Payments, Processors, & FinTech

If Software Is Eating the World… Payments Is Taking a Bite

24 January 2020
Equity Research | Americas

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Payments, Processors, & FinTech
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Payments, Processors, & FinTech coverage overview

Networks, merchant acquirers, bank tech, B2B-related, and money transfer

- The initial payments coverage universe consists of networks (V and MA, co-covered with Moshe Orenbuch), merchant acquirers & bank technology providers (GPN, FISV, FIS, PYPL, SQ, and RPAY), B2B-related businesses (FLT, WEX, and VRRM), and money transfer platforms (WU and IMXI).

Global payments networks	Merchant acquirers (including MSP, PSP, etc.) & bank technology providers	B2B-related businesses and payments networks	Money transfer (international remittances)
mastercard	FIS	FLEETCOR	intermex INTERNATIONAL MONEY EXPRESS
VISA	fiserv.	VERRA MOBILITY Safe. Smart. Connected.	WesternUnion WU
	globalpayments	wex	
	PayPal		
	REPAY Realtime Electronic Payments		
	Square		

Payments, Processors, & FinTech company reports

Links to our detailed company-specific reports

- Visa (V): Expanding moats of the 4-party model -- Co-covered with Moshe Orenbuch
- Mastercard (MA): Expanding moats of the 4-party model -- Co-covered with Moshe Orenbuch
- PayPal (PYPL): The best way to win a fight…Is not to get into a fight
- Fidelity National Information Services (FIS): Accelerating at scale
- Fiserv (FISV): Scale begets scale
- Global Payments (GPN): In all the right swim lanes
- Square (SQ): Square stands apart; ecosystem scaling
- FleetCor Technologies (FLT): King of the Cross-Sell
- Western Union (WU): The traditional money remittance power
- WEX (WEX): Operating in attractive FinTech swim lanes
- Verra Mobility (VRRM): Market leader in tolling payments processing and traffic safety solutions
- Repay (RPAY): Integrated payments platform serving niche (but expanding) verticals
- International Money Express (IMXI): Focused competitor gaining share in important remittance corridors

Payments, Processors, & FinTech coverage & ratings

8 Outperform, 3 Neutral, 1 Underperform

Ticker	Company Name	Market Cap ($b)	CS Rating	Market Price	CS Target	Brief take on stock
V	**Visa, Inc.**	$459	OP	$205	$228	US contactless rollout likely to benefit V to a greater extent vs. MA (due to mix); Emphasis on attracting new payments flows onto both card and non-card rails (Visa Direct + Earthport, efforts in both cross-border and B2B, recently announced [pending] acquistion of Plaid)
MA	**Mastercard, Inc.**	$330	OP	$324	$350	Higher exposure to faster growth international markets; Acquisitions (Vocalink, Transfast, Nets, Transactis) support multi-rail approach, B2B (Mastercard Track), and bill-pay (Mastercard Bill Pay Exchange); Maestro card conversions
PYPL	**PayPal Holdings, Inc.**	$140	OP	$116	$135	Share gainer & eCommerce pure-play with a long list of nascent areas of upside (i.e., Braintree becoming more global, Venmo flipping to EPS boost, partnerships [MELI, Uber], bill-pay, China, iZettle, Honey), eBay manageable
FIS	**Fidelity National Information Services, Inc.**	$91	OP	$147	$170	Expectation for accelerating topline in 2020, 2021, and possibly 2022, rare; ~45% of merchant acquiring in global eComm & ISV; Two deals worth of revenue synergies in 2020; Longer-term in-store expansion in new countries
FISV	**Fiserv, Inc.**	$84	NEUTRAL	$121	$133	FDC undervalued thesis now validated by market (valuation); Exposure to attractive swim lanes (ISV, eCommerce International) albeit at lower levels of total revenue vs. Outperform-rated acquirers; GBS tougher compares ahead (following impressive acceleration in 2019)
GPN	**Global Payments, Inc.**	$60	OP	$199	$230	Highest relative exposure to the fastest growing channels (owned & partnered software, global eCommerce/Omni channel with local support in 33 markets); Leading credit issuer processor via TSYS; Potential for more bank/JV partnerships
SQ	**Square, Inc.**	$33	OP	$69	$84	Intersection of software + payments, "3x recycling"; Sentiment and number reset ahead of analyst day in March; Two recent price increases help alleviate a degree of the investment pressures (e.g., ~50bps on Instant Transfer)
FLT	**FleetCor Technologies, Inc.**	$28	NEUTRAL	$310	$335	Fuel, Corporate Payments, Lodging, & Tolls all recurring revenue, high margin, network effects, similar distribution; Best at cross-sell & accretive M&A ("Beyond Fuel latest example); Valuation recovered in 2019 (vs. 2017 and 2018 levels) with a return to LDD organic growth in fuel segment
WU	**The Western Union Co.**	$12	UP	$28	$26	Valuation at a meaningful premium to historical averages, dividend (~3%) at low end of range; Market digested recent good news ($150mm cost savings, 3-year targets/guidance); Competition from traditional & FinTechs; Platform/asset value & online white labelling supportive of value
WEX	**WEX, Inc.**	$10	R	$226	-	Company noted beginning Q2 2020 will lap Chevron and Shell portfolio conversions (currently contributing a ~600bps boost to Fleet segment revenue growth), also we note the recent weakness in SSS at -2.5% in Q3 2019
VRRM	**Verra Mobility Corp.**	$2.5	OP	$15.3	$17.5	Positive on the moats and sustained mid-single digit+ growth (guidance Government +2-4%, Commercial +6-8%, + boost via M&A, Europe, and new initiatives); Awaiting further detail on timing/execution of ramp in Europe (recent acquistion of Pagetelia potential to improve timeline)
RPAY	**Repay Holdings Corp.**	$0.9	OP	$16	$19	Integrated payments in niche verticals; Increasing debit penetration in core verticals, adding verticals, new merchants & ISV partners as drivers (organic ~mid-teens + M&A, e.g., B2B and Healthcare)
IMXI	**International Money Express, Inc.**	$0.5	NEUTRAL	$12	$14.5	Operates within a large TAM, share gainer, and numerous nascent initiatives (Africa, Canada, white labeling with Latin American banks, GPR cards); Mexico & Guatemala concentration (volatile data/end-market); Await further clarity on 2020 outlook given recent data points

Source: Company reports, FactSet, Credit Suisse estimates

Payments, Processors, & FinTech coverage overview
Top Pick: Global Payments (GPN), stable large-cap growth

Top Pick	Rationale	Catalyst Path
Global Payments (Outperform, $230 TP)	▪ ~22% EPS CAGR (2019-221E), supported by business mix analysis suggesting organic ex-FX revenue growth ~8-11% medium-term (plus M&A), along with ~200bps annual margin expansion (including ~$325mm in guided cost synergies). ▪ Highest relative exposure to the fastest growing channels: 1) ~37% owned & partnered software growing ~10-14%; 2) ~17% global eCommerce & omnichannel growing ~15-18%; 3) ~20% International growing ~10%+; and 4) an emphasis on SMB and multi-nationals. ▪ Leading credit issuer processor with dominant share in the US, UK, Ireland, Canada, and China (+5-7% growth vs. industry +3%); improved ability to win bank partnerships and joint ventures.	▪ Potential vertical software M&A (late 2020 return) ▪ New and/or expanded partners and client wins ▪ Initial 2020 guidance (expect low end of "*high single to low double digits*" topline) ▪ Synergy target increase
Added Outperform Highlights	**Rationale**	**Catalyst Path**
Square (Outperform, $84 TP)	▪ Intersection of software & payments, with two ecosystems (Seller & Cash App), with ability to launch and quickly scale new products (e.g., launched Cash Card late 2017, already at ~$230mm in annual revenue in 2019E by our estimates). ▪ Attractive set up for 2020 (coming off 2019 transition year) with its initial guide out of the way, two recent pricing actions (in-store processing, Instant Transfer), and a March analyst day to bridge gap until we begin to see benefits from re-investment (late 2020 and 2021). ▪ $75mm investment in numbers (marketing, salesforce, hardware), which we expect to add ~$4b+ 2021E GPV – we model stabilization (mid-20%s) in 2H 2020.	▪ March 2020 analyst day ▪ Instant Transfer price increase ability to offset entire incremental marketing & new office ▪ 2H 2020 GPV stabilization ▪ New product launches ▪ Updated Cash App user #
PayPal (Outperform, $135 TP)	▪ Near pure-play on eCommerce, with a ~$4-5tr "True TAM" inclusive of global eCommerce, eTravel, eFood delivery, eTicketing, online charitable donations, ride-sharing, etc. - provides confidence in the persistence of growth and annual compounding. ▪ We forecast Venmo to exit 2020 at a ~$900mm revenue run rate and reach profitability in 2021 (and become a 3% EPS benefit, up from a 3% drag in 2020E). ▪ Potential areas of upside: Bill-pay (Paymentus), iZettle (offline), new marketplaces, high-growth emerging markets investments (Uber, MercardoLibre, GoPay in 2019), engagement (Pay with Rewards), Honey, and M&A.	▪ Additional partnerships announcements ▪ Venmo-related (Pay with Venmo, credit card, Honey integration, updated user #, etc.) ▪ New markets and/or acceptance methods for Braintree

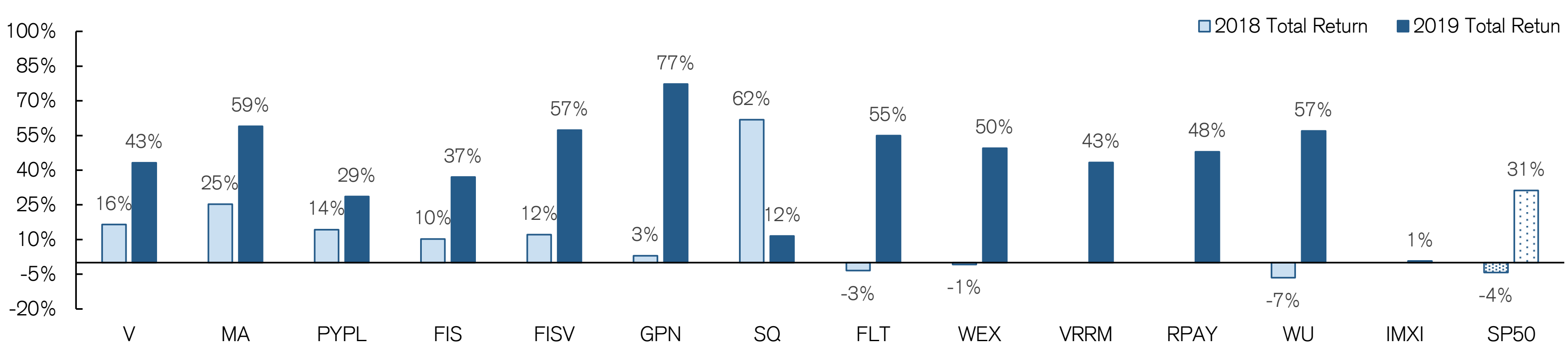
Source: Company reports, FactSet, Bloomberg, Credit Suisse estimates

2019 recap…

"Mega-mergers", increasing valuations, & FinTech advancement

2019 saw three large mergers combining merchant acquiring businesses with bank technology providers, numerous premier FinTechs continue to scale, and more announcements from BigTech

Consolidation	▪ Three mega-mergers (GPN-TSS, FISV-FDC, FIS-WP) ▪ GPN, FISV, MA, WU best performing stocks of 2019, while SQ was a laggard	
Premier private FinTechs scale	▪ Financing rounds and increasing valuations (e.g., Stripe ~$35b, Paytm ~$16b, Nubank ~$10b, Marqeta ~$1.9b, Plaid ~$2.65b [acquired by Visa for $5.3b in Q1 2020], Affirm ~$2.9b, Chime ~$5.8b), along with Bill.com's successful IPO	
BigTech & FinTech moves	▪ Apple Card/Apple Pay critical mass ▪ Google Checking + hired Bill Ready (PayPal) ▪ Facebook Pay across properties (FB, Instagram) ▪ Affirm announced "Anywhere" ▪ Alipay continued expansion outside China (US, Europe)	▪ Paytm in India expanding to 7mm+ merchants, launching banking product ▪ Challenger banks global expansion takes hold (Revolut, Monzo, N26 launch in US), and Nubank's expansion in Latin America ▪ Uber Money launched



Source: Company reports, FactSet, Credit Suisse research

…and expectations for 2020

"Big three" mergers of 2019 give way to progress on nascent initiatives

Some of our expectations for 2020 are for more M&A (bolt-on acquisitions with an emphasis on merchant acquiring), card networks progress on now nascent initiatives, and increasing efforts by BigTech in FinTech

