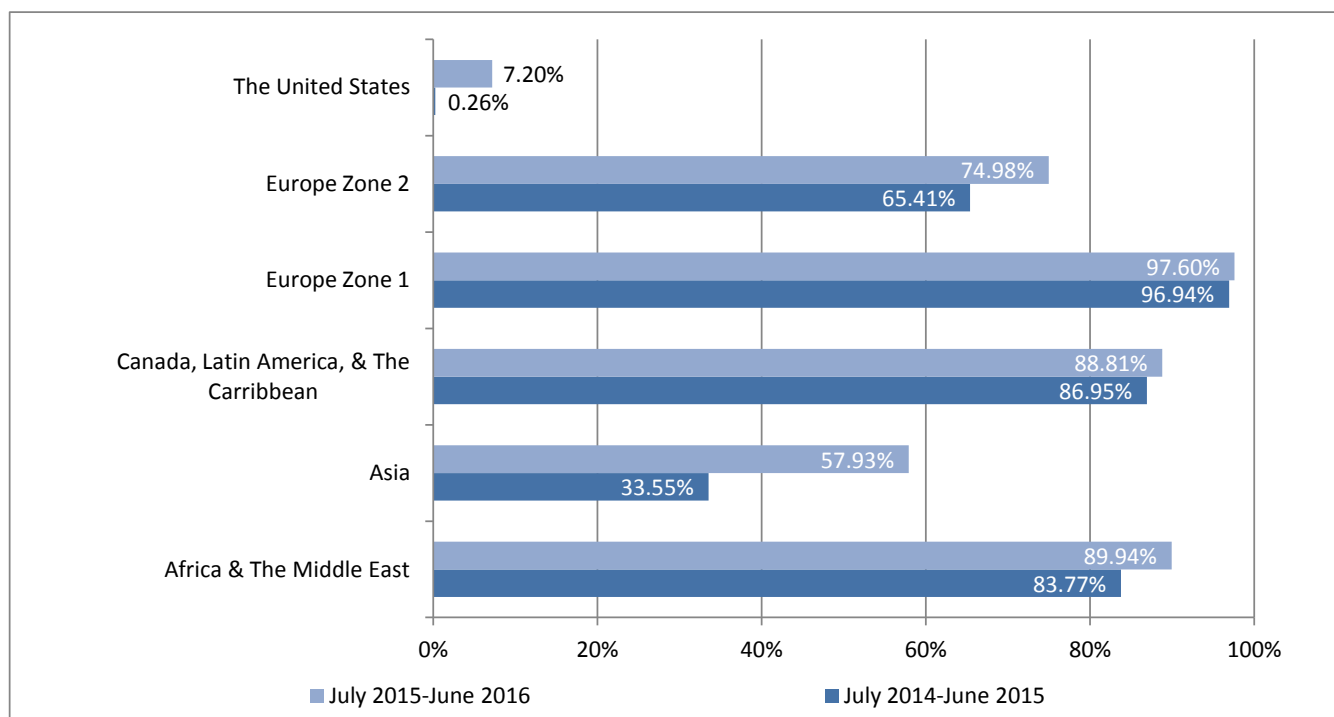
Unsurprisingly, Europe Zone 1, which is the most developed area in Europe, had the most card present EMV transactions at 97.6% from July 2015 through July 2016 (up from 96.94% in the prior year) essentially reaching full capacity while Europe Zone 2 continues to make significant progress at 74.98% from July 2015 through July 2016 (up from 65.41% in the prior year).

The US has been the laggard with just 7.2% of transactions from July 2015 through July 2016 being EMV, which is up from 0.26% in the prior year, and we expect the adoption to significantly increase given the liability shift in December 2015 for merchants along with the Petro liability shift, which was recently pushed out to 2020 by the networks. The large majority of the tier one US merchants have upgraded their terminals while the SMBs continue to work through the process.

In addition, Asia has seen a strong uptick from 33.55% of transactions being EMV from July 2014 through July 2015 to 57.93% from July 2015 through July 2016. We expect adoption to continue, particularly as EMV mandates are implemented, for example in places like Japan ahead of the Olympics.

Africa and the Middle East have strong EMV adoption with 89.94% of card present transactions being EMV from July 2015 through July 2016, up from 83.77% in the prior year while Canada, Latin America, and the Caribbean also have strong adoption with 88.81% of card present transactions being EMV, up from 86.95% in the prior year.

Figure 33: Percentage of card-present EMV transactions



Source: EMVC

Worldwide chip card deployment and adoption data below tracks EMV from 2013 through 2015, highlighting how the adoption has trended in each region. The data shows the significant uptick in the US, which we believe would show an even stronger uptick through 2016 as the EMV liability shift propels the



merchant terminal upgrades and card re-issuance. In 2016, MA announced that ~80% of its US consumer credit cards are now EMV chip cards while Visa, on 24 October, noted that 65% of credit cards and 45% of debit cards are chip enabled.

Figure 34: Worldwide EMV chip card deployment and adoption

Region	2013		2014		2015	
	EMV Cards	Adoption Rate	EMV Cards	Adoption Rate	EMV Cards	Adoption Rate
Canada, Latin America, and the Caribbean	471m	54.20%	544m	59.50%	680m	71.70%
Asia Pacific	942m	17.40%	1,676m	25.40%	2,459m	32.70%
Africa & the Middle East	77m	38.90%	116m	50.50%	160m	61.20%
Europe Zone 1	794m	81.60%	833m	83.50%	881m	84.30%
Europe Zone 2	84m	24.40%	153m	40.40%	200m	52.30%
United States	-	-	101m	7.30%	394m	26.40%

Source: EMVC

SMB market to take time for mass EMV compliance

Verifone highlights recent US EMV adoption statistics

In its 4Q16 earnings call on 12 December 2016, Verifone highlights that, per Visa, only 37% of all storefronts nationwide are actively accepting chip card transactions. In contrast, Ingenico noted that ~50% of the EMV terminal upgrade opportunity remains with the concentration of upgrades remaining primarily in the SMB space. Verifone has benefited from the first strong wave of EMV adoption among tier 1 merchants (top 200 retailers) and expects the remaining upgrades primarily across SMBs, Hospitality, and Petro to provide a multi-year opportunity in North America. PAY stated ~95% of the tier 1 space is EMV enabled and has begun accepting transactions.

Verifone estimates that there are still ~5m terminals in the US that need to be upgraded as of the end of 2016, which includes roughly half of all SMBs as well as several segments of the US market, which are installing customer facing payment devices for the first time.

Hospitality, including quick service restaurants, represents the largest of the greenfield opportunities. In addition, the networks recently pushed out the liability shift for Petro to 2020, which creates a multi-year transition period potentially accelerating as the liability shift nears.

US market size

As per data given from Verifone, below we have outlined the relative size of the US market.

- ~13m devices in North America with ~5m still needing to be upgraded by the end of 2016 mostly in Hospitality, SMB, and Petro
- ~1.8m tier 1 merchant terminals
- ~460k terminals across mid tier
- ~6.8m terminals across SMB



Petro EMV liability push-out elongates adoption curve

The broader US EMV liability shifted in October 2015. As a review, we detail out the shift the scenarios, for which the merchant or issuer is responsible for fraud liability.

- **Magnetic Stripe card used at Magnetic Stripe terminal:** The issuer is generally liable on counterfeit transaction
- **Chip card used at Magnetic Stripe terminal:** The merchant is generally liable on counterfeit transaction
- **Chip card used at EMV-enabled terminal:** The issuer is liable on counterfeit transaction

The liability shift prompted many large retailers to upgrade their EMV terminals. However, given the cost and timelines of the upgrade, many SMBs have pushed out adoption. In September, over 120k gas stations in the US, per the US Census Bureau, had an original liability transition date of October 2017 that was pushed out to October 2020 given more complex infrastructure and technology requirements or, potentially, even higher costs. For example, gas pumps may need to be replaced before adding the new card readers, which would potentially require destroying concrete as well as specialized vendors to install the pumps. Ultimately, this liability date push out has affected the terminal sales as reported by Verifone and Ingenico. Specifically, in 4Q16, Verifone noted a -26% Y/Y decline in North America due to the difficult comps created by the EMV upgrades at merchants while also affecting by the push out in the petro liability shift. In FY17, the company expects certification delays, bottleneck issues, and the liability shift date will impact revenues, though they should improve through the year. Ingenico noted a -5% Y/Y decline in 3Q16 revenues and noted it expects no significant EMV related sales in 2017, though a pickup may occur in 2H17.

Reviewing the challenges and solutions in the EMV road to success

Reviewing the issues that led to an EMV bottleneck

Verifone sells terminals either directly to the merchants, typically in case of larger tier 1 merchants, and also to the acquirers, which then provide the terminals to the merchants, typically in case of SMBs. The acquirers may either take on the inventory risk and pay Verifone for the terminals up front or pay for the inventory after it has been delivered, installed, integrated, and certified at the merchant.

There are two phases of the certification process. First, the terminal equipment itself needs to be EMV certified, which is Verifone's responsibility, and the company is able to achieve this on its EMV capable devices without any issues. Two, the equipment then needs to be certified once it is installed and integrated with the merchant's back-end systems, which is usually the responsibility of the acquirers. In addition, given the uniqueness and complexity of the EMV upgrade cycle, Verifone has been providing services to the large merchants essentially helping them with the integration and certification process where typically the large merchants perform the functions in-house.



The impact from the slower-than-expected integration, installation, and certification created an EMV bottleneck, which impacted Verifone and other players in the ecosystem. The impact was delayed revenue recognition for the hardware providers and slowdown in new terminal sales given the buildup in inventory at the acquirers. Positively, the bottleneck has now largely been worked through.

[New solutions for speeding up the chip card checkout](#)

The EMV upgrade has caused a slowdown in the checkout time due to the longer transaction times. American Express reported transaction times of 10-20 seconds; however, players in the market are working on solutions to improve the speed. Square has improved the speed of transactions for its latest EMV enabled POS devices from 5.7 seconds to 4.2 seconds and has a goal of three seconds. Chip cards account for 75% of the cards processed on SQ, which is up from 40% a year ago. In addition, Visa has rolled out Quick Chip for EMV, which helps streamline the processing of chip card transactions and has highlighted transaction speed of two seconds or less.

[Blockchain improving B2B payments and back-office processes](#)

[Backing up to tell the blockchain story](#)

Blockchain has quickly evolved from being the underlying infrastructure powering Bitcoin, a cryptocurrency that was introduced in 2008. A blockchain network provides a central database that requires consensus from partner networks to record a transaction (reducing fraud likelihood) and stores the transaction history and details, real-time, on blocks that are unalterable and transparent to parties within the network (could be more limited depending on the setup of the network). The technology is widely viewed as having the ability to significantly impact financial firms' brokerage and trading platform if implemented correctly. The benefits of blockchain include a near real-time transfer of value online, low to no costs, high transparency and redundancy, and the ability to build financial products on top of the platform. Importantly, transactions with blockchain don't require the parties in a transaction to involve an intermediary that reconciles information, approves the transactions, and stores transaction information locally, which is what typically happens in a transaction today leading to high costs, low processing speeds, and even incorrect payment handling, resulting in potential fraud or disputes. After empowering Bitcoin, the technology is being tested for different use cases ranging from, but not limited to, corporate payments, private payment networks, cross-border remittance, digital identification and currency transfers.

[Most prevalent blockchain use cases](#)

While the current applications of a centralized general ledger are in its infancy, several use cases, including the potential to alter industries, are being tested by governments, financial institutions, central banks, public players, and startups. We often have noticed interested players partner with others to create, prototype, and implement different private or public networks. Applications tested include, but are not limited to, improving digital identity, KYC, and logging transactional data. We continue to believe its primary use case is facilitating B2B payments compared to retail payments as well as disrupting back-office functions at financial services companies. It could potentially disintermediate checks or ACH, if implemented to streamline clearing and settlement processes for B2B payments. We will continue to



monitor the development of blockchain standards and related adoption, which may also impact MA's ability to grow the Vocalink business (if the acquisition goes through). However, the back-end technology benefits for B2B transactions are not fairly evident for retail payments given no tangible front-end benefits, making it hard to get merchant adoption. The payment networks have already built a successful and relatively efficient global infrastructure for retail payments that would be costly and difficult to emulate.

Attempting to scale with enterprise level blockchain solutions

Network capacity has historically been a large hurdle for blockchain's success, given the size of one block is limited to 1MB, restricting a public network to processing seven transactions per second, per TechCrunch. On 15 March, it was reported that the number of transactions awaiting verification on blockchain (the technology for Bitcoin) was up 5x from 2016 and causing processing transactions to be more expensive than with V or PYPL. Given network restrictions, the Bitcoin community has backed an upgrade to blockchain that would eliminate the cap imposed on the amount of data processed while SegWit is a solution that would verify transactions in a different way (not getting consensus approval from the community).

As a result of these delays and potential inefficiencies with the technology, we believe private company Chain and consortium R3 are attempting to scale private or public blockchain solutions for interested financial institution parties, and applications thus far are being created and tested primarily for cross-border B2B payment transfers (could extend to domestic B2B payments) as well as financial institution contracts, such as cash deposits or even trading reconciliation. For example, Citi and Banco Santander, in 2015, announced the development of blockchain technology for international payments and smart contracts.

Visa rolling out international B2B payment solution with Chain

Backed by \$40m in funding from varying financial institution partners including Visa, FISV, Nasdaq, Citigroup, and Capital One as well as VC firm Khosla Ventures, Chain is attempting to build enterprise level blockchain infrastructure enabling better, more efficient financial institutions. The company doesn't actually own any of the networks itself, but helps design, implement, and manage private networks for enterprise partners. On our payments bus tour in March, Chain laid out details in its work with Visa to create a private blockchain infrastructure to support B2B payments.

Visa introduced B2B Connect in October, which it plans to pilot in 2017, to enable international, cross-border payments amongst companies using their financial institution partners. The system is being designed using Chain Core, a blockchain infrastructure facilitating enterprise level financial transactions through private blockchain networks. Visa is attempting to design a consistent standard in managing payment settlement, using its standard practices, but also make these payments available real-time (reducing delivery time), offer clear cost structure, and help institutions reduce overhead costs related to the payment ecosystem.

R3 – financial institution partnership interested in distributed ledgers

Since we wrote our last FITT report, R3 has grown its distributed ledger consortium from 43 financial institutions to over 70 (including adding LatAm financial services company Credicorp in December). The consortium is working towards developing Corda, an open source distributed ledger platform that



records, executes and manages these institutions financial agreements, while attempting to remain regulatory compliant across countries. The primary difference is that not all partners in the network can view transactional data via a block (as typically happens in a decentralized ledger system), but can be limited to need-to-know parties, primarily the sender and recipient of information as well as regulators. Corda claims to be the only distributed ledger platform to support multiple consensus providers using different algorithms on a single network, which enables multiple regulatory bodies to verify data ensuring compliance with local regulations. In addition, being open source allows partners to add on to the platform and adjust their nodes to make it specific to their partners.

Central governments testing blockchain applications

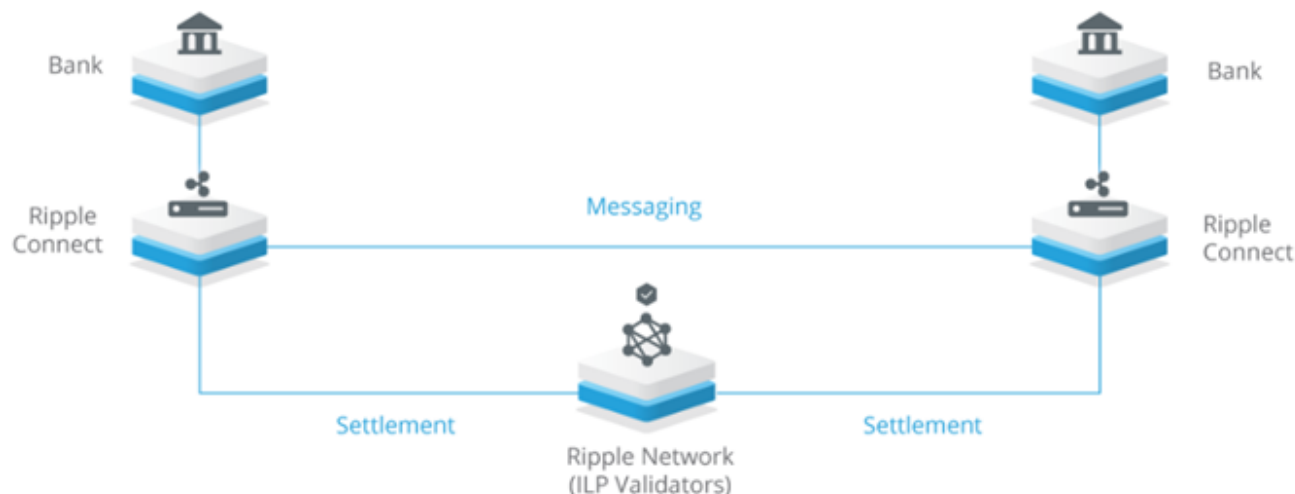
More and more central banks are exploring blockchain applications for digital currencies, especially in underbanked countries where corruption is sometimes higher than average. For example, the PBOC completed a trial run testing a digital currency in mid-December and is potentially testing to move its fiat currency over to a digital currency. In November, India prime minister Narendra Modi asked for India to embrace digital currencies after removing the 500 and 1000 rupee notes from circulation and, in January, the Reserve Bank of India released its first exhaustive white paper on blockchain discussing trade related applications. In the domestic market, Banque de France inquired into more research on blockchain applications, France's Central Bank opened a new innovation lab in February, testing ideas with blockchain startups. The US is also interested in the technology, but wants to see more real-life applications and use cases tested before further pursuing the technology.