Bolt-on M&A returns 2H 2020	▪ Digest recent mergers (integration) 1H 2020 ▪ Potential return to acquisitions 2H 2020 with an emphasis on merchant acquiring (fastest growing sub-segment within FISV, FIS, and GPN) and FinTech platforms (leveraging distribution reach)
Card network progress on contactless, new payment flows, SRC button, and FinTech partnerships	▪ Contactless cards could reach ~40% of US cardholders by year-end 2020 ▪ Visa Direct/Mastercard Send, bill-pay efforts, and more B2B automation ▪ SRC rollout gains steam in 2020 after soft launch in Q4 2019 ▪ Continue to help FinTechs scale, ensuring their positions in the ecosystem (e.g. Visa – Plaid)
Square strategy updates	▪ Square touching on "horizon three" at March investor day (one is scale, two is lifting attach rates, and three is bringing the two ecosystems [Seller & Cash App] together)
Increasing focus from and partnerships with BigTech	▪ Continued efforts from BigTech to drive adoption of their payments offerings to reduce checkout friction and increase commerce on their platforms: Instagram shopping, Google Commerce, and more launches from Apple (growth priority) ▪ We note 17% of European bankers view BigTech as the single biggest threat to their business (#2 overall behind regulation), ahead of FinTech at 15% given their established customer relationships, large user bases, brand recognition, and technical talent (Tink)

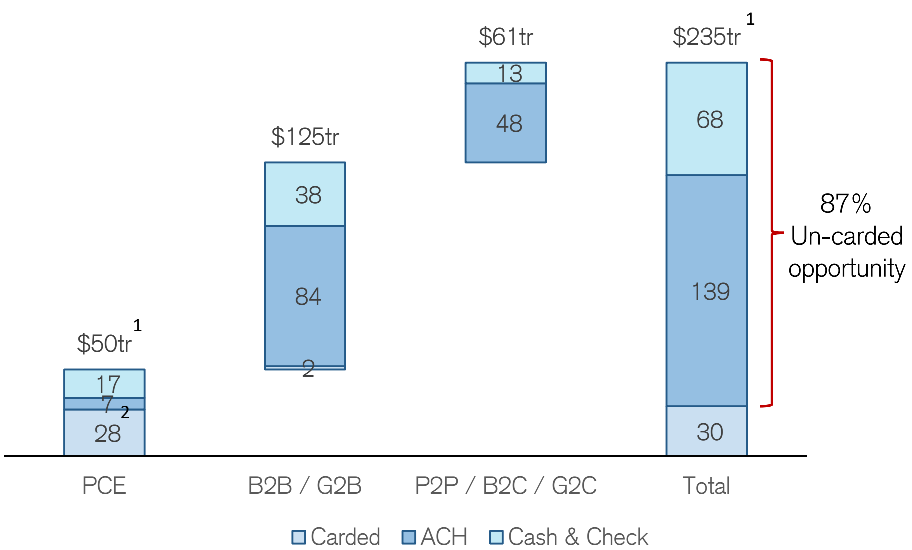
Source: Company reports, A.T. Kearny, Credit Suisse estimates.

Global payments volume TAM is bigger than global GDP

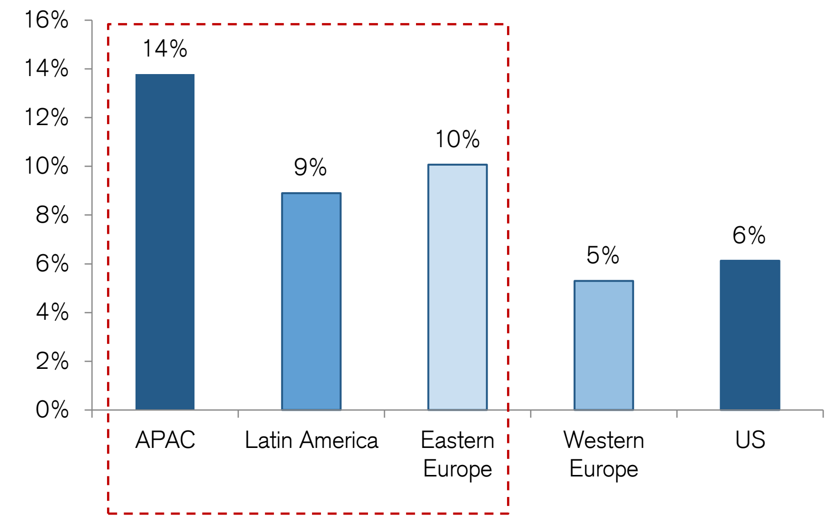
First ingredient to an investment thesis…

- Entire coverage universe is in some way exposed to secular trends toward digitization of payments.
- Global payments volume (~$240tr) is bigger than global GDP (~$85tr) because multiple payments are made for the same level of output or production.
- While a meaningful opportunity remains in the US and Europe, faster-growth markets are in Asia-Pacific, Latin America, and parts of Central / Eastern Europe.

Global payments TAM (total addressable market), across carded, ACH, and cash & check totals to ~$240tr, with only ~13% carded



Total card volume (Visa, Mastercard, and numerous local schemes) are expected to deliver ~5-14% CAGRs (2019-2023E), with APAC, LatAm, and Eastern Europe as faster-growth geographies



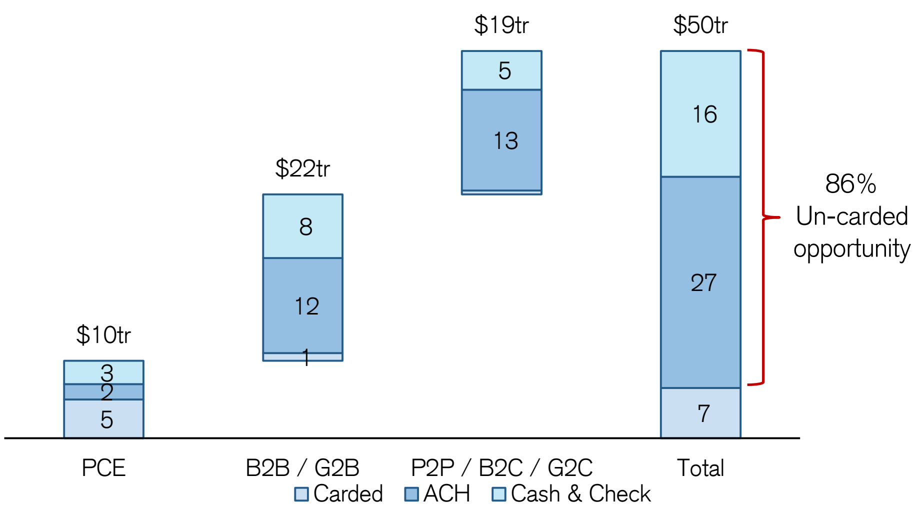
Source: Mastercard, Euromonitor forecast (bottom right chart), Credit Suisse estimates
(1) Includes $12T of non-purchase consumption; (2) Includes $13T of non-PCE card purchases in China

US Payments addressable market

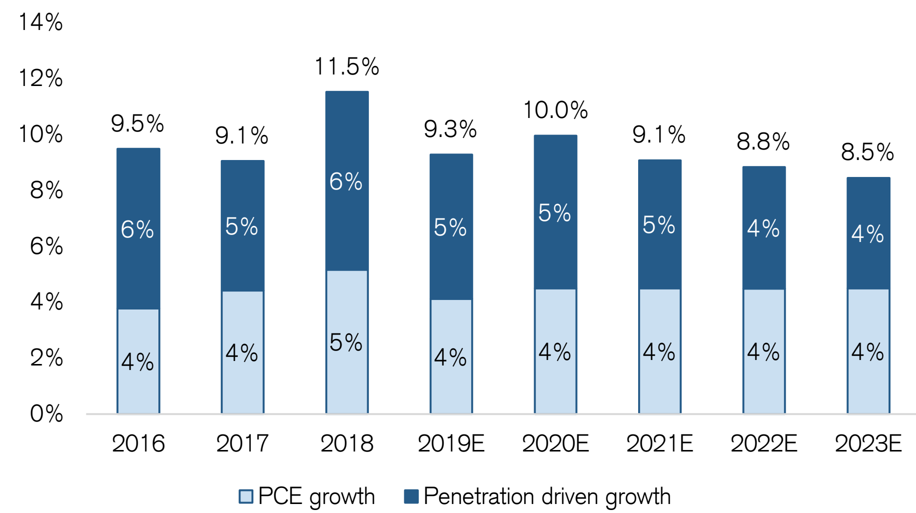
Large TAM driven by PCE growth + cash-to-card conversion

- Our industry model (card volumes/penetration vs. adjusted PCE + cash-to-card penetration) suggests continued HSD volume growth should persist through at least 2023.
- We model V & MA US volumes combining for ~59% of adjusted PCE by 2023E (vs. ~49% today).
- Our confidence is driven by nascent TAM-expansive payment flows beyond traditional consumer-to-business retail payments (i.e., beyond PCE), particularly push-to-card (priced to attract interchange-sensitive payment flows) and B2B.

The US payments market has a large TAM, estimated at ~$50tr in volumes when viewed in its entirety (PCE, B2B, G2B, P2P, B2C, and G2C), with ~50%+ of consumer payments penetrated and ~5% of B2B



Our industry model is built based on a combination of US PCE growth + cash-to-card penetration increases; we note that V & MA combined represent ~70-80% of US volumes



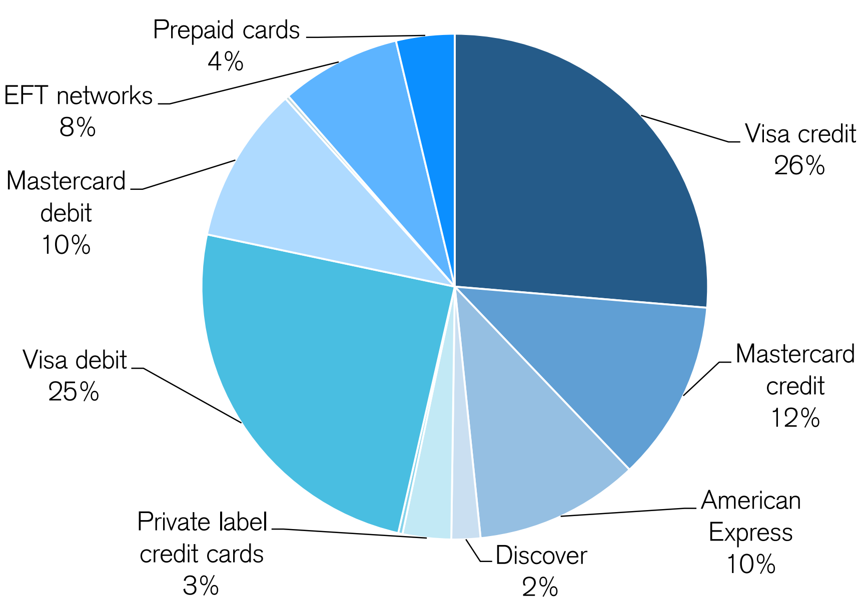
Source: Company reports, Mastercard, FactSet, the BLOOMBERG PROFESSIONAL™ service, Euromonitor, Credit Suisse estimates. There are rounding differences in both B2B and P2P bars in US TAM graph

US Payments market revenue pools

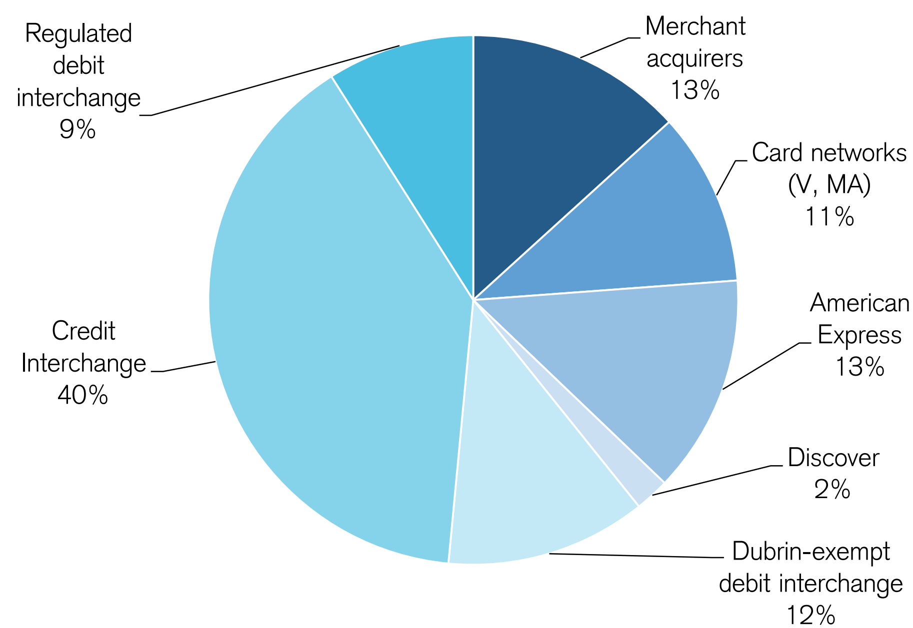
Merchant discount rate components (opportunity for acquirers, networks, & issuers)

- US payment card volumes are approaching $8tr in total, with the vast majority touching Visa and/or Mastercard networks.
- Visa and Mastercard are not the largest revenue beneficiaries though – banks are (the card issuers themselves), with card issuers earning interchange on each transaction equivalent to ~130bps on average (vs. Visa and Mastercard earning network yields that come to roughly ~26bps).
- Additional revenue opportunities include software, working capital, payroll, issuer processing, security, loyalty, etc.

Visa and Mastercard-branded card make up more than 70% of all US payments volumes (credit, debit, pre-paid)…



…but card issuing banks (which earn interchange) earn the majority of revenue made on a given transaction (excluding interest income)



Source: Company reports, The Nilson Report (US Purchase Volume from The Nilson Report for 2018 base, and 2019E represents Credit Suisse estimates), The Federal Reserve, Credit Suisse estimates

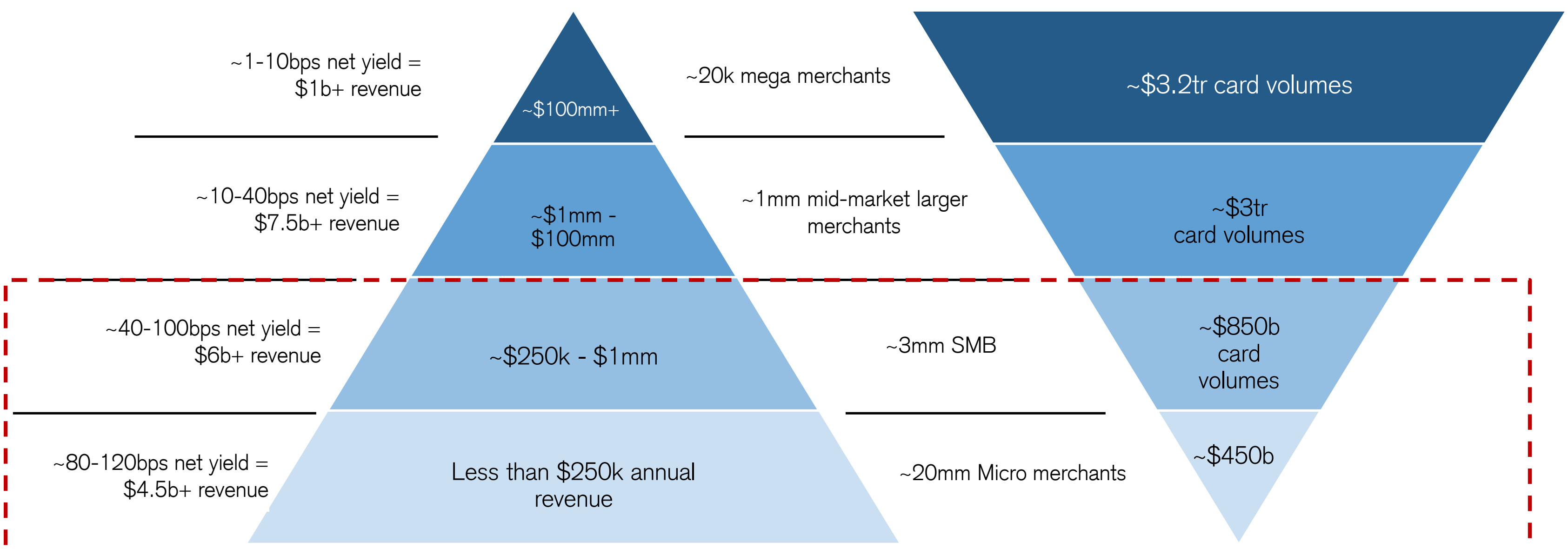
Merchant Acquiring: SMB is where the money is at

SMB segment ~17% of volumes, but ~55% of revenue in US market

- Often operate with bundled pricing models, with simple, rack-rate pricing (e.g., 2.6% + $0.10 for Square), which when combined with scale and interchange optimization, can result in net revenue yields ~40-140bps (vs. low-single-digit yields for large merchants)
- Less likely to be commoditized with bundling of vertical software embedded into operations (e.g., Square recently increased price)
- SMB merchant attrition is higher; ~20% of micro merchants fail per year[1] vs. LSD for larger merchants
- Opportunity to expand beyond payments (e.g., capital/cash advances, website design, CRM/marketing tools, payroll, etc.)

~$7.5tr in US card volumes (2019E), of which ~$1.3tr is from SMB and micro merchants, which despite making up just ~17% of volumes, account for ~55% of the acquiring/processing revenue opportunity

"…First of all, we stick to our knitting and we focus really on SMBs in a given country. So as good a company as Amazon is, we're not interested in Amazon, right? So for us to be a commoditized provider…no contracts, 30-day outs, no minimums, no service, low fee. Why is that interesting?"
– Jeffrey Sloan, CEO, GPN (May 15, 2019)



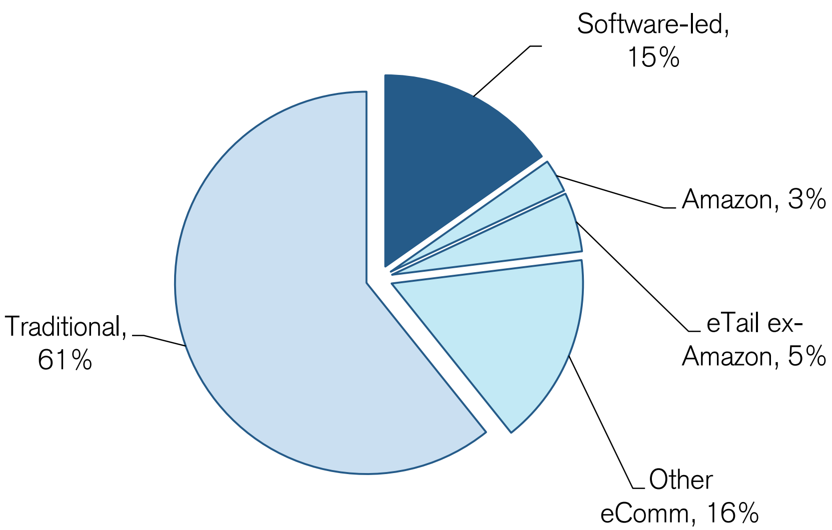
Source: [1]Small Business Administration, Company reports, Square, US Census, Credit Suisse estimates, US General Purpose Card Volume from The Nilson Report for 2018 base, and 2019E represents Credit Suisse estimates

Merchant Acquiring: Software & eCommerce fast-growth channels

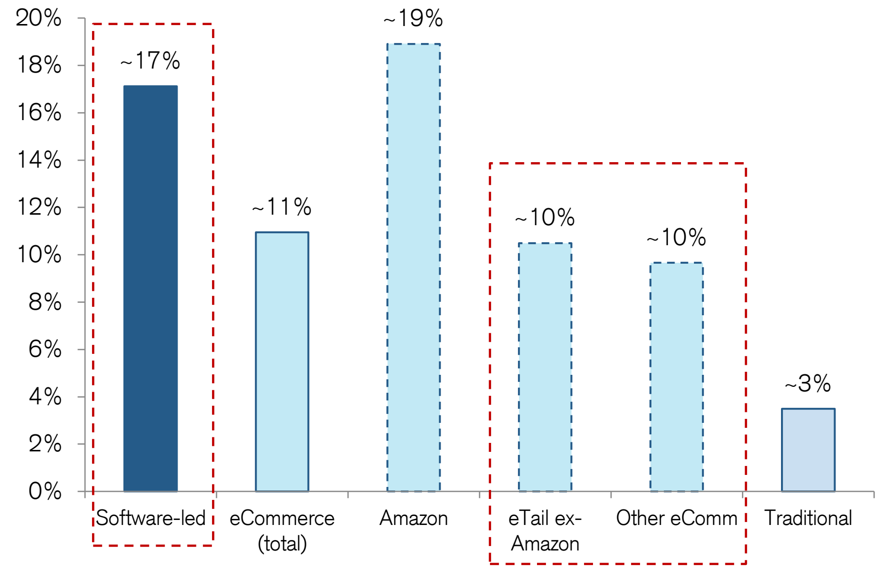
Want exposure to companies positioned to deliver tech-enabled payments

- Technology-enabled payments (software-led and eCommerce-related channels) is not a new trend, but it remains a powerful one, with software-led channels growing ~2x the overall market (~4-5x traditional channels) and eCommerce ex-Amazon growing ~2-3x traditional.
- Share gainers will be payment providers with the best exposure to these channels (own the technology to serve, with business mix skewed toward these faster-growth swim lanes, along with the scale and resources required to keep up with increasing complexity and competition).
- Amazon makes up ~35% of US retail eCommerce (and ~55%+ of growth), a portion of payments that is less addressable for the majority of payments companies and with the lowest unit economics for acquirers – for this reason, we separate the remaining portion of eCommerce, which we define as eTail ex-Amazon (i.e., retail eCommerce for SMB and non-Amazon merchants) and other online commerce (e.g., eFood delivery, ride-sharing, online travel, etc.).
- Further, a large portion of the remaining eCommerce volume runs through marketplaces (~50% of eCommerce globally) and multi-national companies (e.g., Uber, Netflix), placing additional emphasis on global & cross-border eCommerce & omnichannel capabilities for merchant acquirers.

We estimate that US payments volumes are still ~2/3rds traditional, with ~15% software-led and ~24% eCommerce-related (across Amazon and other non-Amazon online channels)



Software-led payments (~2x+ industry growth rates, or ~4x+ traditional channels) is the most attractive vertical in the US market, along with eCommerce ex-Amazon – 2019-2023E CAGRs below



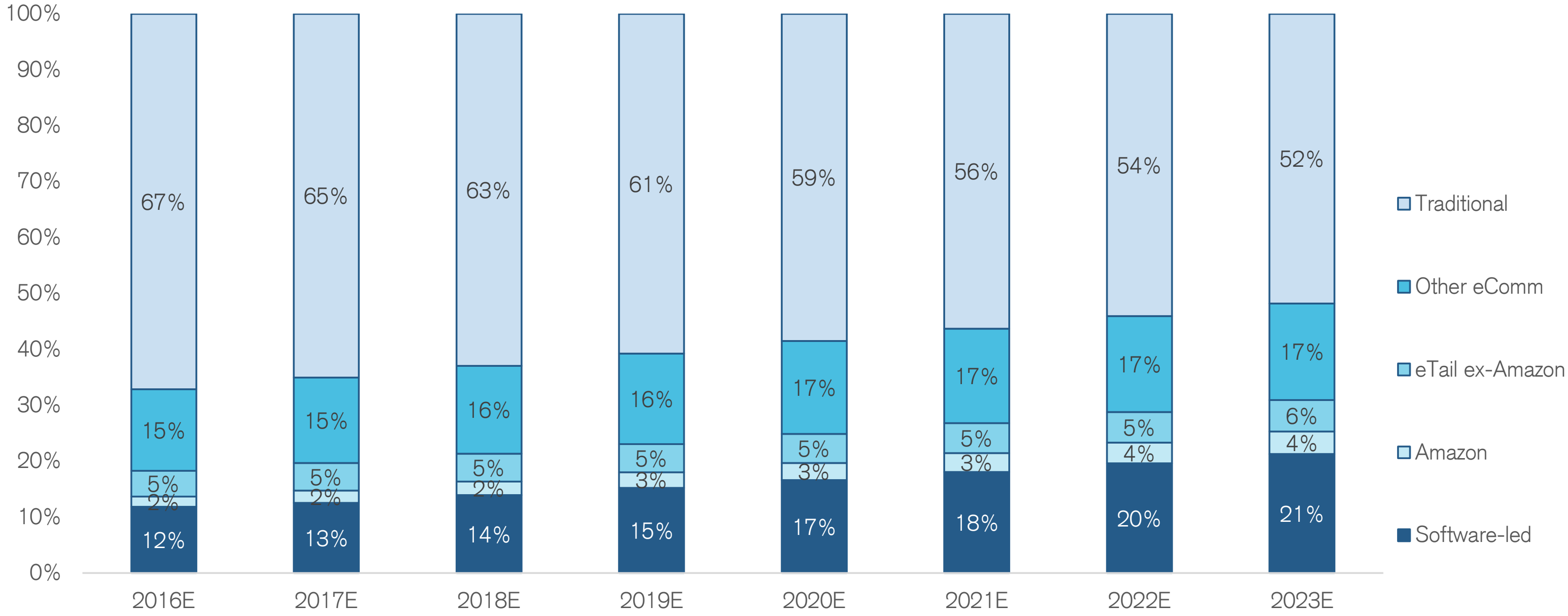
Source: Company reports, US General Purpose Card Volume from The Nilson Report for 2018 base, and 2019E represents Credit Suisse estimates, BCG, AZ Payments, eMarketer, 2019 Federal Reserve Payments Study; Software-led defined as integrated payments sold through owned or partnered software platforms typically to small or medium-sized businesses.