Financial institutions integrating blockchain solutions with Ripple

Ripple, a FinTech startup backed by Google, has been adopted by 15 of the top 50 banks globally, has 30 active integrations and is in production in over 116 countries. Ripple let's banks connect to its Interledger Protocol (ILP) through Ripple Connect, enabling real-time, efficient, and secure settlement of cross-border payments. Separating these two points (having integration through Connect) lets the ledger be preserved in ILP and ensures privacy for the financial institution, unlike a public blockchain network, but also lets the bank exchange information to other parties on an as-needed basis.



Figure 35: Ripple technology flow



Source: Ripple

Its blockchain technology is being trusted by a Japanese banking consortium that accounts for 30% of all the banks to develop domestic and international real-time capabilities for cross-border payments. Ripple believes, looking at retail remittances and corporate payments, that blockchain technology can reduce transaction costs by 60% and 50%, respectively.

Enterprise Ethereum Alliance (EEA)

JPM, MSFT, and INTC partnered with over 24 other companies (including ACN) with the hopes of developing, implementing, and promoting blockchain application's best practices, standards, and EntEth 1.0 architecture. The alliance includes tech, financial services, IT Services, and even energy firms (BP). Currently, JPM is developing a system named Quorum atop Ethereum, which is meant to give regulators access to sensitive trading related data, yet keep the details from the public of those who desire to remain private. The Royal Bank of Scotland also is developing a clearing and settlement system using Ethereum's distributed ledger and smart contract platform.

Ethereum, which was initially released in July 2015, is an open-source blockchain platform that offers smart contracts, which essentially build in logic from traditional contractual clauses and use computers to facilitate, verify, and enforce negotiation and performance of the contracts (which are publicly viewable). However, the platform has been susceptible to several data breaches, including one in June 2016 that resulted in ~\$50m of its cryptocurrency, Ether, to be transferred to a fund only accessible by the hackers. The Ethereum community reversed the transaction and has since rolled out a new version of the platform to address security concerns, which persist. Ethereum plans for a broad release to the public (known as Metropolis), and eventually wants to unlock the platform to allow all to build on it.

Skry focused on detecting inconsistencies

Skry has an analytics platform for managing and visualizing public and private blockchain data across a range of sources. The analytics are intended to detect irregularities in data, which could be a result of a DDoS attack or result from an



unprompted spike in transaction fees. In February, Skry was acquired by Bloq, a company focused on building blockchain networks for enterprise customers. Skry could potentially be marketed to Bloq's existing enterprise clients.

[PYPL partners with Oro on B2B](#)

OroCommerce is an open source B2B eCommerce platform, and PayPal has partnered with Oro, creating a fully integrated payments solution, which streamlines the workflows allowing Oro's clients the ability to provide customers with seamless payment solution. The partnership helps PayPal penetrated the B2B eCommerce market, which is expected to reach \$12trn by 2020 (3x the size of B2C eCommerce).



Digital Remittance Market Heating Up

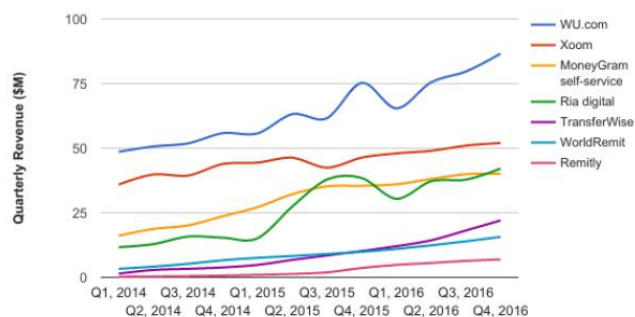
New entrants disrupting the traditional money transfer business

The digital money transfer business is heating up, fueled by the rapid adoption of smartphones. The biggest question with regard to digital money transfer today is whether or not the traditional players, such as WU and MoneyGram, will be disintermediated by new incumbents such as Xoom, Ria, TransferWise, WorldRemit and Remitly.

The traditional money transfer players have a significant presence on the ground with physical locations globally for extracting cash and they have invested significantly in compliance. In addition, the majority of the new competition is focused on account-to-account money transfer; however, the traditional players have historically had a much larger focus on account to retail transfers even in their digital businesses and are also working toward capturing the account-to-account opportunity.

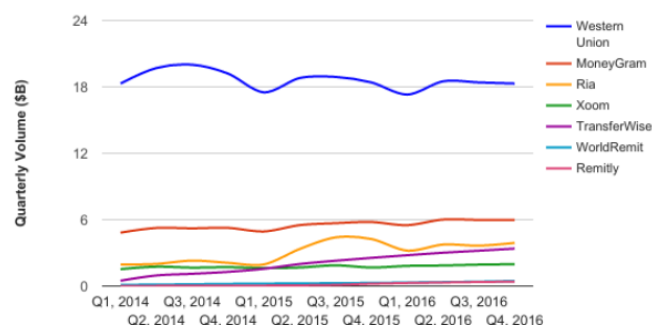
The traditional remittance players have expanded into digital cross-border; however, they still earn the majority of their revenues through physical cash agents, which carry higher margins. Given these dynamics, the traditional players have been able to be competitive on pricing in the digital cross-border arena. WU has been able to accelerate its digital revenues ahead of the leading digital competitors and remains far ahead in terms of overall cross-border volumes.

Figure 36: Digital cross-border revenue



Source: SaveOnSend.com

Figure 37: Cross-border volume



Source: SaveOnSend.com

In our view, the new digital cross-border money transfer competitors lack differentiation in their services, and need a more compelling value proposition other than price where we have seen significant competition in the past, particularly in corridors such as the US to India. However, PayPal's acquisition of Xoom provides the users with a platform of synergistic services, which we believe could drive further engagement.



Traditional money transfer providers expanding capabilities

Digital growth at WU has been strong. WU.com grew 30% cc in 4Q16, with 65% of the transactions originating from the US coming from mobile. WU has deployed the mobile app across 17 countries and WU.com is available in 37 countries for sending money to over 200 countries (cash, accounts, mobile wallets). Digital represents ~9% of revenues and WU is focused on expanding to additional countries with a particular focus on Asia.

While much of the digital volumes are coming from account to retail, WU is also expanding into the account-to-account market taking on competitors such as Xoom. WU now has 2.5bn accounts worldwide and over 100 banks linked to the account payout functionality across more than 50 countries. Roughly 30% of the digital cross-border money transfers are paid out to an account.

WU is combining mobile with retail, mobile to mobile, mobile to mobile wallet, and mobile to bank account for a full suite of remittance solutions. In addition, given the company's significant presence in retail, which has higher margins, WU is able to effectively compete on price in digital where needed. In addition, WU believes that the majority of its digital customers are new. According to WU, 80% of its customers coming to online or mobile are new to the network, creating incremental opportunities for the company.

WU is differentiated from the new digital-led competitors by its significant brand recognition and global presence, partially due to the over 500k physical locations it has as well its long-standing history of providing money transfer services. In addition, the company has invested heavily in compliance and has a strong global network as well as multiple payout options.

WU's digital business has been successful in the US as well as the UK, France and Germany. The company continues to evolve its app with over 3m downloads highlighted at its most recent analyst day. WU is also focused on building a scalable solution that it can deliver to the banks.

Xoom gaining traction

Xoom was founded in 2001 with the intention of disrupting the cross-border remittance market. The company went public in February 2013 and was acquired by PayPal in mid-2015. Xoom's US customers are able to send money to over 53 countries now and over 70% of the transactions originate on a mobile device. Xoom contributed ~\$200m to PYPL revenues in 2016, growing at ~10% Y/Y. Xoom is focused on adding more send and receive markets, leveraging the PayPal assets. Xoom boasts nearly 90% of its volumes from repeat customers. Xoom is able to take advantage of PYPL's significant global presence across over 200 markets, which has helped it in increasing the market penetration.

At its 2016 investor day, PayPal highlighted a \$600bn cross-border remittance opportunity. The majority for of the cross-border remittance market is handled offline by the traditional players and Xoom was the first all-digital money transfer company. Xoom has partnerships with large financial institutions, retailers and mobile wallets for sending money faster and provide multiple payout options including cash, bill pay, and phone reload.



In addition, Xoom recently added a request feature that allows the senders and receivers interact and help reduce the friction associated with the sender having to enter the recipient's information prior to making a transfer. Remittance recipients can request funds, bill payments or mobile reloads from customers in the US across 29 countries.

Furthermore, PYPL has introduced the ability to link the PYPL account and Xoom accounts, providing access to the PYPL funding sources within Xoom. PYPL has ~87m active US customers and continues to pursue cross-selling opportunities with Xoom. We believe that the Xoom assets help PYPL round out the suite of value-added services, providing a full platform of financial tools for the customer.

Euronet and Ant Financial battle to acquire MoneyGram

On 26 January 2017 MoneyGram (MGI) announced a definitive agreement to merge with Ant Financial, the parent company of Alipay, the dominant online/mobile payment player in the Chinese market. Ant Financial offered \$13.25 per share in cash with the transactions valued at \$880m for all of MGI's common and preferred shares, with Ant Financial assuming or refinancing MGI's outstanding debt. The per-share consideration represented roughly 20% above the share price at the time. On 14 March 2017 MGI confirmed the receipt of unsolicited proposal from Euronet Worldwide (EEFT). EEFT offered to acquire all of the outstanding shares of MGI common and preferred stock for \$15.20 per share in cash on an as-converted basis for a value of \$1bn. MGI's Board of Directors announced that it would carefully review and consider the proposal and, on March 19, MGI confirmed it would share confidential information with EEFT to allow the company to shore up its offer.

More recently, both EEFT and Ant Financial have been lobbying in Washington DC to advocate for their own acquisition interests. EEFT CEO, Michael Brown, stated that an Ant Financial acquisition would go against the national security interest of the US given transactions may be misused or accessed by the Chinese government. He lobbied to Representatives of the districts in which EEFT and MGI are headquartered (Kevin Yoder from Kansas and Eddie Johnson from Texas) on these concerns, who subsequently drafted a letter on the same topic to Steven Mnuchin, the current administration's Treasury Secretary. However, the Financial Times reported that MGI rejected allegations of data availability. Further, President of Ant Financial International, Doug Feagin, issued a press release discrediting EEFT's lobbying efforts claiming an EEFT acquisition would less-so advance American interests given 85% of EEFT's assets are outside of the US, an EEFT/MGI merger would reduce competition in the US (from 3 to 2 large players), while pointing to Euronet's recent efforts to avoid paying US taxes among other things. It also stated that, if successful in acquiring MGI, it would expand the MGI business within the US, hiring more US-based employees while ensuring MGI data stays local and confidential, operating separately from Ant Financial's data systems. We will continue to monitor developments in this ongoing battle and the implications for the global money transfer business (not just the US).



Opportunities & Disruptors in Merchant Acquiring

Merchant acquirers reinventing – monitoring Chase Pay disruptions

Merchant acquirers such as GPN and VNTV invested early in integrated payments through acquisition and partnering with ISVs/VARs for penetrating SMB while also focusing on other high growth channels including bank referral and secular shift to online/mobile with GPN also focusing on owning the software assets. FDC acquired Clover as part of its integrated payment strategy and is now looking to build its dealer/developer network while SQ builds its integrated platform from the ground up, providing a seamless end-to-end experience. Chase has the potential to cause the largest disruptions to the traditional acquirers and we will monitor the company's strategy on potentially moving downstream to smaller merchants.

Please visit our 25 September 2016 report, *Monitoring the Important Trends in Merchant Acquiring* for a deep dive.

Penetrating high growth channels

The traditional merchant acquirers continue expanding into high growth areas namely integrated payments, bank referral, and online/mobile through organic investments and acquisition. GPN and VNTV led the way investing early with the APT/PayPros and Mercury/Element acquisitions and have expanded in the ISV/VAR distribution models helping capture the integrated payments opportunity across the long tail SMB market as the traditional channels, namely ISOs/referral, have fallen out of favor.

Expecting integrated payments to sustain momentum

The integrated payments opportunity is still in the early stages with the ISV/VAR channel accounting for ~9% of the ~150-200k US merchant signed annually and ~4% of the volume with ~30% of the installed terminal base in the US still using dial terminals, per First Annapolis. In addition, the ISV/aggregator/market place models represent only 10% of the volume, but account for +50% of the growth, highlighting the potential opportunity, and we expect 15-20% growth in integrated payments to sustain over the next several years. Furthermore, integrated payments tend to be stickier given the embedded business solutions into the merchant daily activities driving better retention rates and higher yields given the value proposition.

Acquirers verticalizing and owning the software assets

GPN has taken its verticalized strategy a step further by focusing not just on capturing the integrated payments opportunity through partnerships with the ISVs/VARs, but through owning the software for enabling payments. The company is focused on driving growth with its technology enabled strategy, accounting for ~30-35% of North America revenues, and plans to push this contribution toward 50% over the next several years, which should not only benefit the organic growth, but also the margins.



Offsetting pricing pressure through value-added services

The sale of value added services is helping offset the pricing pressure in the core processing spreads (new merchants signed at 60-70% of existing merchant spreads, per First Annapolis), which will likely increase as ISVs/VARs increasingly become aggressive on pricing. In addition, Chase could potentially accelerate the pricing pressure in the industry across the large merchants by offering better economics, which could lead to share shift, but we will monitor the company's plans for moving down market in SMB.

Monitoring potential disruptions from ChaseNet

ChaseNet leverages an instance of Visa's VisaNet network taking on the role of the acquirer, network, and issuer with the ability to offer better economics as a result of its strategy and have better control over the operating rules. Chase had previously partnered with MCX, the retailer consortium, and could expand into new deals with the large MCX merchants. Chase expanded its relationship with WMT to process Chase card payments excluding PIN debit across 5k+ Wal-Mart and Sam's Club locations in the US, and on the Sam's Club eCommerce website, applicable to all Chase card transactions. The company has offered guaranteed fixed-rate pricing for Chase Visa credit and debit payments with the economics likely being lower than the deals WMT has inked with other acquirers and networks. Merchant acquirers with the highest exposure to large US merchants include VNTV and FDC, in our view.

Potential impact to acquirers from ChaseNet

Although we believe the WMT deal is likely manageable to the acquirers, namely VNTV and FDC (estimated low single-digit millions impact), we expect the company to potentially pursue similar deals with other MCX merchants, which could further impact volumes and pricing dynamics. In addition, we will continue to monitor Chase's intentions on moving down market into SMB, which could be more impactful. Furthermore, we will monitor for other issuers to potentially respond through partnerships with the networks and other acquirers, which could accelerate the pricing pressure in the industry.

Chase Pay economics provide value to the merchants

Chase has also launched Chase Pay, and we believe the company offers a simplified fixed flat fee for MCX merchants (we estimate ~\$0.10 for debit, ~\$0.30-\$0.40 for credit, depending on the merchant volume) replacing interchange fees and not being tied to the transaction amount. The potential Chase Pay economics would provide significant value and incentive for the merchants to accept and promote Chase Pay, in our view.

ChaseNet and Chase Pay attempting to disrupt the acquiring landscape

ChaseNet causing disruption in the ecosystem

ChaseNet was originally called Chase Merchant Services and was first introduced in February 2013. ChaseNet is a closed loop network licensing a version of Visa's VisaNet network. ChaseNet takes on the role of the acquirer, network, and the issuer creating a three-party scheme. The biggest concern from ChaseNet is the potential to reduce the role of acquirers as it essentially creates a direct connection between issuers and merchants in addition to providing better economics, which could further accelerate pricing pressures in the industry. Chase will have a greater ability to set merchant pricing in addition to more control over operating rules. Other large issuers, which have



an acquiring business, could follow a similar path creating their own closed-loop three-party network. Furthermore, Chase could expand into new deals with all of the MCX merchants (Chase Pay had previously partnered with MCX), and should Chase attempt to push downstream into SMBs, the impact to acquirers could be more severe.

Understanding Chase's intent for being aggressive with ChaseNet

Benefits of ChaseNet's closed-loop, three-party system includes increased security, lower card acceptance fees for merchants, and ability to offer more value-added services. At its investor day in February 2016, Chase highlighted expectations to process \$50bn in volume on ChaseNet by the end of 2016. Chase's intent for being aggressive with ChaseNet is still unclear; however, it could be potentially pushing commercial relationships with large merchants as well as improving engagement with the consumers, essentially driving higher value to the Chase card members, and hence, driving greater volume on its cards. Chase is also focused on leveraging data to help merchants and in turn help Chase improve volumes and gain market share.

Detailing the Chase-WMT deal

Chase announced an expanded relationship with Wal-Mart last week to process Chase card payments at WMT (except PIN debit) using ChaseNet across 5k+ Wal-Mart and Sam's Club locations in the US, and on the Sam's Club eCommerce website. Chase was already processing Wal-Mart eCommerce payments. The deal is now applicable for all Chase card transactions, which was previously applicable only for its mobile app, ChasePay (expected to launch in near-term). Chase has offered guaranteed fixed-rate pricing for Chase Visa credit and debit payments, and we believe the economics are likely lower than the deals WMT already negotiated with acquirers and networks.

Chase-WMT deal implications to acquirers and Visa

Chase not only disintermediates Chase payment volumes at large merchants, but the deal also impacts acquiring economics. We believe the Chase-WMT deal impact to FDC and VNTV should be manageable as we estimate the revenue impact to be in the low single-digit millions. However, we expect Chase to pursue similar deals with all MCX merchants and will continue to monitor whether Chase plans to move this strategy down market to the SMB segment, which could be much more impactful. In addition, other large issuers including BAC, WFC, and Citi are constrained by not having their own private network, which Chase secured in the 10-yr deal with Visa in 2013, as well as an in-house acquiring business. However, it remains unclear if the other issuers respond through partnerships with networks and other acquirers potentially pressuring acquiring spreads. For Visa, the deal slightly lowers the company's take per transaction if ChaseNet gains traction (they get paid a bit lower for a ChaseNet transaction than a normal transaction, but still get paid per transaction), although Visa makes less money from large merchants due to incentives (not likely to be material).

Acquirers with high exposure to large merchants most impacted

Merchant acquirers such as FDC and VNTV, which have exposure to the larger merchants, could be most impacted as they could lose volumes. The bigger concern however is if this wholesale pricing spreads to other large and even smaller retailers is impacted which wouldn't be a positive trend for the industry. The launch could potentially be a turning point given its success could spur other global banks to follow in its footsteps creating their own



closed loop network through potential partnerships with networks and pushing their own mobile payment solutions. Downstream success for Chase could come at the detriment to acquirer volumes, particularly at large merchants; however, lack of success would potentially drive banks to partner with existing solutions.

Significant leverage gives Chase importance in the payment ecosystem

Chase is an important player in the payments landscape, having a banking relationship with one out of every two households (\$754bn in payment volume in 2015), 90m accounts, 36m debit or credit card payments accepted daily on Chase issued cards, and almost \$1trn processed through Chase Paymentech. Chase has significant scale in card issuance as the #1 US card issuer and in acquiring as the #1 US acquirer by volume. In addition, Chase has roughly 50% of the eCommerce volume. Chase's Visa-licensed private network, ChaseNet, has the opportunity to shift the economics toward data driven value added services. Visa had previously struck a 10-yr deal in 2013 with Chase. The networks have been in multiple disputes with large merchants on topics from signature PIN routing to anti-trust litigation. In fact, Walmart Canada is in the process of phasing out acceptance of Visa cards in 400 locations nationwide. Chase's significant size and leverage in the payments ecosystem has allowed the company to essentially bypass networks and acquirers inking the deal with WMT to utilize ChaseNet.

Chase Pay entering the playing field with attractive economics

Chase has ~90m accounts with 36m debit and credit card payments daily, which provides the company with a solid footing on the consumer side. Chase Pay economics provide significant value to the merchants as there are no associated network fees, no merchant acquiring fees, and no charges for fraud once a transaction has been approved. Merchants will have the opportunity to lower the cost of acceptance overtime as volumes grow. Chase Pay also partnered with MCX, a consortium of 40 merchants, in October 2015 to help expand merchant acceptance and is now expected to launch late 2016 after some delays. Chase Pay is expected to be available in over 100k retail locations as a result of the MCX partnership and will be accepted by merchants who are not Chase Commerce Solutions clients through partnerships with 17 technology vendors (FIS, AJB software, et. al.). We believe Chase Pay plans to charge a simplified fixed flat fee for MCX merchants of ~\$0.10 for debit and ~\$0.30-\$0.40 for credit depending on the merchant's total volume (replaces interchange fees and is not tied to the transaction amount).

Delayed launch of Chase Pay

Originally to be released mid 2016, the Chase Pay app was released late 2016, though it was already available for checkout at select online retailers. The in-store delay could cause some merchants to partner with Apple Pay/Android Pay or create their own mobile app (such as Wal-Mart Pay), although Chase was still on-boarding key merchants such as Starbucks, Shell Oil, and Philips 66 prior to the app's rollout. Most recently, Best Buy announced acceptance of Chase Pay in-store, in-app, and on its website. Chase Pay will have two interfaces upon launch providing consumer choice. Merchants receive more value not only through reduced fees, but also through preservation of their own loyalty programs. The value proposition to both sides of the equation is compelling.



Chase exiting the ISO channel

Integrated payments, bank referral, and online/mobile are important building blocks for growth in acquiring particularly for SMBs as ISOs have fallen out of favor. In January 2016, merchant processor First American Payment Systems announced the acquisition of Chase Commerce Solutions' independent sales organization (ISO) portfolio. Although the ISO channel continues to represent a relatively significant channel for many merchant acquirers, Chase has de-emphasized the channel using the ISOs more as support.

Competitive dynamics impacting pricing and volumes

New distribution channels coupled with integrated solution driving growth

We expect the highly competitive nature of the merchant acquiring business, which is reflected in the yield pressures and high attrition rates, particularly in the traditional channels, to continue as the ISVs/VARs become more aggressive. Core processing net spreads continue to face pressure; however, the silver lining is in the shift to higher margin value-added services. We expect new incumbents including the aggregators and online players as well as the shift in technology, which enables new distribution channels such as the ISVs/VARs to drive further competitive pressures. In addition, recognizing the pricing pressures in acquiring spreads, ChaseNet and ChasePay, including the partnership with WMT, seem to accelerate these trends given the better economics offered. However, merchant acquirers, which are able to shift their business model toward new distribution channels and technologies while aligning their consumer payments and merchant acquiring business, should be best positioned to deliver value to the merchants and ultimately gain share particularly in the highly fragmented SMB market.

Value-add services offsetting pricing pressure

Due to the high levels of competition in the merchant acquiring business, core processing net spreads continue to face pressure. The net spread continues to deteriorate for newly signed merchants, and First Annapolis study suggests that the net spread for new merchants recently is 60-70% of the spread for existing customers. Hence, the mix of new versus old merchants on the platform can impact the growth and even more so for those acquirers with higher attrition rates. In addition, Chase's plans to offer better economics could further pressure spreads and potentially shift share disrupting volumes towards competitors. However, value-added services have higher margins and help lower the attrition given the more sticky business management solutions embedded into the business. In addition, given the large variations in pricing in the marketplace for new merchants signed, acquirers, which are able to utilize the various distribution channels most effectively, train and deploy sales teams most efficiently, and offer the most robust value-added services, should be able to offset the core processing pricing pressure.

Integrated payments still in the early stages

Integrated payments enhancing the value proposition

Integrated payments are maturing into the de facto standard and have a long runway ahead. Integrated payments refer to the integration of payment processing with various retail/business management software solutions/applications sold through the Value-Added Resellers (VARs) and Independent Software Vendors (ISVs) such as accounting and customer relationship management (CRM), among other useful tools. The integration of



payment processing with retail/business management software/applications creates a significant value proposition to the merchants and has become a source of growth for the merchant acquirers. Integrated payments help streamline business processes, lower costs, increase accuracy, and drive growth for businesses through data collection and more effective marketing campaigns.

Business management software creates stickiness with merchants

The business management software developed by ISVs and sold through VARs is integrated with the merchant's business. For example, the merchant could have its customer relationship management software (CRM) embedded within the payment solution along with its accounting software, business analytics software, and other software such as its rewards program or marketing program. These business management tools when integrated create a significant value proposition to the merchant as it allows the entire business to be run efficiently and effectively. However, due to the integration, dependencies, and wealth of information collected and stored across the applications, these tools tend to create stickiness with the merchant as it becomes harder for them to switch providers.

Pricing still important, but no longer the only decision factor

The integrated payment solutions provide significant value to the merchants in the form of efficiencies and cost reductions as well as operational excellence and differentiation among competitors helping to grow the business. Although pricing is always a consideration, we have seen a shift in the sales pitch toward functionality especially for industry specific tailored solutions, which has pushed pricing more towards a secondary consideration point. Historically, the direct channel where new merchants were acquired by going door-to-door was centered on a few pieces of functionality and pricing was a key consideration.

Large attractive addressable market for integrated globally

At its 2015 Analyst Day, Global Payments (GPN) detailed the market opportunity for integrated solutions globally in combination with Euromonitor data. North America is the largest target market as it's less than 10% penetrated with the small- to mid-sized merchants being the most penetrated. Overall, North America represents a ~\$5bn opportunity while Europe represents a ~\$3bn opportunity and Asia Pacific a ~\$2bn opportunity. GPN plans to utilize OpenEdge and Ezidebit to serve customers globally. The company believes it has a foothold in Canada and is already live in the UK while Asia represents a significant opportunity and South America is a developing opportunity. The company plans to leverage regional expertise along with global partners as well as OpenEdge and Ezidebit complimented with aggressive business development to globalize and scale the ecosystem market by market.

Underpenetrated and fragmented SMB space still large and attractive

There is also still a large opportunity in the SMB space. In payments and POS services alone, US card volume is expected to represent ~\$10trn by 2023 while the US SMB SaaS spend is expected to represent \$17bn by 2018 according to data from Nilson and IDC. In Financial services, US SMB loans and demand for new credit is currently ~\$210bn while US payroll services spend is ~\$16bn. On marketing, US restaurants spend an average of ~\$70bn per year in takeout related services while local ads for US restaurants represent ~\$138bn in spending currently. In aggregate, these market opportunities represent a



\$200bn US revenue opportunity. Square (SQ) looks well positioned to capitalize on this opportunity with its suite of fully-integrated payment solutions, which have competitive pricing. In addition, Square Capital has the ability to penetrate the US SMB loan space while Caviar positions well in the restaurant vertical.

Merchant acquirers positioning in integrated payments

The traditional acquiring business became more commoditized as payments started to be embedded within business applications and cloud-based POS operating systems. The merchant acquirers have built out or acquired strategic assets in order to capture the opportunity and have shifted their distribution model toward direct channels and ISVs/VARs supplementing the traditional ISO/field sales approach. GPN acquired APT and PayPros (Open Edge) to gain a foothold in integrated payments, and with the recent acquisition of HPY, stands to accelerate its integrated offering in the US market. In addition, Vantiv (VNTV) acquired Mercury and Element positioning in integrated payments while TSS recently acquired TransFirst helping accelerate its push into integrated. FDC acquired the software-based POS solution Clover, but has had limited success and maintains plans to expand its integrated strategy primarily through organic investments. Square has built a fully integrated payment processing and business management ecosystem from the ground up and remains well positioned as the company attempts to move more up market into larger merchants, which are still considered by most companies to be in the SMB space given the size classifications at SQ.

New distribution models utilizing ISVs/VARs disrupting share at ISOs

New models curb attrition and margin pressures

The distribution strategy for the merchant acquirers has shifted in recent years. Traditional distribution channels such as ISO/field sales are now being supplemented with dealer/developers who are being utilized to acquire new merchants through ISVs and VARs. ISVs are the organizations, which actually develop the business management software solutions while the VARs sell the software solutions to merchants as well as the computer systems, which operate the software. The direct and dealer/developer channels through the ISVs and VARs are growing much faster than the traditional channels. Importantly, merchants acquired through ISVs/VARs are less prone to switching given the embedded business solutions and provide higher yields compared to ISO/referral and direct sales. The traditional channels are lower margin due to the pass-through included in the revenues and expenses, which pressures the margins as the ISOs grow and command a higher percentage of revenues. However, we do expect the ISVs/VARs to become more aggressive over time. We believe GPN/VNTV are best positioned due to the APT/PayPros and Mercury/Element acquisitions, which provided a strong ISV/VAR network (VNTV has ~3k VARs) while competitors such as FDC have organically developed their own network, and now there are only smaller vertical specific ISV/VAR assets left in the market for potential acquisition.

Low penetration and rapid growth make ISV/VAR channel attractive

According to First Annapolis, the ISV distribution model, the aggregator model, and the market place model together still represent a relatively small portion of the overall market at ~10% of current volume, but account for over half the growth. Despite representing ~9% of new merchants signed and ~4% of the



volume, the ISV/VAR channels are growing rapidly and taking share from ISOs with their sweet spot being the fragmented SMB market. In addition, despite the advent of faster, more efficient, and less costly iPOS solutions, which provide value to the merchant, still 30% of the installed terminal base in the US are dial terminals, showcasing a long runway for integrated solutions. Furthermore, banks still account for 40% of the new merchants signed and remain the largest lead source.

Highly fragmented market with lack of contractual exclusivity

The ISV channel is highly fragmented with +10k developers and +60% having annual revenues less than \$500k, according to First Annapolis. Despite the increasing number of partnerships with acquirers, most ISVs don't hold more than one acquirer relationship outside of the major players such as Micro, NCR, and Squirrel as ~84% are certified to only one acquirer and 1.6% to more than five. In addition, First Annapolis believes there isn't any contractual obligation of exclusivity, but rather de facto exclusivity. Overall, the highly fragmented market and lack of contractual exclusivity in most cases provides a significant opportunity for acquirers to partner and grow their merchant base utilizing the ISV channel.

ISVs/VARs helping penetrate the highly fragmented SMBs market

Historically, the merchant acquirers have captured the SMB market through building out their direct sales force, acquiring strategic assets, and partnering with ISOs. However, the ISVs/VARs represent the newest form of partnership for acquirers and have quickly become one of the fastest growing channels, particularly in the SMB market, taking share from the traditional ISOs. ISVs/VARs tend to have very sticky relationships with merchants driven by their consulting led approach, their expertise in iPOS solutions they deliver to the market, and difficulties in switching providers due to the integration of various business applications.

Changing international dynamics and opportunities for expansion

International expansion in focus for leading US players

Many of the acquirers are making efforts to expand internationally given the significant opportunity abroad, especially with more lucrative cross-border transactions. GPN has the largest exposure internationally (~32% exposure post HPY; \$768m in FY16) and continues to grow its channels by extending HPY and its integrated payment solution, OpenEdge, into Canada and the UK with plans to extend it further across Europe, which is also boosted by the Realex platform. In addition, the company has invested in growing online acquiring channels in the Asia Pacific with its Ezidebit (growing over 20% the past two QTRs) and eWAY acquisitions. VNTV is predominantly focused on the US, but does see opportunity to invest abroad, specifically in the eCommerce category, which is seeing its fastest growth in the Asia Pacific. FDC generates more revenue internationally than GPN at \$885m in FY15, but it makes up a smaller percentage of total acquiring (22% of acquiring revenues) given its market leading position in the US. FDC is in the middle innings of a turnaround and has made solid progress while expanding internationally, with a focus on Latin America, with its newly established merchant acquiring business in Brazil as well as India with the ICICI JV. In Europe, lower debit interchange provided a transitory benefit for merchant acquirers (Spain was an early adopter and those benefits have lapped) as it typically takes 12-18 months for spreads to



adjust lower. GPN, specifically, continues to benefit from interchange actions in the UK, which is expected to continue until the benefit anniversaries in December 2016. Square, with its transparent pricing model, noted potential to eventually extend its offering to SMBs internationally.

Omni-channel represents a significant opportunity

Given the significant growth in mobile and online retail, omni-channel acquiring solutions have become an important element for growth among acquirers. GPN added 4k new eCommerce customers in the UK and Ireland as well as signing several enterprise eCommerce clients in the UK in 4Q16 driven by its Realex platform's scalability, reliability, and performance. The company expects growth to continue driven by the rollout of its bundled eCommerce solution in Spain as well as the integration of Heartland's eCommerce offering its global eCommerce solutions by the end of CY16. In addition, the acquisition of eWay helped expand its scope of offerings in the Asia Pacific region. VNTV, as previously mentioned, noted a significant opportunity internationally, but is still more focused on the online channel internationally and noted potential for M&A in eCommerce while the US continues to be its main focus. However, competition is stiff in the online acquiring space, given full stack solution providers like Stripe and PYPL (via Braintree). Traditional acquirers are best positioned to compete with online acquirers by providing omni-channel solutions, enabling brick-and-mortar merchants to accept orders online (or vice versa) while also providing a range of security and data services from POS to online channels, especially given the majority of retail sales are still completed in-store.

UK distribution channels shifting

Historically, banks have been a key distribution channel in the UK, but the market has begun emulating the US by shifting to ISVs with the trend expected to continue, per First Annapolis. With the reshuffling due mostly to the bank's passive approach, distribution in the UK has evolved to include hundreds of parties across three categories, namely acquirers and ISOs, PSPs, and ISVs. PSPs have evolved due to the rise of eCommerce and corresponding product gaps in front-end technology while ISVs can offer business software, services, and integrated payment solutions, per First Annapolis. While ISOs may have lost their foothold, many have embraced these shifting trends, with 50% of PSPs in the UK now offering a merchant account, per First Annapolis.

Security, encryption, and tokenization delivering new opportunities

Shift to EMV opening new opportunities for acquirers

The shift to EMV in the US has opened new opportunities for merchant acquirers as they help their clients better understand security and fraud while replacing their terminals with EMV enabled devices. While some merchant acquirers have been able to leverage EMV non-compliance fees, we believe these incremental revenues will come down as the long-tail merchants become compliant. More importantly, players such as VNTV, which have been helping clients accelerate the shift to EMV-enabled devices, are using EMV as a catalyst to win new business in addition to protecting their base of clients. Furthermore, EMV has helped to drive growth in the traditional ISO channel in some cases to mid single digits versus previous flat to modest growth given the opportunity for ISOs to have entry discussion points into the merchants related to security, tokenization, and other value-add products. In addition,



merchant acquirers such as VNTV and FDC have benefited from card personalization and re-issuance in their respective financial institutions oriented segments.

Online/mobile acquiring and payment gateways

Integrated cloud-based POS solutions differentiating key players

Due to the significant value proposition, we have seen an uptick in the adoption of iPOS solutions particularly among SMBs, which need a one stop shop to manage their business effectively and efficiently. Although the cloud-based iPOS solutions pose disintermediation risks to the traditional terminal vendors such as Verifone and Ingenico, they also provide significant opportunity to take share from incumbents such as Square, Poynt, Leapset, Revel Systems, and Shopkeep. The cloud-based POS players offer no or significantly low upfront costs and low monthly payment plans similar to the SaaS model, which coupled with the value proposition, is driving share gains. Square, in particular, has been aggressively moving up market into the larger merchants (although the size categorization is still more reflective of SMB) and has new solutions catering to EMV and contactless payments. In addition, merchant acquirers such as FDC, which purchased the software-based Clover POS solution remain well positioned to cross-sell into their existing client base and capture new merchants helping drive volumes coupled with its significant bank referral partners.