Merchant Acquiring: Software & eCommerce fast-growth channels

Most attractive swim lanes in the US are Software-led & eComm ex-Amazon

- We expect the majority of all growth in the US payments market will accrue to Software-led and eCommerce channels (we note the increasing importance of omnichannel capabilities capturing this growth).
- We forecast traditional payments (i.e., brick on counter and/or large merchant contracted separately) to cede ~10% share by 2023E, with more than half benefiting software-led channels (i.e., owned software-led platforms like Square and ISV-partnered integrated payments; gaining ~6%, going from ~15% to 21% share) and the remainder going to eCommerce payments channels (gaining ~3%, going from ~24% to ~27%).

Our US payments market estimates suggest that traditional payments, which still make up the vast majority of all volumes, will cede share to software-led channels (i.e., owned & ISV-partnered) and eCommerce (including digitized payments outside retail)



Source: Company reports, The Nilson Report, BCG, AZ Payments, eMarketer, Credit Suisse estimates

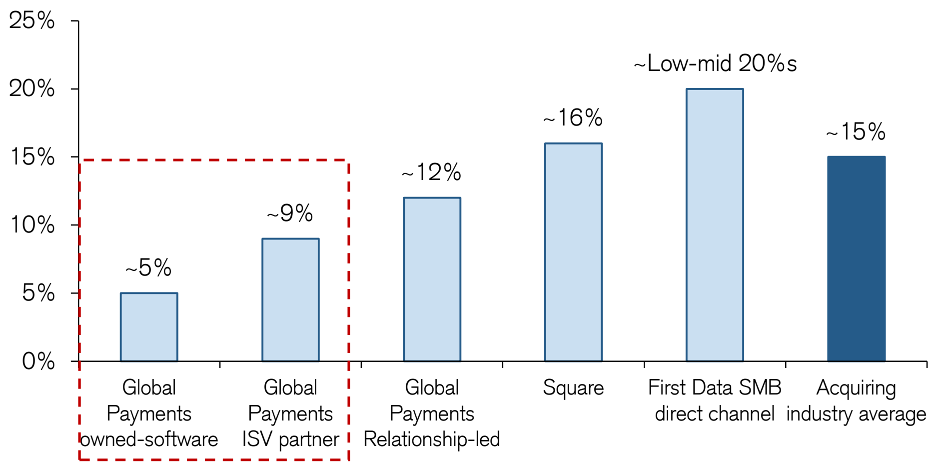
Merchant Acquiring: Software-led in two flavors – owned and partnered
Both support SMB access, cross-selling opportunities, and reduced attrition

- Results in a highly recurring revenue streams with reduced attrition, and the potential for higher margins (i.e., distribution leverage – "acquire the merchant once, sell the merchant many times", including additional ancillary products and services such as working capital loans, payroll processing, invoicing, etc.).
- Payments and software companies often strive to work with the same underlying merchants (SMB and mid-market, higher net revenue yields vs. larger merchants).
- Makes sense for payments and software to work together given payments data is valuable for decision making and planning (customer preferences, inventory planning, cash flow management), making the offering less commoditized.

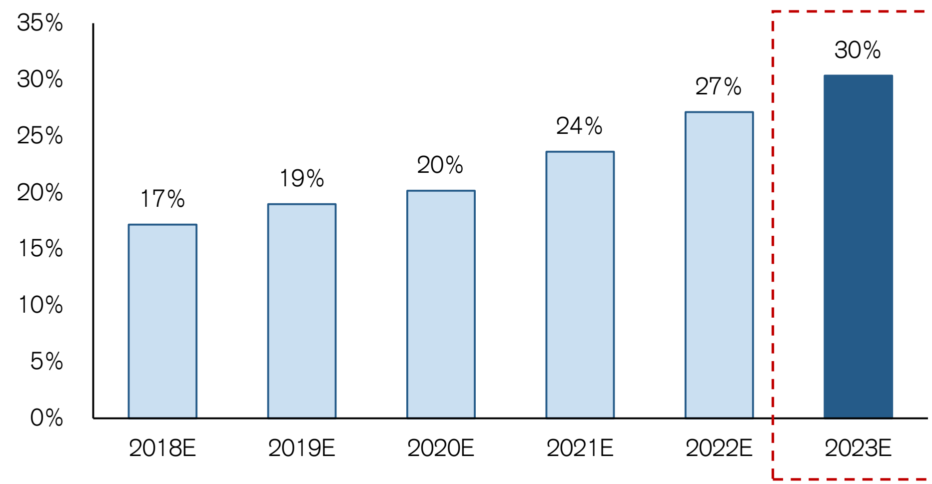
"…as we drive deeper into software & more integrated, the attrition fundamentals…are significantly better…once you're tied into the underlying software environment…it's hard to see people leaving…but I think to say those channels are in the single digits is probably a good estimate of where we see attrition rates in the sort of integrated and sort of the owned software markets."

– Cameron Bready, CFO (currently COO), Global Payments (March 2018)

Platforms that combine payments + software (both owned and ISV partnered approaches) benefit from meaningfully reduced attrition, particularly impressive given SMB skew of these channels



We estimate ~32% of Square's total company revenue will come from additional seller services (e.g., Capital, payroll, Instant Deposit, Business debit, additional paid software, online store, etc.) by 2023E



Source: Company reports, Credit Suisse estimates

Merchant Acquiring: eCommerce & Omnichannel drive share gains

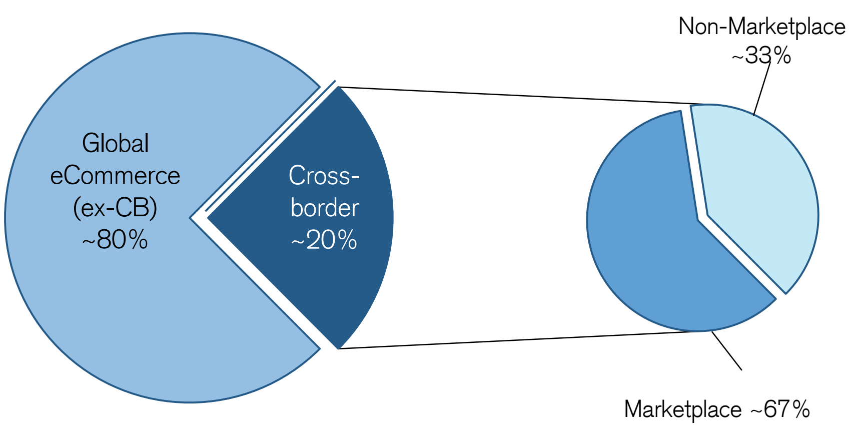
Increasing consolidation of relationships around fewer (~3-5) scaled platforms

- We expect larger merchants (including marketplaces) to increasingly consolidate their payments relationships around fewer globally-scaled platforms that can provide local acquiring both online and in-store across the majority of the merchant's geographic footprint.
- Share gaining platforms will allow for a single (or few) integration(s) to access local acquiring and consumer experiences (including local payments methods, both card and non-card), leading to higher authorization rates, increased conversion, and reduced costs (interchange, network fees, fraud).

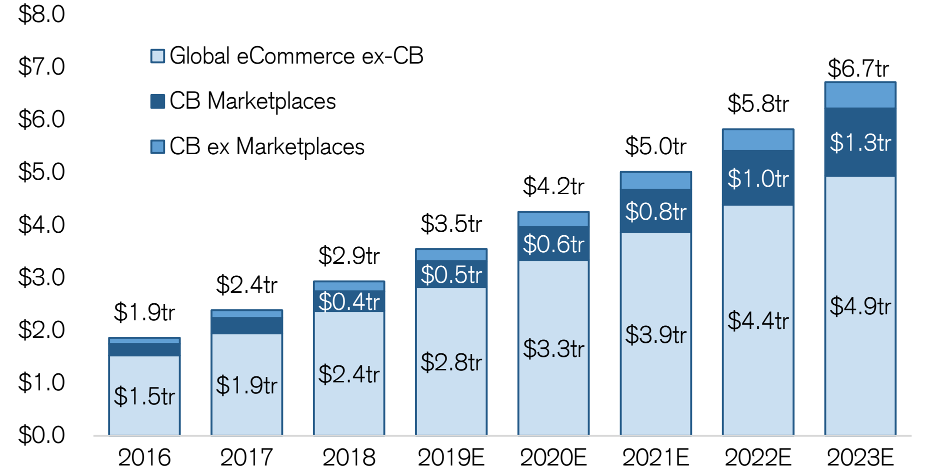
"…It's not unusual for a large global retailer to be managing 30 to 60 and sometimes 100-plus contracts and partners…It is not unusual for a large international company to be eliminating potentially dozens of different partners and integrate one implementation across all of those regions with one set of contracts and one solution…"

– Brian Dammeir Head of Product, Adyen (April 2019)

Global eCommerce is about ~80% domestic and ~20% cross-border; within cross-border, ~2/3rds are done via Marketplaces (and a meaningful portion of the remainder is via larger multi-national merchants)



Global eCommerce is a fast-growth swim lane (~17% CAGR 2019-2023E), with the cross-border component growing ~25%+ (with an even faster-growth sub-component, cross-border on Marketplaces, is growing ~27%)



Source: Company reports, Worldpay, eMarketer, Forrester Research, Zion Market Research, Credit Suisse estimates

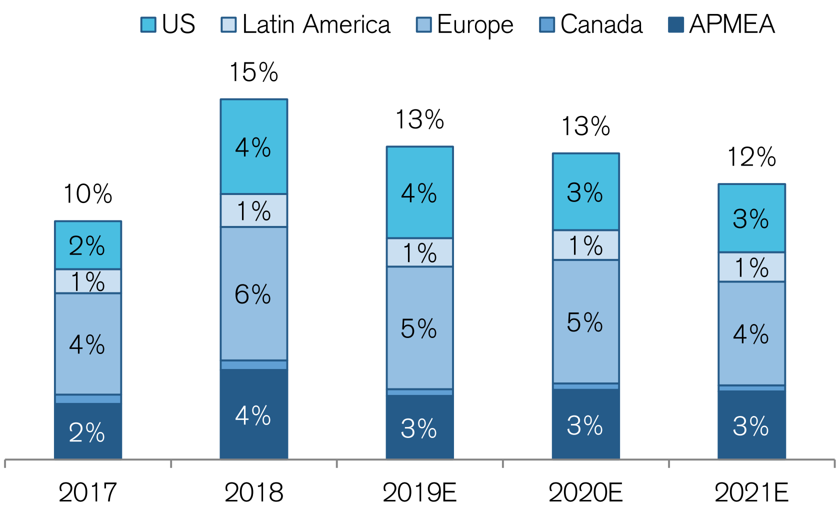
Merchant Acquiring: International exposure supports growth
Faster-growing underlying markets with lower penetration

- Faster-growth international markets, often in earlier stages of the secular cash-to-card conversion (e.g. APAC, Latin America, and Central / Eastern Europe).
- Processing in-store payments for domestic merchants requires local acquiring capabilities (owned or sponsored licensing), local support staff, local knowledge, relationships with regulators, local payments methods, local language, etc.
- The ability to handle both in-store and eCommerce (omnichannel) is a differentiator, better positioning acquirers to win multi-national merchant contracts (e.g., Global Payments won Citi for global eCommerce & omnichannel for Citi's multinational banking clients on this basis).