Addressable market and share trends

Large addressable market

As per the Nilson Report, consumer payment card purchase volume is expected to reach \$7.6trn in 2018 and is estimated to reach \$10trn by 2023. In addition, according to the Nilson Report, Global Purchase Volume is expected to post a 12% CAGR from \$16.3trn in 2013 to \$49.1trn in 2023. Global Purchase Transactions are expected to post a 10% CAGR from 187bn in 2013 to 469bn in 2023. Furthermore, US Purchase Volume is expected to post an 8% CAGR from \$4.5trn in 2013 to \$10trn in 2023.

SMB an important growth driver for economy

SMB market is a clear growth driver for the economy as the US Census Bureau's 2012, 2013, and 2014 reports and the US Small Business Administration's March 2014 report estimate that the ~30m small businesses in the US generated ~46% of the private sector output in 2010. In addition, many small businesses are likely not included in this analysis, and we believe small businesses will continue to drive the economy moving forward. Furthermore, Kauffman Index Startup Activity 2015 estimates that in 2014, ~530k new entrepreneurs started businesses each month. New business formation and small business growth is a key factor for Square to continue to grow above market rates.

SMB spending outlook

The US small and medium-sized businesses including micro businesses were projected to spend ~\$11bn on all types of SaaS products in 2014, which is expected to grow to ~\$17bn by 2018. In financial services, US SMB loans and demand for new credit is currently ~\$210bn while US payroll services spend is ~\$16bn. On marketing, US restaurants spend an average of ~\$70bn per year in takeout related services while local ads for US restaurants represent ~\$138bn



in spend currently. Square is well positioned to capitalize on a large, underpenetrated and underserved market opportunity in SMB payments. In aggregate, these market opportunities represent a \$200bn US revenue opportunity for Square. In addition, Square has a presence in Canada and Japan with plans to expand into additional countries.

Global market share trends for acquirers

In 2015, Chase Commerce Solutions was the largest merchant acquirer worldwide based on volume, as per the Nilson Report data. First Data was the second largest followed by Vantiv, Bank of America, and Global Payments while WorldPay held the #6 spot followed by Elavon, Alipay, Barclays, and PayPal. Vantiv was the largest merchant acquirer worldwide in 2014 based on number of transactions having ~8.7% market share of the top 150 acquirers, as per the Nilson Report data. Bank of America held the #2 spot (~7.9% share) followed by Chase Commerce Solutions (~7.5% share), First Data (~6% share), WorldPay (~5.4% share) and Citi Merchant Services (~4% share). Global Payments was the ninth largest merchant acquirer worldwide in 2014 with ~2.9% share while Heartland was the twelfth largest with ~2% share.

US market share trends for acquirers

Over the past five years, First Data has held a leadership position in the US based on number of transactions having processed 18.36bn transactions in 2015 (+3.1% Y/Y). Previously in the #2 position for the US in 2011, Bank of America has dropped to #4 over the past five years having processed 14.44bn transactions in 2015 (+1.7% Y/Y). These two companies have transaction growth at a much slower rate than competitors Vantiv and Chase over the past five years. As a result, Vantiv has moved from the #3 position in 2011 to the #2 position in 2015 having processed 17.67bn transactions in 2015 (+14% Y/Y) while Chase has moved from the #4 position in 2011 to the #3 position in 2015, having processed 14.97bn transactions in 2015 (+10.9% Y/Y). In addition, Heartland Payments processed 4.28bn transactions in 2015 (+12.6% Y/Y) climbing one spot over the past five years to #5 in 2015 while Global Payments processed 2.74bn transactions in 2015 (+9.6% Y/Y), dropping from the #7 spot in 2011 to #9 in 2015. Notably, Global Payments acquired Heartland Payments in April 2016 and would put the combined company in the #5 spot for 2015 while Total System Services acquired Transfirst propelling the combined company into the #10 spot. Vantiv has gone from ~14% market share in 2011 to ~19% market share in 2015 while First Data market share has come down from 23% in 2011 to 20% in 2015. In addition, Bank of America market share has gone from ~18% in 2011 to 16% in 2015 while Chase has been able to gain market share from ~12% in 2011 to ~16% in 2015. When comparing top US merchant acquirers by payment volume, Chase holds the leadership position followed by First Data, Vantiv, Bank of America, and Elavon for 2015. Global Payments ranked #7 while Heartland ranked #8 based on payment volume in 2015 and combined would rank #6. Total System Services ranks #12 in 2015 based on payment volume while TransFirst ranked #10, and combined would rank #10 in the US by payment volume for 2015.

Europe market share trends for acquirers

In Europe, WorldPay is the largest merchant acquirer based on number of transactions as of 2015 while Sberbank and Barclays ranked #2 and #3. There has been a shift in share among the top three acquirers based on transactions as in 2011 Barclays held the #2 spot while Group Credit Mutuel held the #3 spot, and Swedbank Group at the time was #5. In addition, although Global Payments didn't rank in the top ten for 2015, the HSBC/Global Payments in



2011 held the #7 spot while in 2015 Global Payments was #13. To note, WorldPay and Barclays has a greater presence in the UK while Sberbank has a foothold in Russia and Nets has a greater focus on Denmark while Credit Mutuel, Credit Agricole, and BPCE are focused on France. JP Morgan and Elavon have a greater presence in Ireland while Swedbank is based in Sweden. Based on volume, WorldPay still ranks as the #1 merchant acquirer in Europe followed by Barclays and Credit Mutuel while Global Payments ranked #6, according to the Nilson Report data. While WorldPay and Barclays held their leading status as #1 and #2 since 2011, HSBC/Global Payments was ranked #7 in 2011 and in 2015 Global Payments had moved into the #6 spot. In addition, the 2015 data for Global Payments does not include the UCS Russia business or the La Caixa joint venture (Comerica) in Spain.

Detailing the acquirers unique go-to-market strategies

GPN progressing with OpenEdge, Ezidebit, and Heartland

GPN plans to utilize OpenEdge and Ezidebit to serve customers globally, tapping a combined \$10bn opportunity in North America, Europe, and the Asia Pacific. The company plans to leverage regional expertise, global partnerships, and OpenEdge/Ezidebit, complimented by aggressive business development, to globalize and scale the ecosystem market by market. OpenEdge typically has attrition rates in the mid- to high-single digits, lower than the typical client attrition rates, and Ezidebit is growing strong +20%, despite weakness in the China economy. The HPY acquisition further accelerates the company's integrated payments technology solutions in the US. GPN will gain significant breadth in the US and plans to deliver accelerated revenue growth through leverage of HPY's products and services as well as by combining OpenEdge's partner integration marketing and distribution capabilities with HPY's technology and expertise. In addition, opportunities to cross sell HPY's products, namely POS, payroll, loyalty, and gift solutions, into GPN's customer base bode well and GPN gains meaningful presence in verticals it's currently not exposed to.

Vantiv strategically focusing on high growth channels

Vantiv's strategy is centered on further expanding its high growth channels including integrated, merchant bank, and eCommerce, which together grew 22% Y/Y in 2Q16 and is expected to sustain mid to upper teens growth in FY16 and contribute ~50% toward the Merchant segment. VNTV's integrated strategy and shift in distribution model toward ISVs/VARs has been driven by strategic acquisitions including Mercury and Element (now has ~3k VARs). In addition, VNTV has only mid single digit market share in bank referral with ~4k banks still ramping while eCommerce initiatives were accelerated with the acquisition of Little and continue to benefit from the secular shift to online. VNTV has delivered significant new enterprise wins recently including USPS (expected to benefit starting 2H16), and extended its long-term agreement with Fifth Third while the Capital One migration is expected to weigh in FY17. In addition, VNTV's ISO channels has recently benefited from EMV both in Merchant and in Financial Institutions segment (card re-issuance), which is expected to trail into FY17. VNTV has also has a shareholder friendly capital allocation strategy, which includes accretive TRAs as well as share repurchases. In addition, with more normalized leverage post acquisitions at 3.1x as of 2Q16, VNTV has the ability to pursue M&A with Moneris being a potential target, as per a recent Bloomberg article (6 July).



First Data revitalizing the enterprise strategy

FDC is a turnaround story, and the company has made significant progress having revamped its management team, restructured its go-to-market strategy, invested in next-generation commerce solutions such as Clover (acquired five other commerce tech start ups), and strengthened its balance sheet driving revenue growth from flat Y/Y in 2013 to mid single digits constant currency. The company has a multi-prong strategy with a revitalized emphasis on enterprise clients having reshaped its sales organization and built out a product suite tailored to large merchants helping lower the merchant's overall cost of acceptance (Telecheck, STAR debit network, TransArmor) and drive revenues (closed-loop gift cards, Gyft), which should help it win large merchant accounts compared to competitors solely focused on acquiring. The company is just starting to on-board previously won large merchants such as Toys "R" Us, PetSmart, and Cabela's, and more recently partnered with four large banks (BBVA, First Tennessee, Zions Bank, and Silicon Valley Bank) each in varying stages of ramp up. In addition, the company's suite of solutions should help curb the US SMB attrition while its leading PIN debit network STAR could potentially increase share from moving to PINless transactions. Acquisitions including Gyft and Transaction Wireless also open opportunities in fast growing digital market and deliver synergies to its existing gift card processing business. Furthermore, FDC is focused on expanding internationally particularly in India given its JV with ICICI, and in Brazil, given establishment of a new merchant acquiring business.

TransFirst propels TSS integrated payments push

The TransFirst acquisition propelled TSS to the #6 acquirer position in the US by revenue and #10 by volume (up from #12) as well as giving it greater exposure to eCommerce and integrated payments. The acquisition helped accelerate revenue growth for its Merchant segment to high single digits. TransFirst is a high quality acquirer, which grew low double digits and sported 50% EBITDA margins in FY15. With the acquisition of TransFirst, the company is the third largest integrated payments provider in the US based on revenue and, in 2016, expects to process over \$117bn in volume. TSS is currently integrating the two organizations and expects those efforts to be complete in ~12-18 months. The company also has partnerships with over 2k technology providers, which create customized business solutions for key verticals such as Healthcare, B2B and not-for-profits and gives the company access to the attractive SMB space (36% of the processing market). The company plans to continue partnering with technology providers that serve new verticals where it believes the marketplace is underserved. Furthermore, the company will focus on deleveraging to a more sustainable range and on tuck-in/product plays that may complement the current platform.

Square driving up market with fully integrated POS solution

SQ has built its fully integrated POS solution from the ground up, initially focusing on SMBs where the company has had significant success and is pushing up market into somewhat larger merchants. The company has a full ecosystem of payment solutions beyond just core payment processing from its traditional magnetic stripe dongle devices and new EMV/contactless dongle devices to Square Register for larger merchants and Square Capital for business loans. Square Register offers an expansive set of merchant solutions including analytics, employee management, appointments, and invoicing. In addition, the app marketplace could see further expansion of vertical-specific solutions. Square leverages its expansive merchant base, deep understanding of seller business models, risk, cash flow, payback and working capital to



underwrite and extend cash advances to its sellers at below industry fraud loss rates as part of Square Capital. Square offers an end-to-end local SMB marketing solution through Customer Engagement, CRM software solutions for direct and email-based marketing products to target local channels offering custom loyalty, rewards, and coupon offers to its existing customer base, improving both retention and sales volume for the seller. With a very visible brand name, growing customer base and expansive solution set, Square has disrupted the small merchant acquiring landscape with first to market innovative products, transparent and simplified pricing, and end-to-end commerce platform. Square has guided to 20-25% LT revenue growth, significantly higher than the traditional merchant acquirers driven by secular tailwinds, share gains, moving up-market into mid-tier retailers, value-added POS services, and expanding into financial and marketing services. In addition, Square expects profitability to improve and has guided to 35-40% LT EBITDA margins, driven by operating leverage.

[Evertec positioned to capitalize on LatAm opportunity](#)

Evertec, one of the largest merchant acquirers in LatAm and the largest in the Caribbean/Central America, processes more than 2bn transactions annually and offers a suite of services for core bank processing, cash processing and technology outsourcing. Although fiscal austerity from the PROMESA legislation could weigh in the near term, EVTC remains optimistic about opening up new opportunities going forward from electronic payments penetration and technology initiatives. LatAm revenues grew double-digits in 2Q due to the Processa acquisition, which was completed in 1Q16, and the push-out of a LatAm client transition. EVTC also signed a contract with Davivienda, the 3rd biggest Colombian bank, for payment processing in Honduras and signed a new tax contract in 2Q with the Puerto Rican government, which bodes well for sustained low-single digit revenue growth in Business Solutions. Evertec views the rise of the middle class, adoption of electronic payments, and an existing pipeline of deals in LatAm as opportunities to accelerate revenue growth.



Revisiting the Important US Debit Market

Detailing the debit share shift debate

With V recently clarifying its debit routing rules and the US EMV rollout influencing debit share, we believe it is prudent to review dynamics within the US debit market. EFT networks are developing new methods, like PINless and signature networks, in an attempt to capture more debit share. However, we expect V/MA to retain and possibly gain share, especially from smaller networks, driven by pricing/volume incentives (FANF) and routing methods (PAVD). All parties involved should continue to benefit from secular growth in debit. We will continue to monitor routing volume impacts in the US debit market, but remain confident in Visa and MA's position and will monitor FDC's initiatives.

For more detailed information about US debit market dynamics, please visit our 14 December 2016 note titled, "Deep Dive on the US Debit Market."

EMV rollout potentially impacting debit share

Following several high exposure cases of card fraud, the more secure chip EMV standard began rolling out in the US. While the transition has been slow (~45-50% of stores expected to have EMV terminals by year-end, per V) given the high costs, we believe EMV has helped signature networks, given that custom logic is needed to implement EFT network AIDs while the global network AIDs (V/MA) are required or pre-installed on EMV terminals. In 2015, 65% of transactions and volumes were routed over dual-message networks, and we anticipate that number has tracked slightly higher vs. single-message networks through 2016. We estimate US PIN debit market share (by volume) at 32% for V (Interlink), 22% for MA (Maestro), 15% for STAR, 14% for Pulse, 7% for NYCE, 5% for Accel, and 5% for other EFT networks. We will continue to monitor the EFT networks ability to grow their share going forward.

PINless debit threat

Nearly 82% of network fees come from dual-message networks, as per the FRB, representing a sizeable revenue opportunity for EFT networks to introduce PINless or sig capabilities. PINless allows EFT networks to compete in different categories, such as eCommerce, though dollar cap restrictions (mostly \$50 per txn) due to increased fraud risk posing a challenge. FDC specifically introduced PINless functionality in 2015, and we believe it is well positioned to gain share, given its significant presence in the PIN debit market while ~70% of its issuers are enabled for PINless txns. However, only one-third of its merchants are enabled (long runway ahead). We believe the overall PINless market remains small because merchants have chosen not to route sig transactions as PINless to maximize network incentives, while usage has been limited due to dollar caps.

Incentives for volume

Durbin displaced the non-exclusivity provision that V/MA had with issuers, leading to significant PIN debit share loss for V with it losing 50% of its exclusive contracts. However, V utilized several strategies to incentivize merchants to route transactions over their networks, namely pricing incentives,



like FANF, and new routing methods, like PAVD. V/MA also incentivizes issuers to maintain brand presence on cards with dual-message networks paying 92% of overall issuer incentives from networks. The recent EMV transition has made routing over signature networks easier, with custom logic needed to implement EFT network AIDs. While merchant litigation remains a headline risk, with potential changes to routing rules and/or pricing, we do not believe a material change to rules is likely. Nevertheless, it is a risk to keep monitoring.

Uncovering the US debit market

The Durbin Amendment has caused significant changes since implementation for the US debit card industry by lowering the interchange that bank issuers earn on debit and mandating that issuers provide network choice with the regulations, even driving share shift, as is the case of Visa. However, Visa was able to regain its current strong positioning in the debit market through incentives, pricing, lower variable costs and routing strategies such as Fixed Acquirer Network Fee (FANF) and PIN Authenticated Visa Debit (PAVD) for bypassing anti-exclusivity regulations. We estimate V has 51% market share of US debit by volume, including Interlink, while MasterCard has 33% share including Maestro and other EFT networks command 15% share combined.

Although Visa and MasterCard have by far the largest share of US debit, the EFT debit networks continue to devise ways to regain share such as with the competitively-priced PINless debit solution, which started out as a way for online bill and specific eCommerce category spend and has subsequently been rolled out for small value in-store transactions. FDC for example with its STAR network is attempting to gain share through PINless debit as well as new signature debit networks, and is targeting mid single digit share gains in each. Overall, we believe the greatest risks to the Networks come from the growth in alternate payment solutions from the EFT networks. FDC's STAR network is a primary challenger, with ~15% share of the PIN market and development of PINless and dual-message capabilities.

Recently, the EMV migration has presented challenges for the US debit industry, including the creation of network standards, implementation and maintenance of POS terminals as well as routing (Chip and PIN vs. Chip and signature). We believe the recent EMV upgrade cycle has been a benefit to the signature networks, namely V and MA, given creation of AIDs and routing preferences preinstalled on terminals. Currently 82% of network fees in the US are received by dual-message networks (mainly V/MA), as per the FRB. We estimate that V/MA derive 21%/12% of overall revenues from US signature debit and 2% each from US PIN debit, despite volumes being more similar given lower PIN economics. We will also continue to monitor risks from the recent large merchant law suits against Visa and MasterCard related to debit card routing (namely Chip and PIN vs. Chip and signature), but we believe the challenges are manageable.

In this report, we highlight hot topics and key trends in the US debit industry from the impact of the Durbin Amendment to strategic initiatives around pricing and creative debit routing, while also touching on recent debit routing litigation risks to the networks. Overall, we believe Visa and MasterCard are well positioned to continue leading the US Debit market, and we expect FDC to benefit from new initiatives while each network should benefit from secular growth in debit.