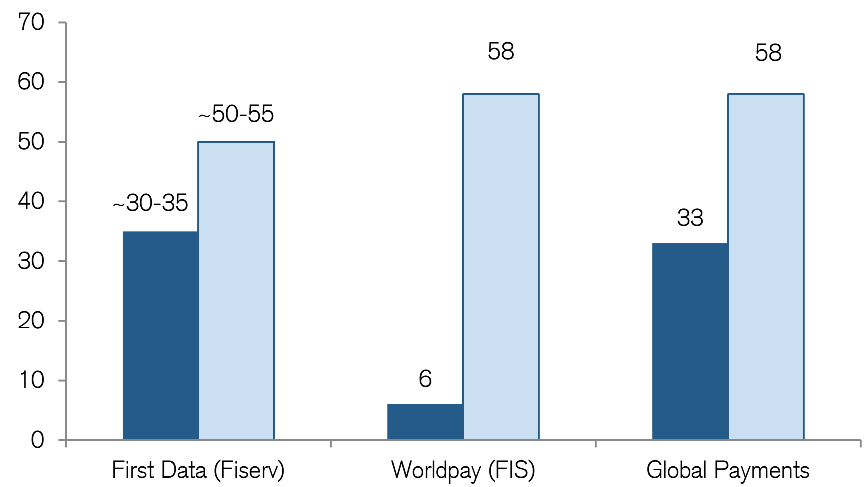
"…We expect continued growth and expansion into faster-growth markets. Most of our peers are in just a handful of geographies, just 1 geography, or are brand-new entrants into just a couple of markets. We should also think…about…the nature of how we compete globally…we provide a unified, seamless managerial operating in technology environment worldwide. Many of our competitors have multiple platforms - we do not. …"

– Jeffrey Sloan, CEO, Global Payments
(March 2018)

Illustrative of the benefits of gaining exposure to faster-growth geographies; Mastercard achieved ~75% of its growth from international, only 65% of its total, and grew~1.6x domestic volumes in 2018



Global Payments, Worldpay, and First Data (Fiserv) have broad global coverage (e.g., Global Payments provides local acquiring in 58 markets, including 33 with domestic in-store processing and local support)



Merchant Acquiring: Channel and business mix matter

Estimated revenue exposure within merchant acquiring business segments

Provider	Software-led (owned and/or partnered, iPOS)	eCommerce	SMB	International	Comment/Description
Global Payments	~37%	~17%	~80%	~20%	Owned (e.g., AdvancedMD) and partnered (OpenEdge integrated payments) approach to software, along with a leading global eComm & Omnichannel business processing in-store domestic, with local support in 33 markets.
FIS (Worldpay)	~20%	~25%	~60-65%	~15%+	Includes a leading global eCommerce acquiring businesses, along with a leading integrated payments offering (Mercury); Revenue recognition based on home country of merchant, understating International.
Fiserv (First Data)	~12%	~14%	>50%	~24%	Software-led includes both Clover iPOS offering and ISV/integrated payments business (CardConnect & BluePay), which has a slight degree of overlap; SMB relationships are via Clover, Partner Solutions (ISV, agent, ISO), referral partners (bank and non-bank), and JV alliances.
PayPal	~1-2%	~98-99%	~65-70%	~47%	Pure-play eCommerce, although iZettle represents offline expansion, software-led payments (owned software-led iPOS); As of 2015, large merchant mix was ~46% of volume (we assume an increase, and factor in P2P volume, pricing, and OVAS revenue).
Repay	~100%	~0%*	>60%	~1%	Pure-play integrated payments, with ~½ volumes integrated with ISV partners and ½ directly into merchant systems; Top 10 clients account for ~30% of revenue; Majority of payments made online or via phone, although we categorize as software-led vs. eCommerce.
Square	~95%	~1-3%	~90%	~5%	Horizontal software, with select vertical-specific solutions; Assumes ~1/2 of Mid-Market sellers are SMB (by volume), remainder are larger (e.g., Shake Shack, Washington Nationals, Blue Bottle, etc.).

Source: Company reports, Credit Suisse estimates; Percentages are estimates (not precise, disclosed figures) of revenue mix within acquiring businesses for GPN, FISV, & FIS and based on Credit Suisse definitions of the categories, acknowledging a degree of overlap and blurring among various channels

Merchant Acquiring: If these platforms gain share, who will lose it?

Hundreds of sub-scale, country/regional, and local bank-owned acquirers

Rank	Acquirer	Country	Transactions (mil.)		Acquirer	Country	Transactions (mil.)		Acquirer	Country	Transactions (mil.)
1	Worldpay	Group	35,235	51	BS Payone	Germany	1,175	101	BB&T	US	247
2	JPMC	Group	25,610	52	UniCredit Group	Italy	1,111	102	Vakifbank	Turkey	246
3	BAMS	Group	17,701	53	Lloyds Bank Cardnet MS	UK	1,081	103	Nedbank	South Africa	235
4	First Data	Group	17,053	54	Aeon Financial Services	Japan	1,056	104	Tinkoff Bank	Russia	232
5	Sberbank	Russia	14,372	55	Raiffeisen Bank	Austria	1,013	105	Sayan Card	Iran	220
6	Global Payments	Group	13,187	56	Yapi Kredi Bank	Turkey	974	106	Electronic Payments	US	215
7	Barclays	Group	7,930	57	T Isbank	Turkey	958	107	QNB Finansbank	Turkey	211
8	China UMS	China	7,770	58	Pasargad Elec Payment	Iran	931	108	Al Rajhi Bank	Saudi Arabia	206
9	Citi Merchant	US	7,564	59	PrivatBank	Ukraine	901	109	T.C Ziraat Bankasi	Turkey	199
10	Wells Fargo	US	7,416	60	Desjardins (Monetico)	Canada	892	110	Sepehr Electronic Paymt	Iran	199
11	Cielo	Group	7,022	61	StoneCo	Brazil	890	111	Clearent	US	197
12	Elavon	Group	6,147	62	Ingenico Pay						194
13	BC Card	South Korea	5,192	63	Paysafe						193
14	Rede	Brazil	4,437	64	Fanava Card						190
15	Behpardakht Mellat	Iran	4,393	65	Credit Saison						188
16	Moneris Solutions	Canada	3,954	66	Banco de Sa						185
17	Credit Agricole	France	3,613	67	Market Pay						184
18	Credit Mutuel	France	3,611	68	First National						184
19	Saman e-Pay	Iran	3,603	69	Akbank						180
20	Nets	Denmark	3,579	70	Concardis						175
21	Worldline	France	3,478	71	No. American						167
22	Asan Pardakht Persian	Iran	3,156	72	Gazprombank						165
23	KB Kookmin	South Korea	3,149	73	Merrick Bank						165
24	Swedbank Group	Sweden	3,124	74	Handelsbank						164
25	JCB	Japan	3,083	75	Priority Paym						164
26	EVO	Group	3,030	76	PNC Mercha						161
27	Parsian E-Commerce	Iran	2,910	77	La Banque P						155
28	Santander	Group	2,856	78	SunTrust Mer						154
29	BBVA	Group	2,610	79	Bambora						149
30	ANZ	Group	2,355	80	BAC Credom						148
31	Westpac	Australia	2,158	81	Unicre						146
32	BPCE	France	2,014	82	Wirecard						142
33	Iran Kish Credit Card	Iran	1,894	83	Standard Ban						141
34	Commonwealth	Australia	1,878	84	Bankia	Spain	445	134	Hang Seng	Hong Kong	132
35	BNP Paribas	France	1,844	85	Banorte	Mexico	417	135	National Comml	Saudi Arabia	130
36	TSYS	US	1,802	86	Evertec Group	Puerto Rico	410	136	i3 Verticals	US	128
37	Societe Generale	France	1,648	87	CSOB	Czech Republic	406	137	Bank Mandiri	Indonesia	126
38	Intesa Sanpaolo	Italy	1,636	88	Redwood Merchant Services	US	405	138	Paya	US	126
39	Samsung Card	South Korea	1,617	89	Russian Standard	Russia	402	139	BankCard Services	US	119
40	Nexi Payments	Italy	1,598	90	VisaNet	Peru	397	140	Payroc	US	112
41	Mitsubishi UFJ Nicos	Japan	1,541	91	Shift4Payments	US	385	141	United Merchant Services	US	111
42	Hyundai Card	South Korea	1,535	92	Pardakht Novin Arian	Iran	330	142	Millennium BCP	Portugal	110
43	Transbank	Chile	1,530	93	Valitor	Iceland	326	143	SABB	Saudi Arabia	107
44	TD Merchant Solutions	Group	1,452	94	CTBC	Taiwan	307	144	KB Smart Pay	Czech Republic	105
45	National Australia Bank	Australia	1,384	95	First American Payment Systems	US	304	145	CardNet	Dominican Republic	104
46	Prisma Med. De Pago	Argentina	1,373	96	Vero	Brazil	302	146	HDFC	India	103
47	VTB Bank	Russia	1,362	97	T. Halk Bankasi	Turkey	295	147	Promsvyazbank	Russia	100
48	Sadad Informatics	Iran	1,253	98	Network International	UAE	295	148	Banco Davivienda	Colombia	98
49	PagSeguro	Brazil	1,235	99	Swiss Post	Switzerland	264	149	Riyad Bank	Saudi Arabia	88
50	Garanti Bank	Turkey	1,228	100	SEB Group	Estonia	253	150	Provredna Banka	Croatia	88

Merchant acquirers (and MSP, PSP, etc.) outside The Nilson Group's global top 25 handle ~30% of transactions and a higher percentage of revenue (larger merchants are more likely to work with larger merchant acquirers)

And while there are numerous share gainers outside of the largest acquirers (e.g., those operating in a sub-segment or niche with vertical expertise have a unique technology or distribution relationship), we expect an increasing trend toward consolidation via both organic share gains and M&A

Source: The Nilson Report, First Data estimates include JV proportionate share of transactions (BAMS, Wells Fargo, Citi, Santander, BBVA, PNC, Cardnet), Credit Suisse research estimates

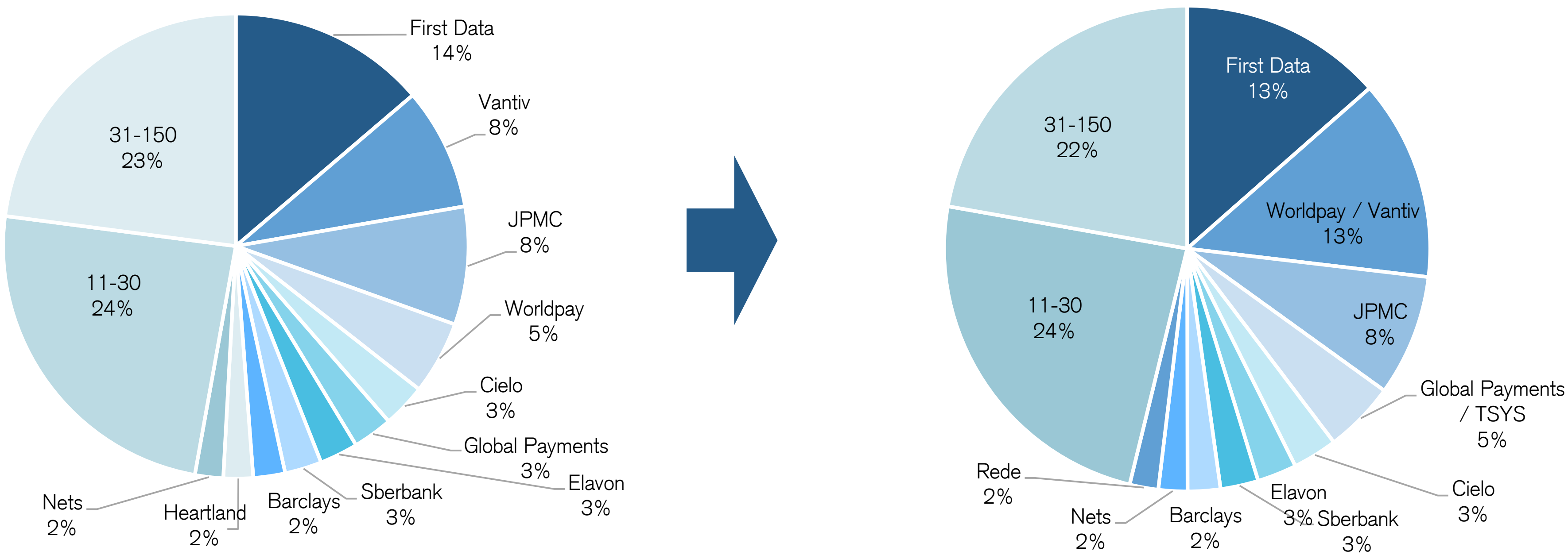
Merchant Acquiring: Share remains fragmented

Combination of M&A and organic share gains will drive further consolidation

- Share remains fragmented beyond the top five, with no others exceeding ~2-3% - many of which are regional or bank-owned (which we expect to struggle to keep pace with innovation and merchant needs relative to well-capitalized, globally-scaled platforms).
- As a result, we expect a combination of M&A and organic share gains (due to scale, increased need to invest in technology, innovation, etc.) for globally-scaled acquirers; from 2015 to 2018, the top five acquirers gained ~500bps in acquiring share (by transactions).
- We expect the three recently merged, scaled platforms (Fiserv-First Data, FIS-Worldpay, Global Payments-TSYS), all with annual free cash flow in the $3-5b+ range, to resume acquisitions with an emphasis on merchant acquiring, the fastest growing part of their businesses.

2015 Merchant acquiring share (by transactions), top five with ~38% share

2018 Merchant acquiring share (by transactions), top five with ~43% share



Source: The Nilson Report, First Data estimates include JV proportionate share of transactions (BAMS, Wells Fargo, Citi, Santander, BBVA, PNC, Cardnet), Credit Suisse research estimates

Networks: New sources of volume supportive of 10%+ until at least 2023E

Street underestimates growth persistence and power of compounding

- We quantify the potential impact (illustrative in sensitizing volume CAGR from small portions of penetration) of five nascent drivers of US card payments (push-to-card and B2B - beyond PCE - along with contactless, bill-pay, and underbanked additions to the card ecosystem) to determine their contribution to incremental growth.
- Industry incentives are designed to drive adoption providing economic benefits for issuers (interchange, incentives), networks (network fees), and consumers and business (rewards, speed, convenience, data) vs. cash, check, & ACH.
- Based on our illustrative (and likely conservative) estimates, these five drivers alone could add ~250bps to US industry growth (2019-2023E CAGR), lifting an expectation for high-single-digit trajectory into a more substantiated low-double-digit CAGR; implies less onus on PCE growth and traditional cash-to-card conversion baked into estimates.

New source of volume	TAM	Illustrative incremental card penetration (2023E)	Implied volume addition	Implied addition to 2019-2023E CAGR
Push-to-card	~$7.7tr	~5%	$386b	130bps
B2B	~$22tr	~1%	$220b	70bps
Contactless	~$3.0tr	~3%	$90b	30bps
Bill-pay	~$2.5tr	~2%	$50b	20bps
Un-banked & under-banked	~$369b	~4%	$16b	10bps
Total				**~250bps**

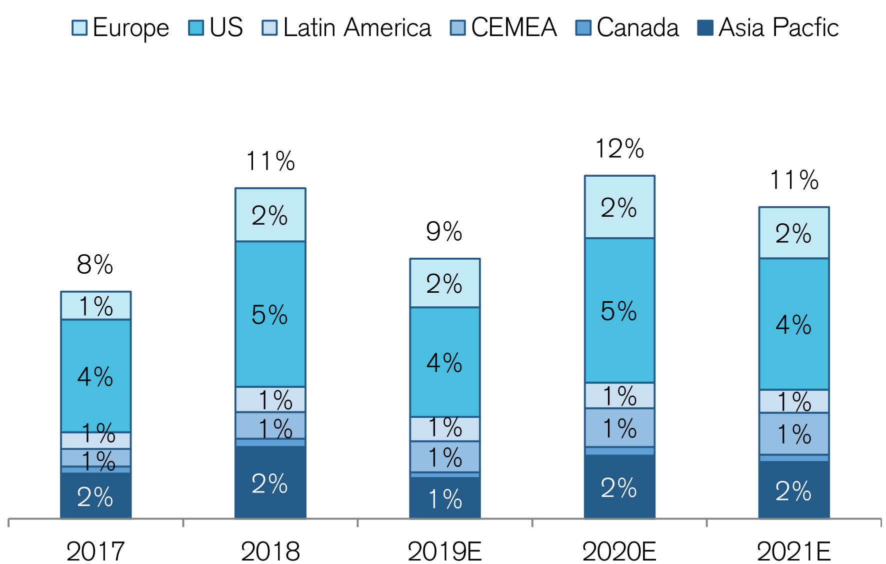
Source: Company reports, Visa, Aite, A.T. Kearney, FDIC, Mastercard, Credit Suisse estimates

Networks: Regional exposures a key driver of growth

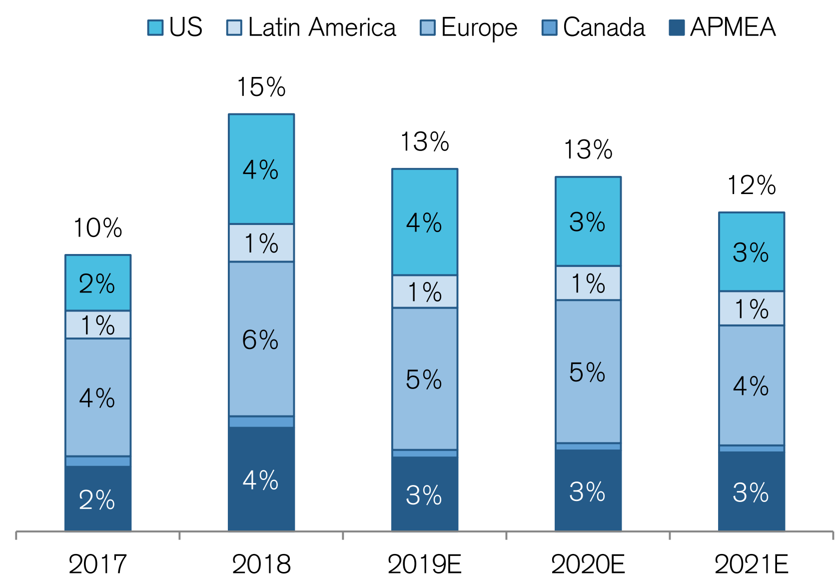
Mastercard's volume growth premium & secular exposure to growth markets

- Regional mix and greater exposure to faster-growth geographies (i.e., more nascent cash-to-card) has been a contributor to Mastercard's recent outgrowth relative to Visa (volume-wise).
- Visa has a larger US mix, and its European business is weighted toward the UK (more mature card market, Brexit, etc.).
- Mastercard benefits from its greater international mix, along with slight share gains, first-mover advantage with FinTechs (though Visa has since improved significantly), and continued Maestro card conversion (not included in reported volumes).

Visa's volume growth has been driven by its leading US business, and we forecast ~500bps of its ~12% growth in 2020E to be US-sourced



Mastercard's growth has been somewhat more balanced (and higher overall), with meaningful contribution from the US, Europe, and APMEA

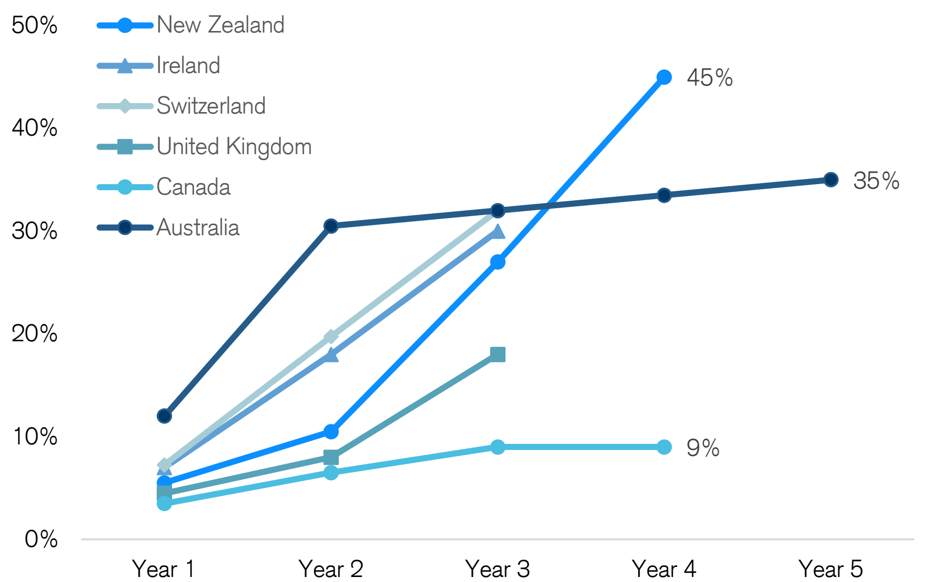


Networks: Contactless rollout in the US

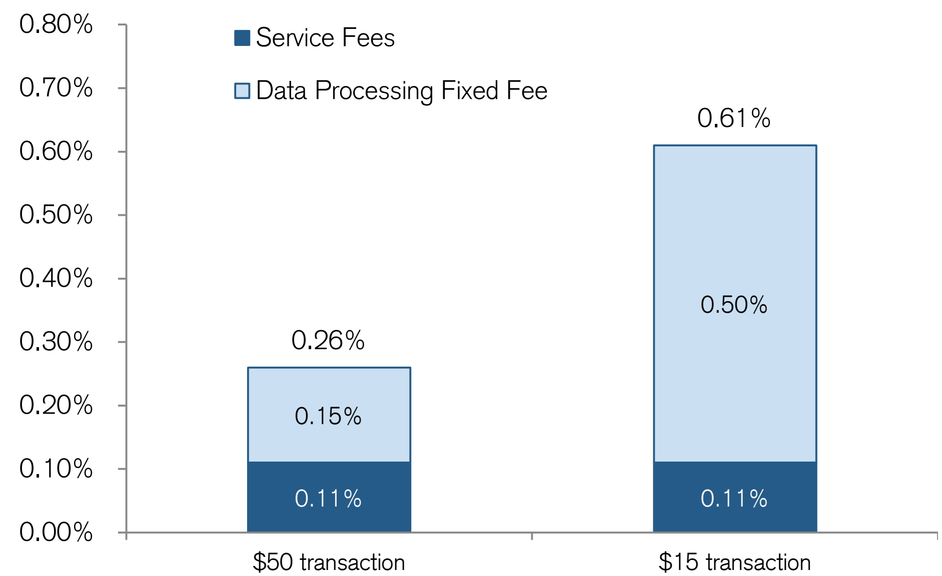
Near-term transaction growth driver and longer-term yield opportunity

- Driver of transaction growth in mature markets with high card penetration, helping to replace cash usage on small-ticket items - forecasts suggest ~50% of contactless penetration in the US by 2021 (Visa alone expects cards to move from ~100mm in 2019 to ~300mm in 2020).
- Potential for ~$90b in incremental volumes by 2023E (~30bps additive to V/MA combined 2019-2023E CAGR), although more meaningful on a revenue basis given higher net yields (bps of volume) at steady state.
- We believe contactless (for the portion with a lower average ticket size) yields have potential to be ~2x+ that of an average sized transaction (i.e., a cents per transaction data processing fee spread over a lower ticket); although we expect Visa and Mastercard will pay away the majority of this premium opportunity in the near term (~2-3 years) to incent the issuance and usage of contactless cards (i.e., rebates to both issuers and acquirers).

Markets similar to the US (e.g., Australia, UK) with high card penetration have seen meaningful adoption 3-4 years (percentage increase in face-to-face transactions per card, years 1-5 post rollout)



Illustratively, net yield opportunity in a steady state for contactless transactions has the potential to be ~2x+ that of a traditional, larger ticket size transaction (although still ~3-5 years away)



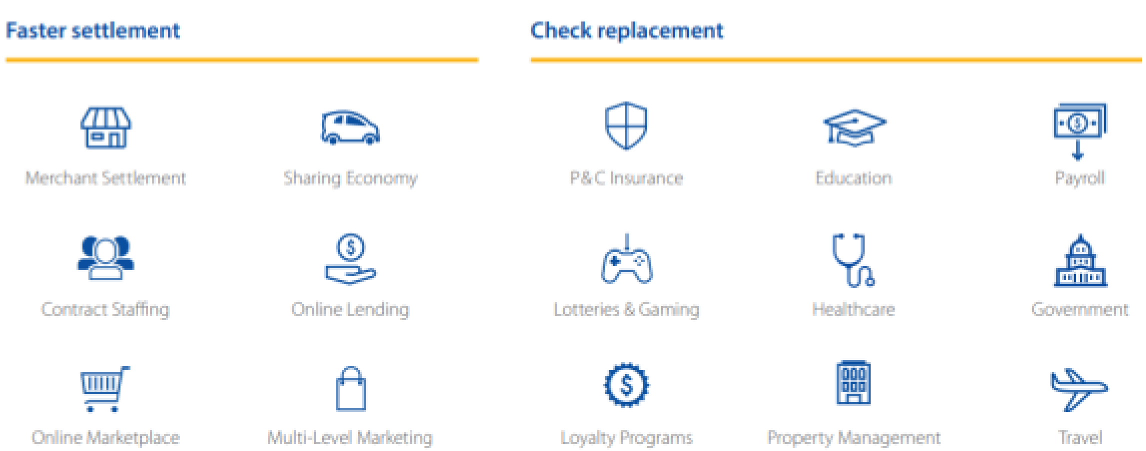
Source: Company reports, Credit Suisse estimates; Note that estimate yield is based on Visa-reported company-wide averages across credit and debit; A.T. Kearny; Note: Issuing contactless cards is more expensive for issuers (~$5 vs. ~$3 per card for EMV enabled) and could impact speed of rollout.