Hot topics in US debit

EMV's impact on debit usage

Several merchant data breaches in 2013/14 caused the payment industry to consider steps for rolling out EMV. Given difficulties with enabling EFT networks on EMV terminals, the networks developed the US Common Debit AID. However, POS terminal manufacturers and VARs have since struggled to provide software and solutions that place routing of EFT networks equally alongside signature networks. We estimate signature debit market share at 61% for V and 39% for MA, while we estimate PIN debit market share at 32% for V (Interlink), 22% for MA (Maestro), 15% for STAR, 14% for Pulse, 7% for NYCE, 5% for Accel, and 5% for all other EFT networks. EFT networks are currently working with merchants to educate them on routing options to help present EFT networks as a viable option to consumers. We will continue to monitor whether the spread in growth rates will shrink given new routing decisions by V as well as new routing options presented by EFT networks, such as PINless debit.

US Common Debit AID

The US EMV transition did not begin in earnest until the US Common Debit AID was created, which facilitates EFT networks and signature networks on one chip. EMV has already been implemented in many countries across the world, but created challenges in the US due to the impact on routing from the Durbin Amendment as well as differences between card verification methods (CVM). The AID chip solved this problem by allowing the card to store multiple applications with specific CVMs, risk management parameters, and card specific data. This was previously rendered impossible by magnetic stripe technology, given limited data availability. However, US EMV terminals must support global AIDs and custom logic must be installed in the POS to facilitate the selection of a US Common Debit AID over a global AID (V/MA), making routing to EFT networks difficult. As a result, the global network brands have disproportionately benefited from the EMV rollout while also benefitting from messaging at the POS. Visa estimates ~45-50% of stores in the US will be EMV enabled by end of the year, while PAY suggests that there remains ~5m terminals in need of an upgrade, primarily across the SMB market as well as specific verticals such as Hospitality and Petro, where the liability shift date from the networks was recently extended by three years. We will continue to monitor whether this benefit reverses as VARs become comfortable with setting up a terminal to accept EFT networks while merchants attempt to reduce fees. However, we believe V/MA remain well positioned given their volume incentives and fixed fee pricing, which were introduced following Durbin.

FANF and other pricing changes help V retain share

Visa introduced fixed fee pricing in April 2012 through the Fixed Acquirer Network Fee (FANF) in addition to lowering the variable fee component of its network Acquirer Processing Fee (APF) and offering rebates and volume incentives to merchants to drive incremental routing of transactions over its network. FANF was specifically introduced to incentivize smaller merchants to accept Visa cards. FANF totaled \$2 per month for ~60% of merchants and less than \$5 per month for ~80% of merchants. In addition, Visa adjusted the FANF in 2015, allowing for potentially zero cost across the micro merchants. Combined with Pin-Authenticated Visa Debit (PAVD), Visa was able to recover signature debit market share starting in 2013, and we expect similar pricing



schemes could be implemented to retain share should the environment change. We estimate that nearly ~two-thirds of US debit volume comes from signature, representing ~21% of total revenues for Visa compared to PIN, which represents ~one-third of US debit volumes, but only ~2% of total revenues for Visa.

PAVD enables PIN routing over signature networks

For the several years following the release of Durbin, Visa began losing debit share to other networks, losing over 50% of the exclusive contracts it had established given the anti-exclusivity clause in Durbin. The clause effectively enabled MasterCard as well as the EFT networks, which utilized PIN authorization, to gain significant share from V. Visa fully implemented PIN Authenticated Visa Debit (PAVD) by the end of FY12 (began in April 2012), which is one of Visa's CVMs enabling merchants to route PIN transactions over Visa's signature network as well as signature transactions to be verified with a PIN. PAVD provided the necessary tool Visa needed to compete against PIN based authentication methods, while still routing those transactions over a signature network resulting in better economics for V. While still a relatively small portion of the overall debit volume, the switch has helped Visa recover lost share to the other networks as, combined with FANF and other pricing incentives, merchants were incentivized to route transactions over Visa's network. To note, Pulse sued Visa in November 2014 for claiming violation of antitrust laws with regards to Visa's PAVD, which continues to drag out in courts.

Monitoring the debit routing litigation

Visa and MasterCard have recently been the subject of law suits from large retailers such as Wal-Mart, Home Depot, and Kroger over debit card routing. The merchants argue that Visa and MasterCard have been pushing chip and signature over chip and PIN despite the latter being a more secure payment method due to higher economics on chip and signature (13bps of services fees starting July 2016). The economics on signature transactions tend to be higher than PIN due to brand fees charged for signature debit and higher transaction fees as well as a mix of higher yielding CNP and cross-border transactions. Visa had levied fines of \$7m on Kroger and threatened to disable its ability to accept Visa debit cards because Kroger hadn't reprogrammed its POS systems to allow customers the choice to verify purchases using signature or PIN. In addition, Visa had filed a counter claim to Wal-Mart arguing that although the original lawsuit the company filed against Visa didn't involve federal regulations there was a contract dispute where Wal-Mart had agreed to allow customer choice between PIN and signature in a contract signed in November 2015, but rolled out PIN-only options in new EMV terminals beginning late 2015. Overall, we will continue to monitor the debit routing litigation as well as the potential for these law suits to be rolled into the ongoing antitrust litigation for smaller merchants while larger merchants such as Home Depot and Wal-Mart have already combined the routing concerns with their individual merchant discount fee litigation cases.

Clarification of Visa debit routing rules not materially impactful to debit share

On 22 November 2016 Visa agreed to make a few modifications and clarifications to its debit routing rules including, 1) clarifying that merchants don't have to offer consumers network choice namely "U.S. Common" or "U.S. Debit", which was never actually a requirement from Visa with very few merchants currently offering customers this choice, and 2) that merchants are allowed to promote their preferred method, but still must allow consumers



verification choice if they prefer a different method. In our view, the changes will not materially alter the current market or Visa's debit positioning. Visa will continue to use incentives with large merchants/ acquirers to gain share of the debit volume. In addition, Visa's rule modification doesn't change the debit routing dynamics since signature transactions cannot be routed over other signature networks.

Pricing comparison

Pre-Durbin, interchange pricing was significantly higher for signature transactions with average PIN interchange fees of 56bps compared to average signature interchange fees of 153bps. With interchange being the largest portion of total fees paid by merchants (~85% of total, per the FRB), the merchants were traditionally incented to transact over PIN networks. However, with the Durbin amendment, signature pricing has significantly lowered for nonexempt issuers and, as of 2015, was actually lower than PIN interchange fees at \$0.23 per transaction compared to \$0.24, per the FRB. Despite the lower regulated interchange fees, merchants can still save given the significant presence of exempt issuer (38.2% of total dual-message transactions) given pricing differences still exist (\$0.51 vs. \$0.26). In addition, the percentage of fraud costs borne by merchants are typically higher for CNP and dual-message transactions compared to single-message transactions further incenting merchants to route over single-message networks. We will continue to monitor the ability to transfer fraud risk to merchants as well as the volume shift between exempt and regulated issuers.

In terms of the Network fees, the dual message transactions are more expensive than the single message transactions at ~0.34% of the transaction value (~\$0.127/transaction) with ~56% paid by acquirers and ~44% paid by issuers compared to ~0.13% of the transaction value (~\$0.053/transaction) with 69% paid by acquirer and 31% paid by issuer, as per FRB. However, the payments and incentives to the issuers/merchants are also higher on dual message transactions at 0.08% of the transaction value (\$0.029/transaction) with 27% paid to the merchants/acquirers and 73% paid to the issuers compared to 0.03% of the transaction value (\$0.011/transaction) with 68% paid to the merchants/acquirers and 32% paid to the issuers. Importantly, network fees paid by issuers for dual-message transactions fell by \$0.003 offset by a \$0.001 decline in incentives and we will continue to monitor for potential fee deterioration with higher competition for dual-message transactions.

FDC through STAR is creating its own signature debit network and we believe the company will charge a rate competitive with V/M/A and the networks will continue to deploy similar competitive tactics once FDC's network is commercialized. FDC has roughly mid teens market share in PIN debit with a goal of achieving mid single digit share of PINless debit and signature debit over the next few years. FDC expects to rollout signature debit in 2017 after having built up the platform with the solution already tested and ready for commercialization.

Monitoring the potential for PINless debit to gain share from signature debit

Merchants have always had the ability to route signature transactions as PINless and we believe PINless usage has been limited due to dollar caps (only used for payments under \$50) and merchant category restrictions. FDC estimates that less than 1/3 of its merchants have enabled their terminals to accept PINless transactions though ~70% of its issuers are enabled for PINless



transactions. We will continue to monitor PINless adoption in-store given it presents a lower cost routing option for merchants (similar economics to PIN). However, we don't expect PINless to take significant share away from signature debit. If merchants do choose to route over the lower cost option, it may result in negative customer sentiment given fraud protection has historically been better with V/M/A and because customers will no longer benefit from rewards programs offered through the signature networks. However, EMV offers better fraud protection and may help get merchants comfortable with offering PINless.

FDC's shift towards signature and PINless debit driven by EMV

Historically, the EFT debit networks had operated single message networks, which were originated from the legacy ATM businesses. However, a number of the EFT debit networks are now introducing dual message capabilities in an attempt to compete with the global networks. Dual message capabilities allow the EFT debit networks to compete online beyond just bill payments. In addition, merchants without PIN pads are able to be targeted. Beginning in 2015, FDC began making its STAR network capable to handle dual message transactions, given difficulties with setting up PIN pad authorization with EMV enabled POS terminals as well as routing messaging at the point of sale while also helping introduce a broader range of merchants it can service. In addition, the rollout of PINless functionality should help enable the company to grow with eCommerce, especially as it relates to small value discretionary purchases under \$50. FDC is well positioned to capture the merchants, which don't have PIN pads given its dual message capabilities, but more importantly due to the First Data Merchant Services offering.

In addition, FDC has built its own separate signature debit network and is in the process of commercializing the solution, which will allow for capturing higher dollar debit transactions (>\$50). Visa recently made changes to its debit routing rules following the FTC investigation, which allows the merchant to have greater control over the network routing. FDC is able to have the transaction routed through its network where STAR logo is printed on the back of the card. We believe the rollout of a signature network will help the company compete with V/M/A for in-store wallet share while PINless functionality bodes well for eCommerce share gains and small value in-store transactions. While both functionalities are in their infancy (signature capabilities not actually live yet), the company can use its solid market positioning to create awareness of the new services and market the service's potentially lower cost dynamics.

However, FDC likely won't be able to capture significant signature share from V/M/A given the volume incentives and rebates in place and is targeting mid single digit market share of both signature and PINless transactions. FDC stated during its analyst day that it currently has 16% share of the PIN debit volume, while two-thirds of industry revenue comes from transactions where a PIN is not required (signature or PINless), highlighting the significant opportunity from these two categories.

Liability shift to accelerate EMV transition

The Visa fraud liability shift went into effect in October 2015, namely shifting counterfeit fraud liability from merchants to issuers if the merchant has an EMV-enabled terminal. In addition, merchants are not liable for small-dollar (\$25 or less) chargebacks, while issuers are capped at ten chargebacks per account. However, the merchant is still liable if it has not upgraded the



terminal. In total, Visa believes these two changes will cause a 40% reduction in counterfeit card chargebacks and a 15% reduction in the dollar amount of counterfeit chargebacks. The policies are expected to remain in effect through April 2018. In 2015, counterfeit fraud represented 34% of total fraud charges, though it represented ~51% of fraud charges on single-message transactions, as per the FRB. We believe it is likely that EMV card issuance will follow the merchants' roll-out of EMV-enabled terminals, given the shift in liability. As of 2015, ~33% of all debit cards have a chip, while nearly 45% of issuers have begun issuing chip cards, as per the *2016 Debit Issuer Study* conducted by Pulse.



Reviewing the China Opportunity for Networks

China's large payment market opening up

China officially released much anticipated rules in the summer of 2016 that opened the large, attractive payments card market to V/MA, both of, which have been actively preparing for entrance into China. China Union Pay's (CUP) purchase volume of \$8.8trn (+30% Y/Y) and China domestic retail sales growth of \$4.6trn (+15% Y/Y) in 2015, coupled with low credit card penetration (0.33 cards/person vs. ~3 in the US) and growing consumption, provide a solid backdrop. Certain influences – large Chinese banks are state-owned, CUP is an association of issuing banks, unique PBOC 3.0 standards, and a lack of clarity on the national/cyber security policies – could potentially delay the entrance to 2017 or require JV/ partnership. However, we believe that the opportunity remains large and that V/MA will be able to navigate through these hurdles and leverage existing partnerships with key players. We believe the China market could add a material lift to revenue growth for networks in the future. Through 2020, we estimate that China will represent a potential \$3bn in incremental revenue opportunity.

For more detailed information about US debit market dynamics please visit our 26 August 2016 note titled, "Expecting China to be a Significant Future Opportunity."

Breaking ground potentially unearths large opportunity

In 2009, CUP processed 5.02bn general purpose card transactions and \$1.0trn in card volumes. However, by 2015, transactions stood at 33.02bn and volume was \$8.8trn. 1Q15 was the first quarter in which CUP volume of \$1.9trn surpassed Visa's volume of \$1.75trn, which reflects the vast opportunity of the Chinese consumer. China's retail sales have consistently grown faster than GDP since 2012, which bodes well for payment networks to grow volumes, in our opinion, given lower card penetration than developed peers. We believe CUP is accepted by ~10m merchants in China, compared to ~500k for V/MA, which presents a large opportunity to continue gaining acceptance through domestic merchant/issuer relationships. V/MA remain constructive on the opportunity, suggesting several steps need to be taken before the business impact could become significant. However, V/MA have MOUs in place with CUP and outstanding cobranded cards (and a small amount of MA-only cards), which could help them obtain brand loyalty. Visa has ~100m cobranded CUP or single issued cards, representing ~5% of revenues excluding VE in 2015, and we estimate that MA has ~80m cards outstanding.

China's open payment system expectedly has roadblocks

On 7 June, the PBC released requirements for foreign issuers to break ground on China's payments card issuance. Under continued pressure from the World Trade Organization since joining the WTO in 2001, China had feigned opening the market for the past 15 years, with the most recent action in 2015 of



releasing principle requirements for handling bank card clearing before stating that PBOC 3.0 standards must be used in the country (a hurdle, given different encryption methods from EMV). In addition, participants must meet China's national/cyber security standards, and are required to have ¥1bn in registered capital. Once an application is submitted (V/MA are gathering pieces for submission), China's central bank has 90 days to accept the participant. If approved, companies must set up their network within one year or resubmit the application if an extension of three months is not granted by the PBC. Alternatively, a foreign investor can acquire a domestic card clearing company. We believe the high regulations domestic yields are likely lower than 10bps.

Lessons from the opening of other closed markets

China UnionPay (CUP) is the only domestic bank card organization in China, and is owned by 85 China member banks with a near monopoly on issuer processing (CUP Data) and merchant acquiring (China UMS). There are a couple other instances of domestic markets that were state-operated before being opened, namely France and Canada. In France, Cartes Bancaires enjoyed a domestic card-network monopoly until 2009, and is slowly losing market share. In Canada, V/MA/AXP have successfully opened credit card networks (68.5m cards; 1.9 cards/person), but Interac (a cooperation between five Canadian banks) continues to enjoy a near monopoly in the domestic debit-network. It is likely that V/MA will move slowly in gaining share in the market, but they are optimistic about the scale of the opportunity.

Key details from the issued measures

After reviewing the *Measures for the Administration of Bank Card Clearing Institutions*, handed down by the PBC and CBRC, below are some of the articles that we found interesting:

- Article 3 essentially requires a foreign issuer to have a legal entity in China
 - **Article 3** *An overseas institution that only provides bank card clearing services in foreign currencies for cross-border transactions (hereinafter referred to as the "overseas institution") is not required to form a bank card clearing institution within the territory of the People's Republic of China in principle. However, if it has significant influence upon the sound operation of the domestic bank card clearing system or the payment confidence of the public, it shall form a legal person within the territory of the People's Republic of China, and obtain the bank card clearing business permit in accordance with the law.*
- Article 4 discusses security requirements, which must meet a national security standards.
 - **Article 4** *A bank card clearing institution shall abide by the laws and regulations on national security and national cyber security, and ensure the safe, stable and efficient operation of bank card clearing infrastructure. The bank card clearing infrastructure shall satisfy the requirements for the graded protection of national information security, use commercial code products recognized by the state cryptography authority, comply with the relevant financial*



standards of the state and the industry, and its core business system shall not be outsourced.

- Both Articles 5 and 7 imply that a foreign issuer must set up domestic processing infrastructure, whether that be through acquiring an card clearing institution or setting up its own. Foreign issuers must also have customer data cleared by the government before offering it to third parties.
- **Article 5** *For the purpose of guaranteeing financial information security, when a bank card issued within China is used within China, the relevant transactions shall be processed through domestic bank card clearing infrastructure.*
- **Article 7** *A bank card clearing institution and an overseas institution shall keep the party's financial information confidential, such as identity information, account information, trading information and other relevant sensitive information obtained in bank card clearing services; and shall not provide the information to the outside without the authorization of the party, unless it is otherwise provided for by any law or regulation.*
- Article 11 quantifies the amount of registered capital needed by a bank card clearing institution, essentially restricting smaller companies from entering the foray.
 - **Article 11** *The registered capital of a bank card clearing institution shall not be less than one billion yuan, and the capital contributor shall contribute its own capital for shares, and may not contribute capital not owned by it, such as funds held by it as a trustee and debt funds, for shares.*
- Article 13 and its subsections lay out the framework for submitting an application.
 - **Article 13** *The applicant that files an application for the formation preparation of a bank card clearing institution with the PBC shall submit the following application materials:*
 - (1) *A written application for formation preparation, which shall indicate the company's name, domicile, and registered capital, among others.*
 - (2) *A photocopy of the business license for the enterprise legal person and the company's bylaws, and, if the applicant is a foreign-funded enterprise, the photocopy of the certificate of approval of a foreign-funded enterprise.*
 - (3) *Materials proving that its capital strength satisfies the relevant requirements and relevant certificate.*
 - (4) *A true, complete and fair financial accounting report of the last year, unless that it has been formed for no more than one year.*
 - (5) *The capital contribution decision of the capital contributors, the amount and method of capital contribution, fund source, and a description of the affiliation relationship among capital contributors.*
 - (6) *Certification materials on the qualifications of the principal capital contributor and other capital contributors individually holding 10% or more shares, including, but not limited to the*



business license, financial accounting reports in the last three years, certificate on no serious violation of law or regulation, and certificate on the practicing experience, among others.