Networks: Push-to-card opening up new payment flows

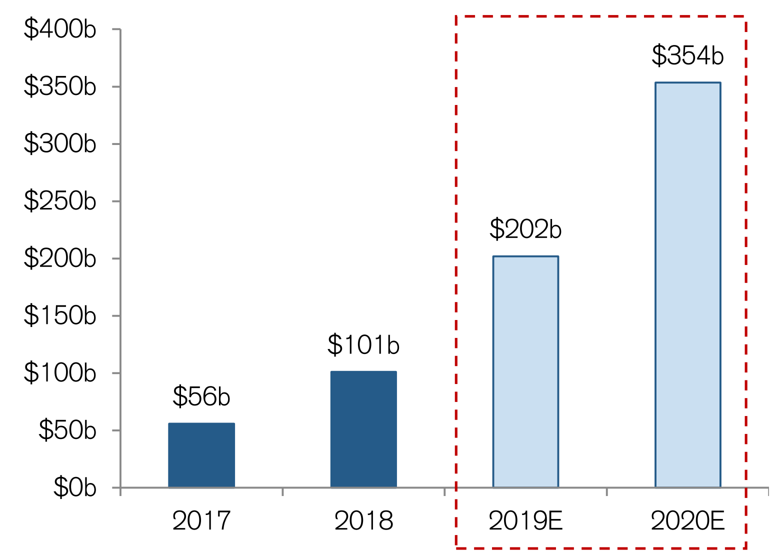
Visa Direct and Mastercard Send

- Push-to-card is both offensive (priced to expand card-able TAM into larger, interchange-sensitive payments) & defensive (race to scale before modern/fast ACH rails gain ubiquity), resulting in increased carded velocity of those same PCE dollars and further into B2B.
- Expands card-able TAMs into new payment flows (i.e., beyond PCE, into marketplace merchant payouts, insurance claim payouts, etc.) – sends to card-based accounts, then re-spent on cards (increased consumer and business debit card usage as an indirect benefit).
- Earthport (Visa) & Transfast (Mastercard) expand the reach of V/MA to 99% of accounts in the top 50 markets; Visa Direct remittance platform partnerships (and potentially bank partnerships) to drive premium priced cross-border transactions.
- A potential $350-$400b (with conservative assumptions) in incremental volumes would be ~100-150bps additive to V/MA combined 2019-2023E CAGR, but a lesser revenue impact given lower net yields vs. debit (as use cases become more commercial, pricing could improve).

"Push-to-card" payments (e.g., Visa Direct, Mastercard Send) expand card payments into new market opportunities, beyond C2B and into B2B, C2B, and P2P



Visa re-cast historical volumes pre- and post-inclusion of Visa Direct, suggesting the new product had already reached ~1%+ of total volumes in 2018 (vs. ~2-3% 2019E)

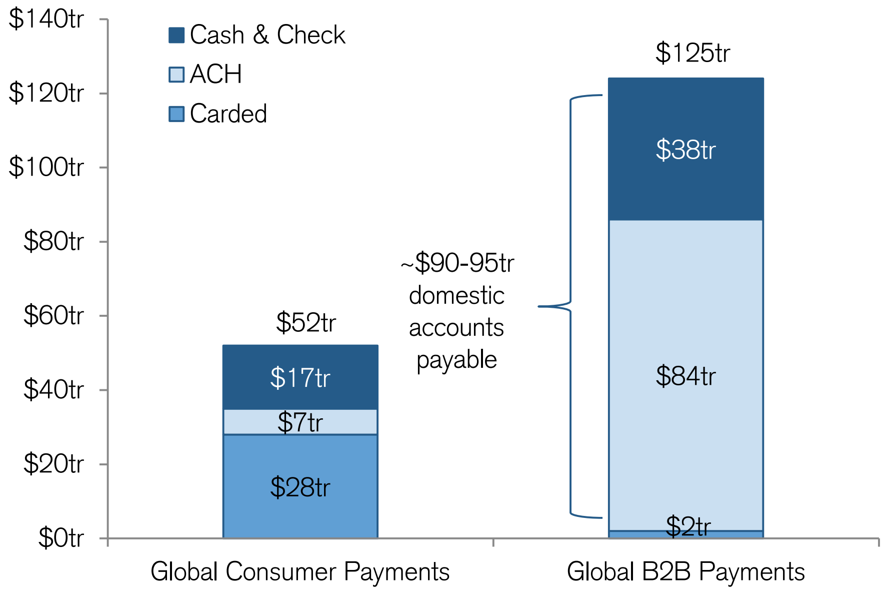


B2B Payments: Underpenetrated growth market nearing inflection

$125tr TAM that is so large, it almost does not merit discussion

- While the actual payments being made can be less of an issue for some merchants, antiquated processes, data/reconciliation challenges, and a lack of automation are common merchant pain points.
- Modern software/payments platforms are helping to solve these pain points and, in the process, are increasing awareness/usage of systems that will ultimately contribute to increased digitization of B2B payments.
- Additionally, card usage and/or rewards programs can lead to rebates – turning AP functions into revenue generators vs. cost centers, adding to the value proposition around efficiencies, reconciliation, etc.

Three buckets of B2B: 1) traditional corporate cards, virtual cards, etc. (~$20tr of volumes); 2) cross-border B2B (~$10tr); and 3) ~$90-95tr in accounts payable (domestic)



Common pain points are often related to processes and data, not the actual payments

Highly manual (people-intensive) processes are slow and expensive, given a lack of automation, and error prone

Checks have hidden costs (e.g., checks can be in the ~$4-20 range vs. ~$3 per ACH transaction, per AvidXchange) and are not guaranteed good funds

Limited transaction data from payments make reconciliation difficult

Cash flow management difficulty – i.e., paying on the due date with certainty vs. mailing a check a few days ahead of time, lacking certainty

Lack of visibility into supplier payment preferences

B2B Payments: FleetCor and WEX, B2B pure-plays

Corporate payments a fast-growing portion for both companies

- Beyond their core fuel card businesses (also a form of B2B payments), both FleetCor and WEX have corporate payments businesses aiming to shift businesses more toward full-AP automation.
- Both handle entire AP files (ACH, eCheck, virtual card) and are building supplier networks to expand virtual card acceptance, bolstered by recent acquisitions – FleetCor's Nvoicepay (~$220mm), WEX's Noventis (~$310mm).
- Corporate payments represent ~20% of FLT revenue, growing ~20%, while the business makes up less than 10% of WEX revenue, growing at a similar ~15-20%. As these businesses become a larger part of mix, they should be supportive of FLT & WEX multiples, given prospects for longer-term growth persistence in a whitespace opportunity.

Corporate Payments segment	Virtual card	Cross-border	AP automation	Other	Comment/Description
FleetCor	Comdata	Cambridge	Nvoicepay	Fintwist for Payroll	Emphasis on mid-market; partnerships with AvidXchange and Bill.com (more SMB focused platforms)
WEX	WEX Virtual Payments	n/a	Noventis, EFS	3Delta Systems, AOC Solutions	Inspyrus partnership in AP automation; utilizes bank channel partners (American Express, PNC Bank, etc.); to address larger multi-national merchants' cross-border needs

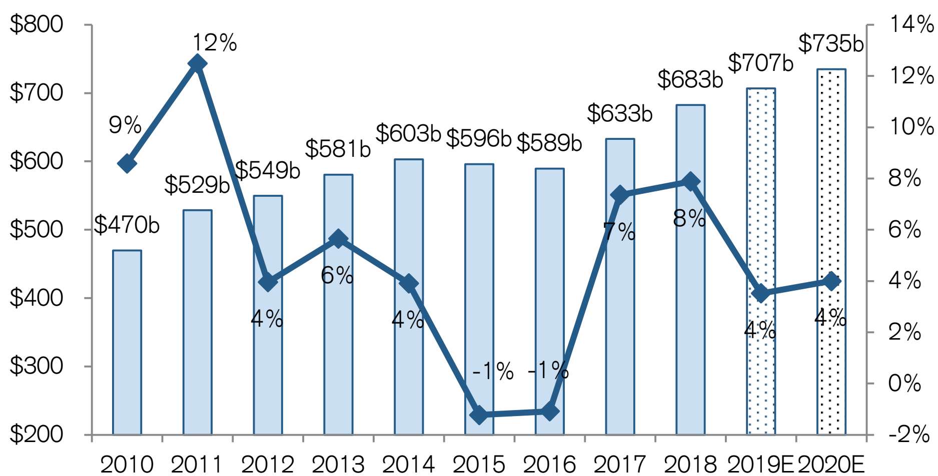
Source: Company reports, Credit Suisse research estimates

Money transfer & remittances: Large market, but increasingly competitive

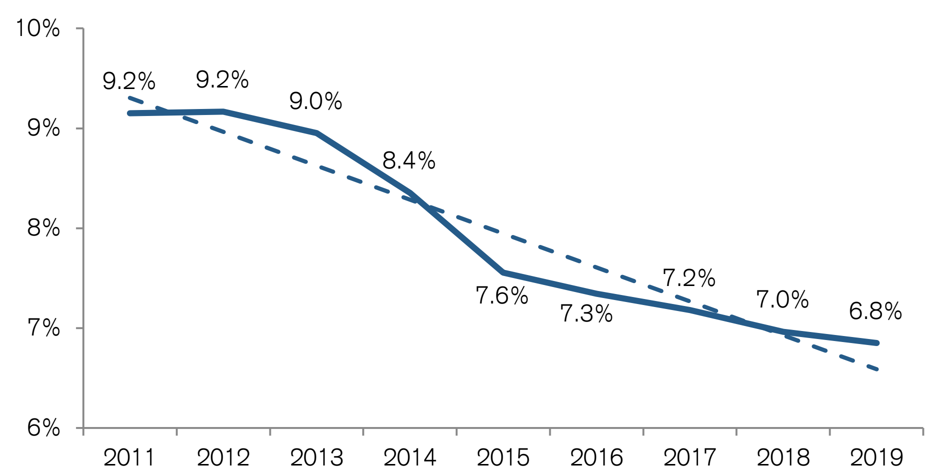
$700b TAM with economics compressing over time

- Traditional bank wires (i.e., SWIFT messaging and usage correspondent banking) are a trusted form of money remittance but historically have come with uncertain timing and fees (i.e., number of hops and fees taken at each hop).
- Bank wires (~65% of global volumes) represent an opportunity for tech-forward platforms that have built their own global treasury operations and/or networks of users and agent locations.
- New entrants (e.g., Transferwise already at ~$5b in volume per month) offer low-fee alternatives to sub-sets of banked customers; Visa Direct-Earthport further enabling globalization of FinTech competitors (via both card and bank account connectivity). Although markets with high underbanked (cash-based) remittances (e.g., US into Mexico – largest corridor) remain attractive for traditional players (WU, IMXI).
- Platforms like Western Union have both strategic/partnership value that is difficult to replicate – global breadth (operations in 200+ countries), local market knowledge, compliance infrastructure (~$200mm per year), numerous licenses, and a brand name.

$700b TAM with volume growth in the MSD, offset by continued pricing pressure, likely results in LSD revenue growth



World Bank data suggest a decline in industry-wide pricing (fees as a percentage of volume), although data are heavily influenced by the bank channel (where fees remain higher than average)



Source: Company reports, World Bank, Credit Suisse estimates

US bank tech: Stable outlook as banks need to lean on providers

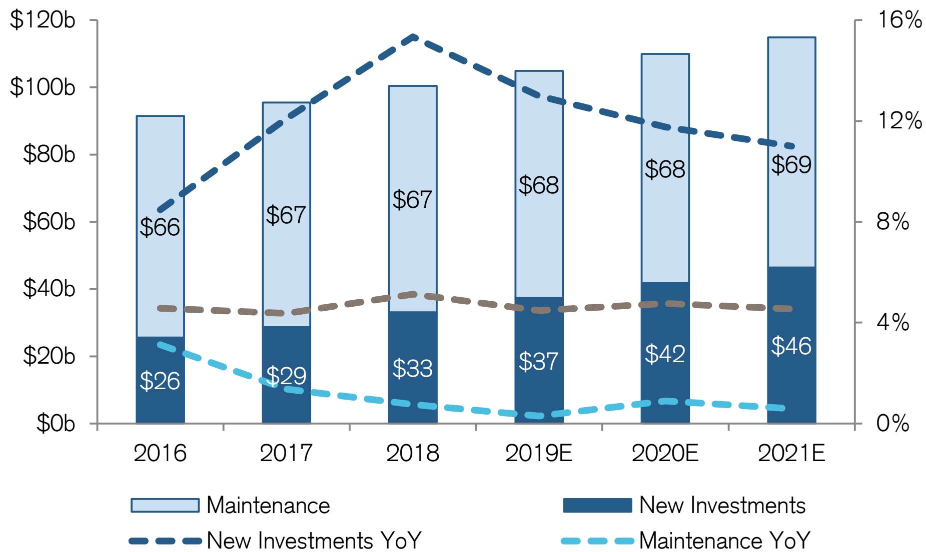
$100b+ TAM growing ~4-5%, weighted toward growth vs. maintenance

- Healthy bank IT spend (+4.5% through 2021) driven by consumer expectations, leading to an increased need for banks to modernize infrastructure by leaning on technology providers.
- Banking is increasingly a technology business (73% of US consumer banking interactions occur digitally), lowering barriers to entry for FinTechs and large technology platforms (e.g., Apple, Amazon) while also favoring large incumbent banks with the capital to invest.