- *Where the capital contributor is a domestic banking financial institution, it shall provide a photocopy of the financial business permit and the document of the CBRC approving its investment in the bank card clearing institution.*
- *(7) A description of the company's actual controller.*
- *(8) A description of the company's organizational structure, financial independence, construction of the risk control system, construction of the regulatory compliance mechanism, and other circumstances.*
- *(9) A description of the plan for AML and CFT internal control rules, organizational structure plan, and technical conditions for conducting the relevant work.*
- *(10) The trademark registration certificate of the bank card clearing brand trademark, if the bank card clearing brand owned by the capital contributor is used, the trademark ownership certificate of, and the transfer agreement or authorized use agreement with the capital contributor, and the applicant's trademark use license granted recordation.*
- *(11) Feasibility study report, business development plan and infrastructure construction plan for bank card clearing.*
- *(12) Framework of bank card clearing standard system and business rules in compliance with national standards and industry standards.*
- *(13) Strategy and mechanism for the protection of rights and interests of cardholders and merchants.*
- *(14) The preparation work plan and the list and resumes of principal staff members.*
- *(15) Other matters that shall be specially explained and declaration of authenticity of application materials.*
- *Where the aforesaid materials are in a foreign language, Chinese translations shall be provided at the same time, and Chinese translations shall prevail.*
- *Where it is necessary to conduct national security review in accordance with the law upon research and judgment, the PBC shall officially accept the aforesaid materials after completing a national security review.*
- Articles 14 and 15 lay out the timeline within which the approving bodies must review the submitted applications.
 - **Article 14** *Where the PBC receives an application for the formation preparation of a bank card clearing institution, it shall, within ten days of acceptance of the application, submit application materials to the CBRC. The CBRC shall issue a written opinion within 30 days of receipt of the application materials, and send the opinion to the PBC.*



- **Article 15** *The PBC shall, under the prudence principle of being conducive to the fair competition and sound development of the bank card clearing market, and the opinion of the CBRC, make a decision to approve or disapprove formation preparation within 90 days as of the date of acceptance, and notify the applicant in writing. If it decides not to grant approval, it shall give the reason.*

V/MA partnering with CUP though co-branding no longer allowed

CUP has issued co-branded cards with Visa and MA where CUP would process domestic transactions and the cross-border transactions would be processed by Visa and/or MA. However, CUP started processing cross-border transactions as it gained global acceptance, violating the original agreement according to V, and Visa threatened to fine the financial institutions if they did not stop processing those transactions starting August 2010. MA signed a MoU in September 2010, potentially taking advantage of the severed relationship between CUP and Visa. Those MA issued cards could be processed in China; but we do not expect them to have a material benefit to the model. MA believes that its MIPS distributed architecture provides MA the footprint to process domestic transactions. However, despite some clarity in the rules, there are some unanswered questions remain before V/MA can break ground. In February 2016, amending the past relationship, Visa and CUP signed a MoU, agreeing to collaborate on payments security, innovation, and financial inclusion. Visa's press release suggested that the two may potentially work together on digital payments innovation. We understand that there are currently 500k merchants in China that accept V/MA cards (likely high-end stores), while 10m accept CUP cards.

The timing of the Chinese market opening up and to what extent remains a question, however this can only be seen as a potential upside opportunity. Questions remain around whether or not V/MA can do the processing as well as if they need to partner with banks and who controls the data. Though the MoUs signed with CUP (MA in 2010, V in 2016), V/MA have built a solid cobranded relationship with CUP. V has ~80m co-branded cards while CUP has nearly 5bn cards outstanding, representing a 1.6% penetration rate with Chinese customers. MA has a similar amount of cobranded cards outstanding due to its long standing relationship with CUP. Moving forward, newly issued cards will no longer be cobranded, as issuers will choose to either issue a CUP card or a V/MA card. Given that V/MA play an important role in international transactions, and as China citizens continue travelling abroad, we believe more V/MA cards will be issued domestically, spurring greater adoption by domestic merchants.

PayPal a key partner for cross-border transactions

The partnership that PayPal signed with CUP in March 2010 enabled the use of PayPal with CUP cards, giving CUP members access to foreign goods domestically. PayPal benefits directly by enabling more cross-border transactions, which account for 25% of TPV and where shoppers spend 2x more than other PayPal users. Additionally, the relationship helps CUP gain acceptance with e-commerce merchants internationally.



However, Ant Financial, owner of China's Alipay, is expanding services rapidly to compete with PayPal, and has surpassed PayPal as the highest valued FinTech company in the world, recently receiving a \$4.5bn private placement valuing it at \$60bn (PYPL ~\$45bn). The funding came predominantly from Chinese investment firms, as per CNN. Shareholders include China Life, China Post Group, China Development Bank Capital, China Investment Corp, and CCB Trust (a subsidiary of one of China's largest banks). While it originally started in 2014 as Alipay, an online payment processing platform for Taobao and Tmall, Ant Financial has added more offerings including a credit rating service, an internet bank for small business, and a money market fund. With more than 500m active accounts, it is nearly three times the size of PayPal's global membership. Alipay controls more than 50% of the 3rd party payment market and 82% of the mobile payment market in China, as per iResearch Group. Given Ant Financial's current dominance, we believe PYPL and CUP (through recent partnerships with Apple Pay and Samsung Pay) are positioning to gain share in China's large and growing eCommerce and mobile payment market.

More recently, PayPal has had problems with merchant acceptance, given that international customers have had concerns about Chinese merchants ignoring trademark rights, like intellectual property. In 2015, following a U.S. judge order, PayPal froze or deducted funds from some accounts given these violations, causing frustration among some qualified Chinese merchants. However, Patrick Foo, PayPal's head of cross-border business in China, suggested the perceived problem is exaggerated, and PayPal remains the most popular way for international buyers to purchase goods from Chinese merchants overseas.

CUP the well-positioned incumbent

CUP remains China's dominant payment network

China Union Pay (CUP) is the only domestic bank card organization in China. CUP was founded in 2002 and remains the only interbank network in China, excluding Macau and Hong Kong. It is owned by 85 China member banks and has a near monopoly on issuer processing (CUP Data) and merchant acquiring (China UMS). It also handles payment terminal procurement and works with the PBOC on setting domestic payment network standards (PBOC 3.0). According to MA, most Chinese consumers have two or three CUP cards while many are unfamiliar with V/MA. According to The Nilson Report, CUP accounted for 73% of purchase volumes for both debit and credit in the Asia-Pacific region (~\$6.9tn). Furthermore, the company partnered with PayPal in 2010, enabling card members to use PayPal allowing CUP to grow its eCommerce presence.

Globally, CUP grew Debit and Credit purchase volumes at a 5-yr CAGR of 41.4% through 2015, as per The Nilson Report. CUP's global transactions grew at a 5-yr CAGR of +37.7% through 2015. By the end of 2015, CUP had 432m credit cards and 5,010 debit and prepaid cards in use, +10.3% Y/Y (vs. +8.2% Y/Y for global card issuance) and accounted for 53% of total credit and debit cards issued globally, per The Nilson Report. For reference, that compares to 4,542.9 cards issued by both Visa and MasterCard combined, accounting for 44% of total cards issued. We believe the majority of cards issued are to Chinese customers, given its origins in China and that it has not quite gained acceptance as a preferred network outside of China and several emerging countries.



Third-party payment service providers

Many domestic Chinese players

The aforementioned UMS is the largest merchant service operator in China,, but there remains many other third-party players operating, especially in the eCommerce space, including Alipay (spun-off from Alibaba through Ant Financial), Tenpay, 99Bill, ChinaPnR, and International Payment Solutions (IPS)

Third-party payment platforms potentially enable V/MA entrance

We believe V/MA can provide these third-party providers, and their partnering merchants, with access to a global brand and enable cross-border transactions (they already do this for Alipay). In addition, we believe V/MA provide unique brands that will help it break ground in China and also benefits third-party providers by expanding card transactions (especially cross-border), provide a global platform to launch their mobile payments solutions, while offering merchants superior services (compared to China UnionPay) like fraud detection and data analytics. For example, V's CyberSource signed an agreement with Tenpay in 2013 to provide fraud management services that supported the development of Tenpay's payment services business.



DB Payments Bus Tour

Tour highlights payment industry's strong fundamentals

Widening moat for at-scale payment players

In March 2017, we hosted our annual Bay Area payments bus tour, visiting seven companies including Visa, PayPal, Square, Blackhawk, Verifone, Chain (private), and VC firm Andreessen Horowitz, along with a dinner with Kausik Rajgopal, head of McKinsey's Payments Practice in the Americas. Our VC/dinner discussions focused on the key disruptive trends in the industry including tokenization, mobile and omni-channel payments (in-store, in-app, browser-based), integrated payments, blockchain, internet of payment things (IoT), next-gen full-featured cloud-based POS devices, and other disruptive trends in FinTech. A key theme on which there is significant focus is a platform-based approach to payments where the customer experience reigns superior, as payments become seamless in the background. Our top pick in the Payment industry remains Visa, which is focused on removing the barriers for commerce and accelerating the secular trend of electronic payments. Both PYPL and SQ continue to disrupt fin tech with market share gaining solutions, while HAWK is poised to rebound in FY17 and PAY is focused on expanding its services portfolio.

V – Seeing healthy demand environment

We met with Visa's CFO, Vasant Prabhu, who was bullish about several growth drivers including US consumer strength, a rebound in cross-border volumes, V Europe tracking better than expectations, a strong pipeline including the potential for large deals, Costco driving Visa cards to the top of the wallet, the USAA migration, India demonetization, and incremental processing opportunities partially offset by potential headwinds from a strengthening USD and moderating currency volatility. We believe expenses are running less than originally planned (potentially incentives as well), which could result in stronger-than-expected numbers for FY17. V expects elevated buybacks to continue for 6-7 quarters post the V Europe acquisition to offset the dilution from the acquisition. Despite a strong performance YTD, our confidence in recommending V as our Top Pick in the Payment Sector only increased following the meeting.

PYPL – Highlights positive changes to the model

PayPal's CFO, John Rainey, highlighted the initial success with the Choice initiative, Venmo monetization, the future benefits of an asset-light strategy, potential for further pricing increases (particularly in cross border), sustainable margin expansion drivers, and a focus on shareholder friendly capital allocation. John is encouraged with the Choice initiative due to improved customer engagement as well as lower-than-expected headwinds to transaction expenses (surprise adoption of lower cost funding instruments vs. modeled). In addition, PYPL remains focused on driving sustainable operating margin expansion through multiple pricing opportunities and lowering its operating cost structure. Upon the move to its asset-light strategy, PYPL has a real opportunity to more aggressively leverage its capital structure, potentially generating additional shareholder value.



SQ – Seeing a positive inflection point

We met with CFO Sarah Friar at SQ's headquarters, who remains optimistic on the company's ability to sustain strong top-line growth and improve EBITDA margins materially over the next few years. Friar highlighted the significant future opportunity the company has to move upmarket towards larger merchants, develop more of an online presence, and expand internationally. In addition, machine learning and AI investments could drive platform revenues, scale, and efficiency, which in turn could help improve EBITDA margins towards SQ's 40%+ long-term target. With new products launching and continued scale, we believe the recent momentum in the fundamentals will continue.

Visa CFO seeing healthy demand environment

Multi-dimensional growth drivers

We met with Visa's CFO Vasant Prabhu who was bullish about several growth drivers including US consumer strength, a rebound in cross-border volumes, V Europe tracking better than expectations, a strong pipeline including the potential for large deals, Costco driving Visa cards to the top of the wallet, the USAA migration, India demonetization, and incremental processing opportunities, partially offset by potential headwinds from a strengthening USD and moderating currency volatility. We believe expenses are running less than originally planned (potentially Incentives as well), which could result in stronger-than-expected numbers for FY17. V expects elevated buybacks to continue for 6-7 quarters post the V Europe acquisition to offset the dilution from the acquisition. Despite a strong performance YTD, our confidence in recommending V as our Top Pick in the Payment Sector only increased following the meeting.

Rebounding cross border volumes clear positive

Cross border volumes rebounded in FY17 after three years of muted growth, which is a material positive to the model given the significantly higher revenue and profit contribution from cross-border (roughly one-third of revenues, despite the significantly smaller contribution compared to domestic volumes). In addition, we believe cross border revenues could be 6-7x more profitable than domestic transactions, and the weakening of the GBP has driven significant UK inbound cross border volume growth. Vasant believes that the market did not take into account the power that cross-border has in the model, since it has been soft since he has been CFO. Given recent trends, we believe cross border will likely continue to contribute toward accelerated volumes and growth in the business.

V Europe tracking well

V Europe has had a solid start (seeing strong volumes) and Vasant remains bullish on opportunities to increase yields. We believe Visa and MA have both recently increased pricing in Europe. In addition, Visa is still in the process of migrating issuers from the rebate to the incentives model, and it is in discussions with issuers to offer competitive pricing as well as to extend the duration of the contracts. On the cost takeout front, V has benefited from the drop in GBP since the deal was announced, and has already stopped duplicative technology development (e.g. rollout of V.me in Europe). Furthermore, the company is currently harmonizing systems and expects to shut down one system in a few years, which could generate further cost synergies.



Monitoring incentives/expenses

Incentives in 1Q17 were lower, predominantly due to the delay in deal closure/renewals as well as the process of migrating V Europe issuers to an incentives model. Incentives are influenced by the timing of the deal closure/renewals, actual vs. expected volume, migration from rebates to incentives for V Europe, as well as ramping of Costco and USAA. Additionally in 1Q17, expenses fell below our expectations and will likely require a significant ramp-up in orders to hit V's guidance, in our view. Looking at the model relative to guidance, we believe both incentives and expenses could fall below V's original FY17 guidance.

Incentive amortization accounting rule change could improve revenue stability

Visa is currently working through the changes in accounting rules, which would require upfront incentives to be amortized over the life of the contract rather than being recognized at the time of incentive payout. The rules could require certain changes. In particular, some incentives could move below the revenue line and treatment for retroactive incentives could change. We believe the accounting changes could create more stability in the incentives contra-revenue line item. However, Mr. Prabhu does not expect any changes in economics or shift in the incentives structure due to the accounting change.

Innovation focused on driving incremental volumes and transaction processing; adjacencies represent growth opportunities

Visa is investing in several new technologies, namely Visa Token Services, Visa Development platform, Visa Checkout, and the Internet of Payment Things (IoPT) to name a few, which could make it easier for any transactions to ride the Visa rails. Mr. Prabhu highlighted that the company remains technology impartial and does not want to pick winners and losers. Mr. Prabhu believes that Visa could pursue large commercial opportunities such as transportation. Technology is also making it easier to digitize, as can be seen in online and mobile commerce as well as mobile POS enabling emerging markets to leapfrog adoption.

PayPal Choice impact – too early to call

Although PayPal Choice initiatives are still in the early days, Visa remains positive about friction being taken out, but is cautiously optimistic about large volume increases. In a separate meeting on our tour, the PayPal CFO highlighted that ACH, Balance, and PayPal Credit are getting much better traction than originally expected, and we will continue to monitor the dynamics.

Credit growing faster than debit

Credit represents higher revenue yields and margins for Visa and has been growing faster than debit due to rewards offered by the issuers. However, excluding the commoditized PIN debit business Interlink, debit has delivered steady growth at ~9% Y/Y.

Monitoring the impact from PSD2

Although PSD2 may offer merchants the ability to connect directly with bank accounts, the regulations would still require players to build an alternative switch, which would represent significant investments and services would likely be priced accordingly. Mr. Prabhu believes it is still in its infancy and will continue to monitor the PSD2 impact. In addition, the company will continue to monitor MA's strategy with the Vocalink acquisition.



Processing opportunity in Europe

Visa processes significant volumes in the US and the UK. However, it processes almost no volumes in countries such as France and Mexico. due to legacy domestic processors or regulatory constraints. New technologies, such as Tokenization, will likely increase investment required by the domestic processors and Visa will likely continue to look for opportunities to acquire domestic processors.

Accelerated buyback to continue

Visa bought \$1.8bn worth of shares in 1Q17 and the company expects elevated levels of buybacks to continue as it plans to offset the dilution from incremental shares issued for V Europe in 6-7 quarters.

PayPal CFO highlights positive changes to the model

Multi-pronged growth drivers

We met with PayPal's CFO, John Rainey, who highlighted the initial success with the Choice initiative, Venmo monetization, the future benefits of an asset light strategy, potential for further pricing increases (particularly in cross border), sustainable margin expansion drivers, and a focus on shareholder friendly capital allocation. Rainey is encouraged with the Choice initiative due to improved customer engagement as well as lower-than-expected headwinds to transaction expense (surprise adoption of lower cost funding instruments vs. modeled). In addition, PYPL remains focused on driving sustainable operating margin expansion through multiple pricing opportunities and lowering its operating cost structure. Upon the move to its asset-light strategy, PYPL has a real opportunity to more aggressively leverage its capital structure, potentially generating additional shareholder value.

Realizing the benefits of network agreements

With the move to customer choice, PYPL was expecting a shift to credit and debit cards and was positively surprised by better-than-expected adoption of ACH, PayPal Balance, and PayPal Credit (first two more balanced while latter is still a small percentage of transactions). PYPL is currently testing experiences in the checkout flows and expects the full rollout in 1H17. Rainey highlighted that choice initiatives have opened up issuer partnership opportunities, which could include partnering with the issuer in order to load their debit cards or make their cards default in PayPal. In addition, there could be an opportunity to sign-up/add cards in PYPL from the banks' mobile banking application. PYPL could effectively structure an agreement, which is mutually beneficial as it drives greater usage for bank cards while PYPL potentially gains discounts.

Positive attributes of an asset-light model

PYPL is actively working on an RFP with multiple issuers, expecting an announcement sometime in 2017 and for it to close by year-end. The rationale for an asset-light strategy is to offload credit risk, lower capital intensity, and improve durability of earnings through the credit cycle as it removes volatility of earnings and improves consistency through the credit cycle. PayPal should be able to offset most of the EPS dilutive impact by growing the size of the portfolio and offering issuers an attractive customer acquisition tool to sell revolving balance products. Three-year guidance includes a shift to an asset-light model.



Venmo monetization could provide upside potential

PYPL expects Pay with Venmo to be rolled out to all parties by end-2017 and for it to be meaningful thereafter. It plans to charge the merchants a similar rate to PayPal (2.9% + \$0.30 and offer volume discounts to large merchants) while funding costs for Venmo are much lower due to the funding mix skewed toward ACH and debit cards. PYPL has not assumed a hockey stick for Venmo adoption. Hence, better-than-expected adoption could deliver upside potential. The company is testing multiple options, including showing the right checkout button. The PayPal or Venmo button could be shown at checkout based on whether the user has a PYPL or Venmo account, and it is also experimenting with co-branded PayPal and Venmo buttons.

Solid momentum in FY17

Transaction growth slowed in 4Q16 due to the anniversary of the Xoom acquisition and transaction expenses increased in 4Q16 due to great mix of Braintree (very limited impact from the Choice initiative). However, the company still raised guidance for FY17, as it expects to benefit from the Choice initiative as well as from other initiatives that are being rolled out. PYPL appears comfortable with its FY17 guidance (although we are not expecting significant upside potential).

Cross border pricing opportunities

PayPal raised cross-border pricing, especially the FX spreads, and the company has further opportunity to increase fees. The company highlighted that it is improving its sophistication on FX pricing, with Visa serving as the leader in best practices. PYPL currently uses the average of the wholesale FX rate from two banks to determine the FX charged to merchants, and the company was leaving money on the table by not opting for the better of the two rates. The company has hired a new pricing executive and is working on identifying more pricing opportunities. PayPal makes money even when the consumer uses a credit card.

Multi-pronged strategy to deliver operating leverage

John Rainey highlighted his background as the CFO of an airline company, provides him capabilities to drive cost takeouts. PYPL is taking a methodical approach, including evaluating the organization's structure (spans of control and management layer) as well as ensuring that incentives are aligned to improve customer experience. In particular, PYPL is improving product capabilities through the rollout of the V.0 platform and One Touch, which should help lower customer support costs and sustainable margin expansion. Take rate headwinds have subsided; however, PayPal expects the transaction margins to continue in the near term as it remains focused on driving growth. However, the company has levers, including pricing and operating leverage, to offset headwinds from the increase in transaction expenses.

Diversification to lower reliance on EBAY

PayPal management continues to have a strong relationship with the eBay management team (even better than prior to the spin-off). Growth in merchant services will likely continue to help diversify the revenue base, and PayPal expects eBay to account for less than 10% of revenues by the time the current eBay contract expires (original duration of five years). In addition, the diversification in revenues should help lower the headwinds from slower growing revenues at eBay.



Potential to double revenues by increasing engagement

Rainey highlighted that, on average, customers use PYPL only in 50% of potential transactions, and he believes that it could double revenues just by increasing engagement. PYPL's MUSE (Move Up the Shopping Experience) initiative is focused on driving engagement. In addition, PYPL could leverage shopping history and work with merchants to make product recommendations. For few large merchants that receive volume discounts, the transaction may be underwater; however, it still serves as a good customer acquisition tool.

Leveraging data to deliver targeted offers

PayPal is working on delivering tailored offers to customers, which could be funded by the merchant or PayPal. For example, merchants may decide to provide offers to a more affluent customer base to encourage higher-value shopping. In contrast, PayPal could send offers to drive usage in order to increase the number of merchants with which the consumer uses PayPal, as it has lower churn (the greater the number of merchants where consumers use PayPal, the lower the churn).

In-store to drive engagement and ubiquity

In-store transactions are purely pass-through transactions, and although PayPal does not get any economics, it could help increase engagement and ubiquity of the product, similar to an initial P2P offering. However, the company does not rule out potential for in-store transactions to be accretive in the future. In addition, Rainey highlighted that the Beacon (BLE) makes it possible to offer similar experiences, including tailored offers in the online world. We believe that the order ahead functionality within the PayPal app also offers a significant value proposition for the in-store usage.

Shareholder-friendly capital allocation

Rainey mentioned that \$2bn of share buybacks was the first step in capital allocation, and he is currently working on developing a longer-term capital structure and capital allocation strategy (pending the decision on asset light-strategy and clarity on tax reform). PYPL's acquisition of Braintree has been a huge success, while the recent acquisition of Xoom and TIO are more focused on targeting unbanked and under-banked segments, which are still profitable and attractive customer segments. PayPal remains focused on tuck-in acquisitions to fill the white space around the globe, especially in more nascent markets. PayPal could have \$10-20bn in available cash post the transition to asset-light strategy and depending on leverage, with potential for the majority being used for M&A and returned back to the shareholders.

Square seeing positive inflection point

Driving both top-line growth and margins

We met with CFO Sarah Friar at SQ's headquarters and she remains optimistic on the company's ability to sustain strong top-line growth and improve EBITDA margins materially over the next few years. Friar highlighted the significant future opportunity the company has to move upmarket towards larger merchants, develop more of an online presence, and expand internationally. In addition, machine learning and AI investments could drive platform revenues, scale, and efficiency, which in turn could help improve EBITDA margins towards SQ's 40%+ long-term target. With new products launching and continued scale, we believe the recent momentum in fundamentals will continue.



New products increase value proposition and pricing capabilities

We believe SQ's new products have the ability to drive either added functionality for sellers, help it move up-market, cross-sell existing products, increase pricing, or even help move it into B2B payments (access to purchase order data). Virtual Terminal is a great way for sellers to access digital payments without a terminal (via laptop or tablet), with SQ charging CNP rates of 3.5% + \$0.15 per txn vs. 2.75% for swiped txns. The product achieved \$40m in GPV in January and has obtained solid tractions among smaller sellers. SQ for Retail, launched in February, provides search-based functionality across SKUs and customers, and also has card-on-file capabilities, which resonates well with larger sellers. A back-end inventory management system, also launched in February, is offered for \$60/mo/device and creates a more sticky platform with cross-selling opportunities for instant deposit and capital. SQ appears to be focused on expanding its wallet share within its customer base and developing more online products.

Expanding sales channels along with margin expansion

Friar highlighted strong ROI on new capabilities and that new sellers continue achieving positive dollar-based retention (as soon as the first quarter). Margins expanded 16ppts in FY16, and Friar stressed the need to balance between investing for top-line growth while gradually showing profitability through efficiency and scale. Internationally (currently ~5% of revenues), SQ invests a pool of capital to understand regional dynamics and build a go-to market strategy. Friar also suggested that an international market could fund itself, though the company could throw in additional resources to accelerate growth in the market. SQ also discussed working with ISVs like Vend and Wix to expand merchant base, with some receiving a revenue share, though SQ keeps a higher portion in most cases because of its own large installed base. SQ remains comfortable with Capital and is even considering extending larger loans (for example, to help sellers open more stores). We believe SQ is well positioned to continue expanding sales channels while meeting or exceeding its margin expansion targets.

SQ launching industry-specific POS for retail

SQ launched Square for Retail in February 2017, the company's first industry-specific end-to-end POS solution, which integrates with the company's managed payments and hardware as well as the seller's directory for advance client telling capabilities, customer profile building, and purchase history. The solution provides a search-based user interface and a fast bar code scanning solution. Inventory management supports tens of thousands of items and manages the cost of goods sold, and purchase orders, among other capabilities.

The company charges a monthly subscription per device and the back-end inventory management system is offered to sellers for \$60/month/device rather than a tiered approach, which this company believes is disruptive, while maintaining simplicity in pricing. The inventory management solution is real-time providing sellers the ability to place product orders with vendors. The company highlighted an opportunity that spans ~450k retailers in the US across the SMB category, which represents \$700bn in GPV on its 4Q16 earnings call. At the meeting, SQ highlighted that most of the small retailers are currently performing many of these task in excel or with small third party partners highlighted the significant cross-selling opportunity. We expect the company to continue launching vertical/horizontal solutions to target the needs of specific sellers.



Virtual Terminal opens up browser-based payments

SQ also recently launched Virtual Terminal in October 2016 for browser-based payments for sellers, which run their business on a computer rather than a mobile device. Due to its platform, which enables fast development, SQ built the solution in just two months and subsequently rolled out the solution to Australia. In January 2017 alone, SQ recorded GPV of +\$40m, driven by new sellers and expansion of the existing base. The company charges card-not-present rates (3.5% + \$0.15), and it is focused on maintaining margins as it drives forward with share gains.

Roadmap to scaling margins toward a long-term target

SQ continues to expect long-term EBITDA margins of 35-40%, and the company is confident in reaching this target, driven by investments in the business where it is seeing strong returns on developed/developing products/solutions. The company continues to expect a 4-5 quarter payback period as well as positive dollar-based retention starting as quickly as after the first quarter in which it is onboarded. SQ sees margins scaling at roughly mid-single digits towards its target after having achieved a ~16pt improvement in 2016.

Square Capital resonating in the market

SQ extended \$248m in loans for 4Q16, representing growth of +68% Y/Y (+19% Q/Q), and the default rate remained stable at 4%, on which third party investor demand remains healthy. The company plans to park no more than 10-15% of its cash/marketable securities on its books. The company highlighted having experimented with larger loans with the potential to extend up to \$100k per loan. A use case for larger loans includes sellers that are interested in starting up a new store front.

Driving sustainable GPV growth

SQ delivered GPV of \$50bn in 2016, growing 39% Y/Y and in 4Q16 delivering \$13.7bn in GPV, growing +34% Y/Y. The company highlighted several ways to continue delivering strong sustainable GPV growth; namely, the potential for step functions in payment volume from working with larger merchants, expanding into new countries, shifting from offline to online, and gaining wallet share at existing merchants.

Drivers of positive revenue retention

SQ is able to deliver positive revenue retention as it grows with its sellers, and the company highlighted expectations to continue growing dollar-based retention over time despite moving into larger sellers. Other than sellers going out of business, another prominent reason for voluntary churn is the need for solutions specific to the seller's industry/type of business, and the company is rolling out solutions such as Square for Retail as well as working with ISVs and software developers to cater to the needs of these merchants with the opportunity to develop and deploy similar solutions across multiple industries.

Verifone working on the transition to services

PAY highlights transition to services

We met with Verifone's CEO, Paul Galant, who discussed management's focus on transitioning into services through a launch of next-gen connected devices. Although the path to strong services revenue remains a bit unclear and likely several years away, we will continue to monitor PAY's progress. Positively,



India demonetization is expected to provide significant benefit over the next two quarters though challenges in the US taxi business, FX headwinds in EMEA, a sluggish US SMB market, fatigue among large US merchants from the EMV upgrade, and push-out of the US petro opportunity creating near-term headwinds.

NA headwinds persist, but monitoring for an inflection point in growth

NA continues to be affected by difficult EMV comps, and this quarter, PAY highlighted weakness in the Taxi business and Petro deconsolidation as incremental headwinds for FY17. Although same store sales remain healthy, there are fewer taxis to competitors like Uber taking share. However, growth is expected to inflect positive toward the end of 2017 as comps become less difficult, Petro begins to ramp, and the company continues to capture SMB and Hospitality on a more normalized trajectory. In addition, although the US is feeling fatigue from the EMV upgrade cycle, PAY is seeing adoption of new products in the US across early adopters of EMV while it expects a full refresh cycle to take place in the next seven years, though adoption of mobile wallets could accelerate new product adoption. We will be watching whether the NA market begins to strengthen in 2H17, as PAY has guided.

Highlighting geographic puts and takes

Galant walked through his opinion on growth opportunities in different geographic regions, specifically in Europe and EM. EMEA growth declined -1% Y/Y in 1Q17 and PAY expects growth to improve through FY17 towards low single-digits with strengthening bank relationships, next-gen rollout, and continued momentum in Poynt in the Nordics. Asia delivered solid +19% Y/Y growth in 1Q17 as demonetization in India drove significant volumes and is expected to continue representing a sizeable opportunity (although strength will likely drop in 4Q17). While China has been a headwind, the company's Value device may meet the needs of merchants seeking a low-cost POS alternative, though profitability may not happen for years (an estimated \$60m in sales required to be profitable). PAY suggested that demonitization potential in countries like Argentina, Vietnam, Malaysia, and Thailand may increase TAM opportunities in those regions by 2-4x. In LatAm, Brazil is improving, although Mexico is a potential headwind, while other regions are progressing as status quo.

Margin pressure from mix shift in growth expected to turn around

Gross margins were pressured in 1Q17 and are expected to face further pressure in 2Q17, but begin to rebound in 2H17. PAY highlighted that lower 1Q17 margins were a function of mix due to significant growth in Asia from the India demonetization. PAY expects margins to rebound in 2H17, driving earnings toward the guidance range through higher-priced new product roll-out, expansion of higher margin services, cost optimization initiatives, and a return to growth in NA and Europe, which have higher margins than Asia and other emerging regions.

Expecting continued momentum in Asia

Asia delivered solid +19% Y/Y growth in 1Q17 as the de-monetization in India drove significant volumes and is expected to continue representing a sizeable opportunity. In addition, while China has been a headwind, the company now has the right management team and devices, namely the Value device, to meet the needs of the merchants seeking a low-cost POS alternative. Japan should benefit from the EMV upgrade cycle ahead of the Olympics and PAY has a



strong partnership with a manufacturer in the country, and other Southeast Asian emerging markets that are demonetizing also represent an opportunity.

EMEA growth expected to improve

EMEA growth declined -1% Y/Y in 1Q17, including the acquisition of InterCard in Germany, which is helping offset difficult comps from the EMV upgrade cycle. PAY partially attributed the decline to normal seasonality in the business and PAY expects the growth to improve over the course of the year, ultimately towards low single-digits as comps become easier and next-gen devices are rolled out.

Latin America

While Mexico and Argentina remain soft, PAY highlighted strength in Brazil, which helped drive 4% growth for Latin America in 1Q17, and the three new wins announced are expected to contribute ~\$5m in revenues each. PAY highlighted that the government in Argentina is potentially working toward a directive to drive the acceptance of digital payments.

Blackhawk management feels comfortable with guidance

Rebound expected to start in 2Q17

We met with Chairman Bill Tauscher and CFO Jerry Ulrich who believe 2Q17 will be the turning point and start of HAWK's recovery. HAWK expects open-loop TDV to gradually improve from the 88% of pre-EMV TDV reported in December 2016 to 94% by the end of 2017 (HAWK believes this is conservative). In addition, HAWK is focusing on driving original content like the 5% Visa cash back card and specialized gift cards like Spafinder, which drives higher margins. We continue to believe HAWK is attractively valued on fwd P/E and EV/EBITDA multiples when including the \$6.50 in the NPV of future cash tax benefits.

US retail improvement and Target relationship

Bill discussed the likelihood of US retail meeting its ~13% growth target in FY17 due to EMV comps easing after 1Q16 and potential for higher-margin original content to become a higher percentage of revenues. Historically, the company used brand strength and open loop cards to acquire customers, but it can now use proprietary RAN technology (used in 5% Visa cash back card), which it received through its IntelliSpend acquisition (which is originally an Incentives focused acquisition). In addition, Target (expected to be a top three customer at full ramp) is onboarding in-store only, and HAWK expects a robust partnership moving forward, potentially expanding the relationship online or into incentives. The mature US retail market is expected to approach 50% of overall revenues end-2017 (nearly 100% of revenues 3-5 years ago), and mid-term, to grow 2-5% organically with an additional 3% from digital.

International and incentives are growth opportunities

International, which HAWK expects to grow 15-20% mid-term, has two different models: gifting and gaming. Local gifting content resonates well in markets like Europe while gift cards used to redeem gaming content do well in markets like Japan. Incentives are also expected to grow 15-20% mid-term, with Grass Roots positioning it well to gain share in Europe. Incentives are estimated to be ~30% of revenues by 2017-end and has a \$47bn TAM in the gift card market. The incentives segment is increasing its exposure internationally and introducing retail commerce products driven by digital



capabilities. HAWK is excited to leverage synergies and capabilities across all its business lines.

Areas of interest for acquisitions

HAWK expects acquisitions to contribute 5% to revenue growth mid-term, and it highlighted opportunities primarily in international, incentives, digital and original content. HAWK spoke of acquisitions layering on top of its content platform, such as Achievers, which has 250 corporate customers to which it cross-sells gift cards, and which could eventually be higher-margin than the core business (Achievers margins are improving rapidly). Through synergies of completed acquisitions, HAWK believes it can expand EBITDA margins by 25 to 75bps annually over the mid-term.

Chain powering future use cases of the blockchain

Chain and its partnership-based approach

We met with Clint Gilliam at Chain's headquarters as part of our Payment's Bus Tour, who walked us through the Chain business model and were provided with details on blockchain technology and its applications, both short-term and longer-term. Chain was founded in 2014 and has raised over \$40m in equity funding, including the latest round in September 2015 raising \$30m. Its primary network, Chain Core, was built over the last three years for partners like Visa, Citi, First Data, Fiserv and Fidelity (among others) to help them commission private blockchain networks. The company's blockchain technology currently runs in V's and Citi's data centers powering B2B solutions, like V's B2B Connect (launching in 2017), or Nasdaq Linq (currently in production), which helps private companies manage and trade shares.

Taking a step back to describe blockchain

Blockchain is a decentralized ledger that allows users to have nodes connected to a shared vault, getting access through cryptographic keys. According to Chain, the technology combines benefits of physical instruments (cash, cards, poker chips, etc.) and digital ledgers, which allow you to transact online and build financial products on top of it. It has capabilities to cut back-office costs, be more secure, and be redundant compared to current instruments empowering the processes. Blockchain applications include native digital assets, permissioned network access, and smart contracts, which impact trading processes, reconciliation of payments, among other financial processes.

Blockchain primarily a B2B solution

Clint viewed blockchain technology applications as more of a back-end solution than really impacting consumer-facing applications. B2B has ~\$70trn in global payment volumes, and Clint believes cross-border B2B is currently the client pain point that is possibly being addressed the most through blockchain technology with the most opportunity for back-office cost reduction and improving quality of processes. From a domestic B2B standpoint, Clint views adoption as region specific, with China experimenting using blockchain to power their currency, while US lags the curve, taking a wait and see approach.

Potentially less intermediaries in the future

Clint believes the biggest risk of replacement from blockchain success lies among existing intermediaries, especially those that aid in back-office



operations. However, he does not believe all intermediaries will be displaced. Those that prove their value and invest early will likely be well positioned to remain as key partners in the ecosystem. Intermediaries, like Visa, have an incentive to invest early in blockchain innovation and can secure their value by influencing decisions and investments using brand and scale.

Andreessen Horowitz facilitating the next major technology players

Driving the next biggest entrepreneurs forward

On one of our payment bus tour stops, we caught up with Alex Rampell, General Partner at Andreessen Horowitz. Andreessen Horowitz was founded by Marc Andreessen and Ben Horowitz and focuses on providing entrepreneurs with access to expertise and insights in innovation as well as executive and technical talent, market intelligence, policy and regulatory business development, and marketing/brand awareness. Rampell is one of eight general partners at Andreessen that mainly focused on FinTech and started TrialPay in addition to spending time at Visa, co-starting Affirm in 2012, and starting SiteAdvisor in 2006, which was acquired by McAfee.

Key areas of innovation in FinTech

Rampell highlighted that millennials are driving change in the market, and 75% use Fin Services from players such as Google, Apple, and Amazon. He highlighted four key areas in which Fin Tech is innovating; namely core banking, new financial products, insurance, and investing. US consumers owe over \$12trn, and Chase borrowers pay 14-15%, with deposits earning 0.01%. Lending Club had introduced an idea in which the depositor earns 8% and the borrower pays 10%. Overall, lending is seeing activity across the sectors such as consumer, student, SMB, and mortgages, and Fin Tech is achieving it more efficiently than banks. In addition, new players are scaling more quickly with PureStreet as an example, which did \$200m in loan origination. SoFi is re-bundling banking and started with student lending. Then, it moved into investing and mortgages while building relationships with the younger demographic.

McKinsey partner highlights positions of strength in payments

Networks well positioned

We met with Kausik Rajgopal, Managing Partner at McKinsey & Co., who co-leads the global digital payments practice as well as the U.S. West Coast practice. Rajgopal provided his views on the current payments landscape and which of the incumbents are best positioned to win, providing three observations; namely, networks continue to be in an advantaged tailwind given ubiquity of presence and material pricing power, core acquiring is structurally challenged with acquirers bringing value-added services that are best positioned to thrive, and card issuers can move to a position of strength by engaging more with customers and becoming more central to the daily lives of their customers. He also discussed the emergence of FinTech startups, estimating that over 4k FinTech startups exist today with the largest value-add provided, making the market more efficient although many are largely challenged due to the high cost of customer acquisition. He believes higher-margin cross-border payments will continue growing with the emergence of eCommerce, as well as mobile commerce. However, key risks to cross-border



growth include the chance of regulatory change (like in the EU) or if a low cost player, like Alipay, competes and drives down rates.

Merchant acquirers shifting to software-enabled solutions

Rajgopal believes merchant acquirers that are quicker to switch to a software-enabled solution are best positioned to win as the world moves towards a greater share of e-commerce as a percentage of total retail sales volumes. McKinsey & Co. estimates that e-commerce represents 10% of total retail sales today and that number will double by 2020. Examples of software-based solutions include risk analytics for online to offline merchants as well as improving unwarranted transaction declines, with merchants losing \$3.5-4bn a year, given archaic architecture used by some acquirers (if/then statements). Rajgopal also believes pricing pressure, which began with larger merchants, is now moving it to the medium-sized merchant category.

Thoughts on PYPL

While PYPL has achieved a strong presence in Payments, Rajgopal believes that it is in the early stages of moving towards a broader financial services company. Rajgopal viewed PYPL as a hybrid mix between an acquirer and processor and not as attractive as the networks. Yet it has assets with which it could drive higher value and margins. He believes Braintree and Stripe are on par with the simplicity of APIs, which is an advantage, while Venmo is not currently functional (and could become a cash flow management tool) and is more of a social hook. When asked about acquisitions, he believes it could target the merchant side (for example, in areas like Working Capital), geographic expansion, in which he believes 90% of revenues currently come from Anglosaxon countries (potentially Japan), or in mobility/processing capabilities.



Valuation & Risks

Visa

Our target price of \$103 is based on 25x our CY18E EPS, a warranted premium to the company's two-year P/E average, given its revenue growth profile. Risks include a slowdown in purchase transactions, volumes, share loss, and new regulations.

MasterCard

Our target price of \$124 is based on 25x our CY18E EPS and represents 17x our CY18 EV/EBITDA, a premium to MA's average over the last two years, which we believe is warranted, given its resilient business model and secular tailwinds. Risks include increased card regulations, purchase volume slowdown, and adverse effects from European regulation.

PayPal

Our \$52 target price is based on 15x CY18 EV/EBITDA, roughly in line with the payment networks, given PYPL's robust growth profile. Risks include a decline in consumer spending or eCommerce volumes, disintermediation risks in mobile, decline in margins and/or increase in funding costs, competitive risk from alternate payment options, and acquisition integration.

Square

Our \$19 target price is based on ~6.8x CY18E adjusted EV/S, ahead of the merchant acquirer comp group and technology growth players, given a higher sales and adjusted EBITDA growth profile. Risks include a slowdown in consumer spending and new business formations/ bankruptcies, faster-than-expected deceleration in revenue growth, lower-than-expected pace of margin expansion and profitability improvement, heightened small merchant churn, increased regulations, and increased competition.

First Data

Our \$19 target price is based on 11x CY18E EV/EBITDA and represents 12x CY18E P/E at a discount to peers on P/E, given its lower growth profile and higher leverage. Risks include slowdown in consumer spending, inability to reduce leverage, M&A/bank failures, loss of clients/ failure to get new clients, unfavorable contracts, and competition.

Global Payments

Our \$85 target price is based on 18x CY18 P/E, roughly in line with peers, and represents 13x our CY18 EV/EBITDA, reflecting our expectation for sustained revenue growth and EBIT expansion. Risks to our target price include a slowdown in international growth, lower-than-expected cost and revenue synergies from the HPY acquisition, investments, and potential spread compression in Canada.



Vantiv

Our \$67 target price is based on 19x our CY18E EPS and represents 15x our CY18 EV/EBITDA, slightly ahead of peers, which we view as warranted given stable revenue growth and a high margin profile. Risks include client losses, bank failures and M&A, in-sourcing, security breach, and a slowdown in consumer spending.

Total System Services

Our \$57 TP is based on 17x CY18 P/E and represents 11x our CY18 EV/EBITDA, at a discount to the peers given slower sustainable revenue growth rate. Risks include further pressure on merchant acquiring, slower/faster than expected new win conversion, and accelerating / decelerating consumer spending.

Evertec

Our target price of \$18 is based on 10x CY18E P/E and represents 10x CY18E EV/EBITDA, a discount to its peer-group average due to soft fundamentals, macro concerns in Puerto Rico, and expected headwinds from Latam attrition. Risks include client losses, spread compression, bank failures and M&A, in-sourcing, security breach, lower-than-expected margin expansion, and a slowdown in consumer spending. Upside risks include new client wins in LatAm, accelerating transaction and volumes in Puerto Rico, and market share gains.

Fidelity National Information Services

Our target price of \$80 is based on 16x our CY18E EPS and represents 11x our CY18E EV/EBITDA, roughly in line with the company's forward P/E and EV/EBITDA two-year average, given improving organic revenue growth profile and mid-to-high-teens EPS growth. Key risks include a(n) decline/increase in bank failures, slowdown/acceleration in demand environment from financial institutions, and greater-/less-than-expected synergies from SunGard.

Fiserv

Our \$101 target price is based on 18x our CY18 P/E and is at 12x our CY18 EV/EBITDA, a premium to payment processor peers. Risks include better-/worse-than-expected bank spending, client addition/reduction from M&A activity/bank failures, and a slowdown in payments revenue growth.



Appendix 1

Important Disclosures

*Other information available upon request

Disclosure checklist			
Company	Ticker	Recent price*	Disclosure
Visa Inc.	V.N	88.68 (USD) 12 Apr 17	4,6,7,8,9,14,15
MasterCard	MA.N	111.47 (USD) 12 Apr 17	7,8,14,15
PayPal	PYPL.OQ	42.49 (USD) 12 Apr 17	7,8,14,15
Square	SQ.N	17.30 (USD) 12 Apr 17	2,7,8
First Data	FDC.N	14.96 (USD) 12 Apr 17	1,7,8,14,15

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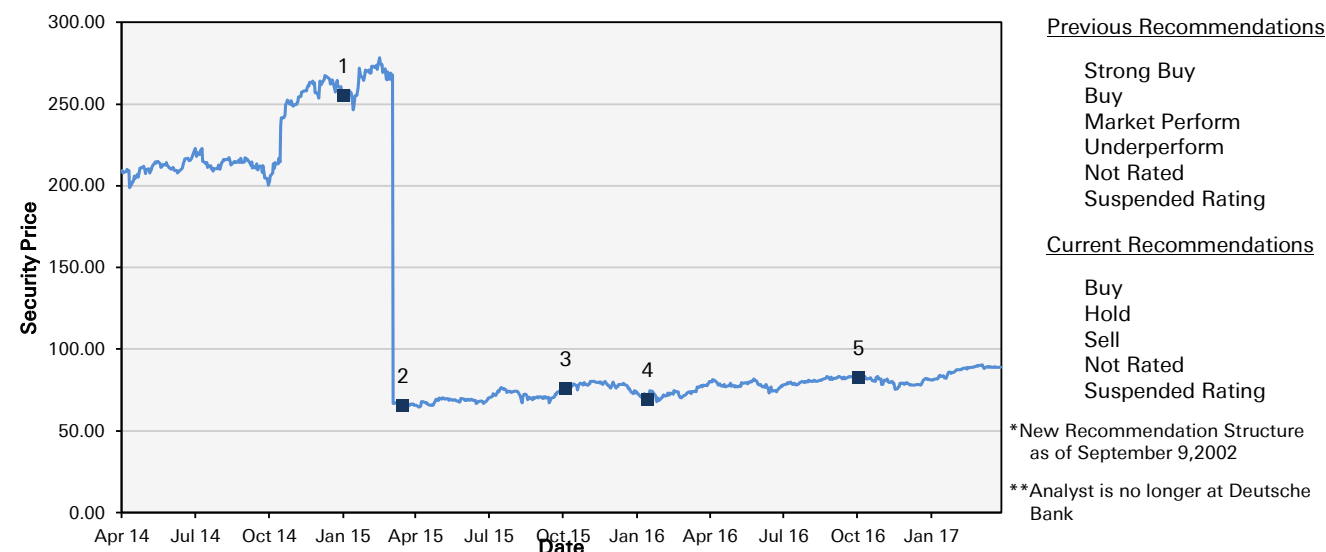
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Historical recommendations and target price: Visa Inc. (V.N)

(as of 4/12/2017)

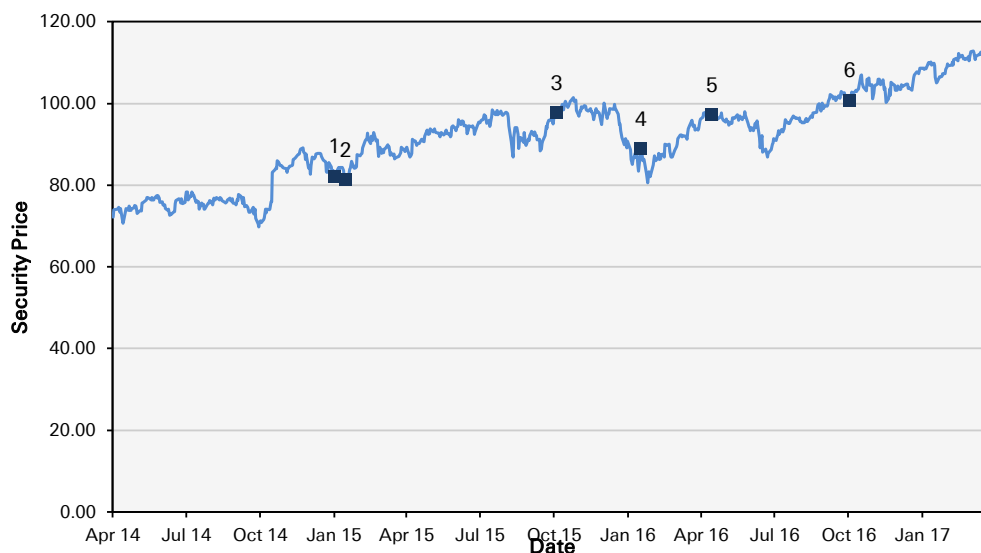


1.	01/16/2015:	Buy, Target Price Change USD316.00 Bryan Keane	4.	01/29/2016:	Buy, Target Price Change USD87.00 Bryan Keane
2.	03/31/2015:	Buy, Target Price Change USD79.00 Bryan Keane	5.	10/17/2016:	Buy, Target Price Change USD103.00 Bryan Keane
3.	10/19/2015:	Buy, Target Price Change USD91.00 Bryan Keane			



Historical recommendations and target price: MasterCard (MA.N)

(as of 4/12/2017)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure
as of September 9,2002

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1.	01/16/2015:	Buy, Target Price Change USD105.00 Bryan Keane	4.	02/01/2016:	Buy, Target Price Change USD100.00 Bryan Keane
2.	01/30/2015:	Buy, Target Price Change USD100.00 Bryan Keane	5.	04/29/2016:	Buy, Target Price Change USD104.00 Bryan Keane
3.	10/19/2015:	Buy, Target Price Change USD114.00 Bryan Keane	6.	10/17/2016:	Buy, Target Price Change USD124.00 Bryan Keane

Historical recommendations and target price: PayPal (PYPL.OQ)

(as of 4/12/2017)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure
as of September 9,2002

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1.	07/13/2015:	Upgrade to Buy, Target Price Change USD42.00 Bryan Keane	3.	10/11/2016:	Buy, Target Price Change USD52.00 Bryan Keane
2.	10/19/2015:	Buy, Target Price Change USD44.00 Bryan Keane			



Historical recommendations and target price: Square (SQ.N)

(as of 4/12/2017)



Previous Recommendations

Strong Buy
 Buy
 Market Perform
 Underperform
 Not Rated
 Suspended Rating

Current Recommendations

Buy
 Hold
 Sell
 Not Rated
 Suspended Rating

*New Recommendation Structure
 as of September 9, 2002

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1. 12/14/2015:	Upgrade to Hold, Target Price Change USD13.00 Bryan Keane	3. 03/13/2017:	Buy, Target Price Change USD19.00 Bryan Keane
2. 12/02/2016:	Upgrade to Buy, Target Price Change USD17.00 Bryan Keane		

Historical recommendations and target price: First Data (FDC.N)

(as of 4/12/2017)



Previous Recommendations

Strong Buy
 Buy
 Market Perform
 Underperform
 Not Rated
 Suspended Rating

Current Recommendations

Buy
 Hold
 Sell
 Not Rated
 Suspended Rating

*New Recommendation Structure
 as of September 9, 2002

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1. 11/09/2015:	Upgrade to Buy, Target Price Change USD20.00 Bryan Keane	3. 11/17/2016:	Buy, Target Price Change USD19.00 Bryan Keane
2. 02/10/2016:	Buy, Target Price Change USD16.00 Bryan Keane		



Equity rating key

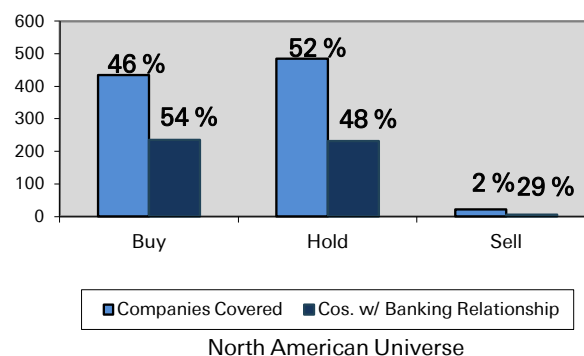
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Sell: Based on a current 12-month view of total share-holder return, we recommend that investors sell the stock

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