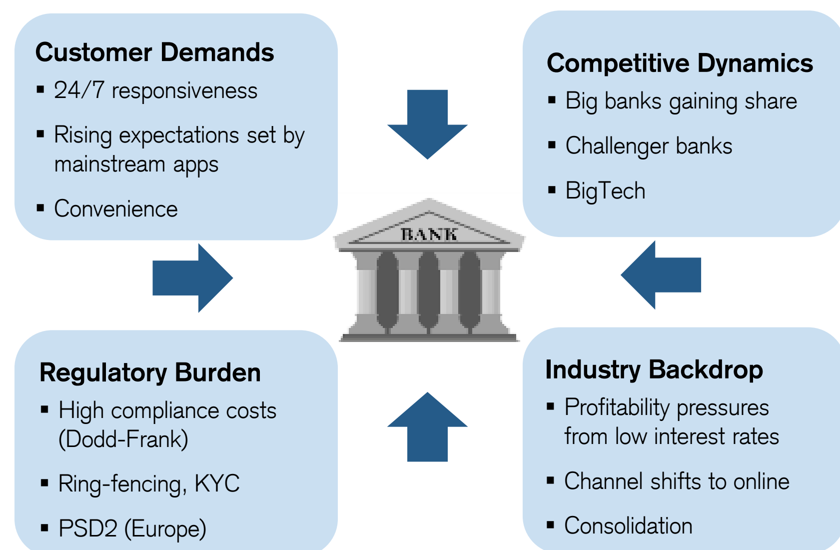
"It is a constant, never-ending set of investments that have to be made because as everyone in the audience knows our expectations change every day as we visit Amazon or Google or WeChat or whatever technology provider – Facebook – that you want to talk about, it changes the expectations that we have for our financial institutions. That puts pressure on the institutions to invest and that's good for us because it allows us to go into the market, aggregate services, deliver them both on a one-off and is scalable.."

– Jeff Yabuki, Fiserv CEO (March 12, 2019)

~2/3 of bank tech spending in North America is maintenance related, but 80% of the growth in IT spending is earmarked for new investments



Banks seeing pressure from all sides (customer demands, regulatory, competition, industry consolidation, and profitability pressures)



Source: Celent, PWC, Company data, Credit Suisse estimates

US bank tech: Need to lean on core providers intensified by "barbell"

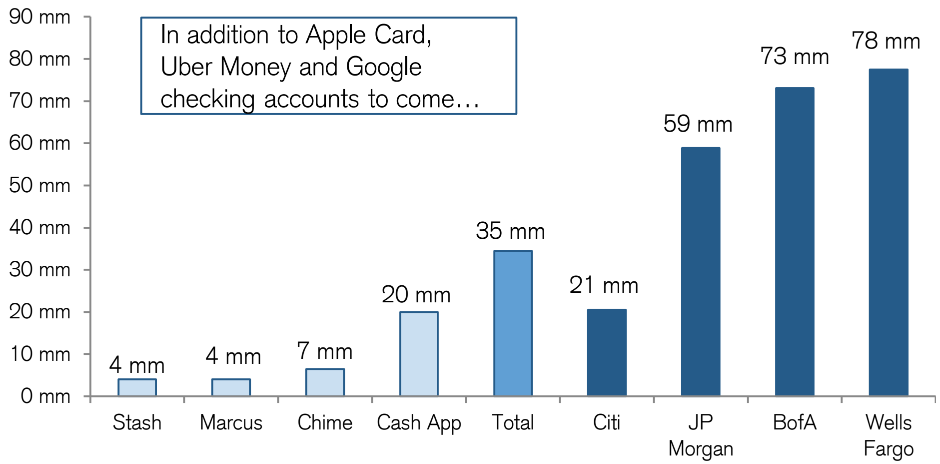
FinTechs are on one end of the "barbell", big banks are on the other

- The top four banks in the US (~63% of assets) have annual technology budgets of ~$40b, equivalent to the entirety of global FinTech funding in 2018.
- As FinTechs (and BigTech) continue to gain new accounts, there are potential headwinds to monitor in the longer term (traditional banks' potential to lose account & transaction share among digitally native generations).
- We believe the majority serve as secondary accounts with the potential for that to change as offerings expand.

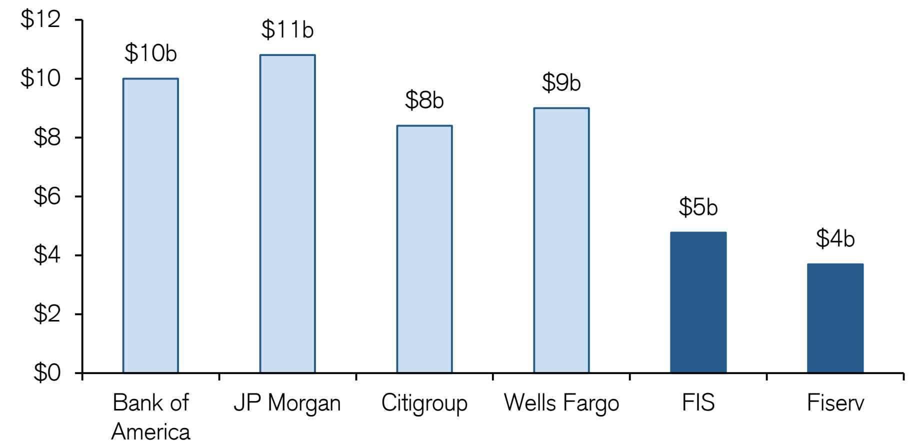
Both ends of the "barbell" are gaining share, in part due to better technology/user experience, along with tech & marketing spend

Neo/Challenger banks (FinTech) and large technology platforms (BigTech)	Regional banks, community banks, & credit unions (core FISV, FIS, JKHY customers)	Large US banks
Chime, Revolut, Monzo, N26, Uber Money, Google, Square Cash App, Varo Money, Apple, Marcus by Goldman Sachs, Affirm, SoFi, etc.	~10-11k US financial institutions	JP Morgan Chase, Bank of America, Wells Fargo, Citi, US Bank, PNC, TD Bank, Truist, Capital One

Neobanks in the US have ~45mm global users in aggregate; longer-term potential to pressure account growth and transactions



2018E technology spend budgets show the big banks in a league of their own (annual spend of ~$40b) vs. FISV & FIS ~$10b combined



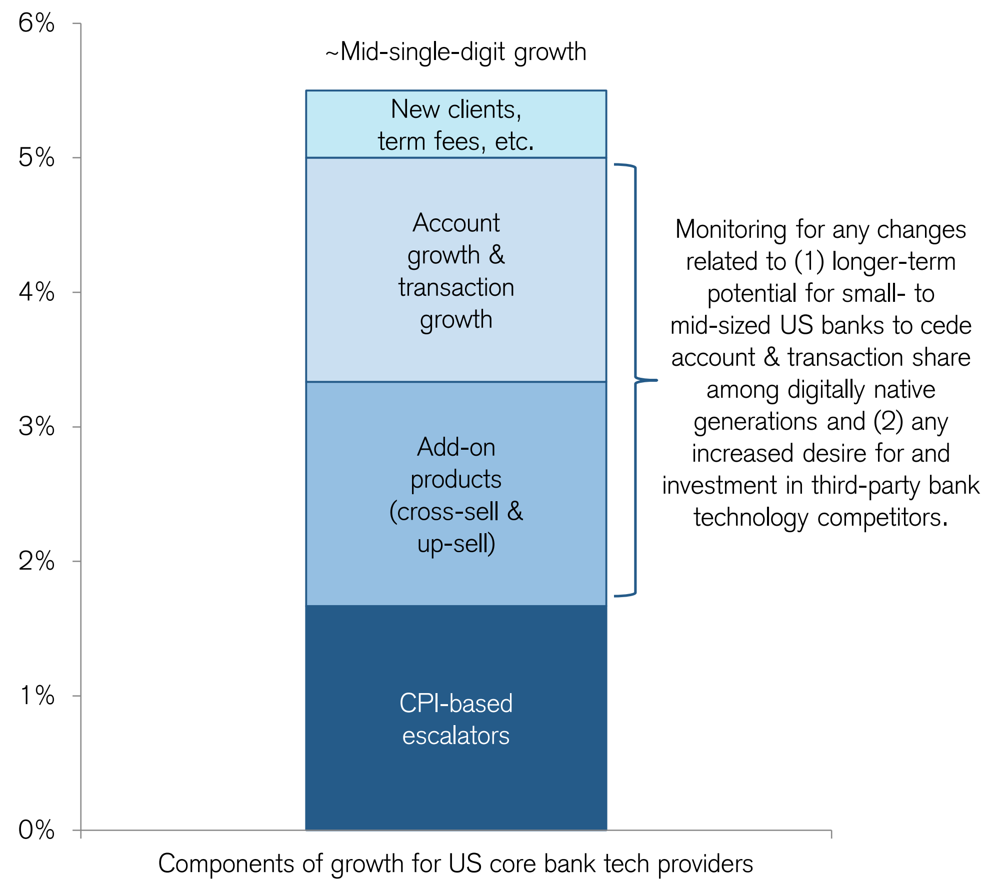
Source: Company data, CB Insights, Credit Suisse estimates; Note 1: FISV and FIS bank tech spend estimates are based on a combination of related 2018 operating expenses (ex-SG&A), capex, and acquisitions (fluctuates by year) and are meant solely to be directional indicators vs. precise figures; Note 2: FinTech user numbers presented are global for non-US platforms that recently entered the US; Note 2: Cash App user numbers are CSe

US bank tech: Growth algorithm all about existing customer growth

Four key drivers with an emphasis on up/cross-sell, accounts & transactions

- US bank technology businesses (e.g., Fiserv, FIS, Jack Henry) are mid-single-digit growers with existing customers driving the majority of growth.
- Four components of growth:
  - CPI-based escalators included in contracts.
  - Add-on product sales (e.g., bill-pay, Zelle, RTP, online banking, etc. sold by core providers and integrated into the core system) including upgrades to more dated versions.
  - Account & transaction growth (checking accounts, debit cards, transactions processed).
  - New client additions (smallest driver), term fees, and other0
- While there are potential headwinds to monitor longer term, existing providers have meaningful moats such as:
  - Sticky relationships and long term contracts (~5 years).
  - Ability to price ancillary bank IT services attractively given low incremental costs.
  - Track record in maintaining technology leadership organically and via bolt-on M&A (further supported by elevated FCF levels from merger synergies).

Four key components to growth in US banking technology businesses (e.g., Fiserv, FIS, Jack Henry, etc.)



US bank tech: Next-gen cores challenged by a ~1-2% window

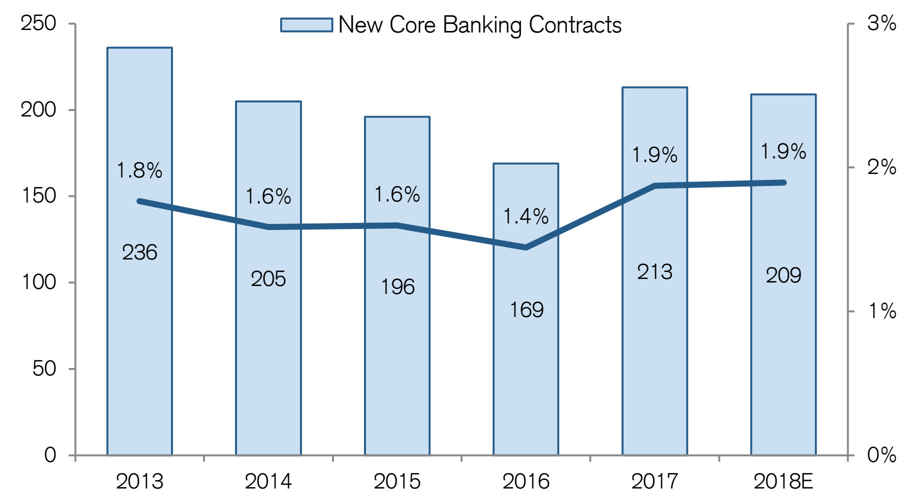
Easier road for ancillaries vs. cores, but signs of interest hard to ignore

- Roughly 1-2% of banks switch core providers per year with core conversions viewed as the most challenging and expensive IT project a bank can undertake (challenge for new entrants).
- Increasing signs that a substantial number of banks would like to use third-party ancillary offerings in lieu of those offered by their core provider (consistent with ABA CEO's conversations with ~3.9k US bank CEOs that led to the formation of the ABA Core Platforms Committee, and the ABA's investment behind Finxact).
- Third-party providers of bank IT services (e.g., mobile banking) face competition from ancillary add-ons offered by the cores (FISV, FIS, JKHY), along with integration challenges (although the hurdle for ancillary services is much lower than switching cores).
- Ability to consider working with third-party providers (aside from bank's core provider) correlates with the size of the bank (i.e., smaller banks often lack a CTO, outsource IT to core provider, and are more likely to maintain a single vendor approach). We believe that banks with at least ~$500mm in assets (~2k banks and credit unions vs. ~11k total) are potential buyers of third-party offerings.
- Emerging vendors should have the most success in new product launches with mid- to larger-sized financial institutions looking for best-of-breed products rather than full core conversions (i.e. considering new savings accounts on a modern core).

"…met with roughly 3,900 bank CEOs…one narrative came up again, and again, and again…we're struggling with our core relationship – the core is not as nimble, it's not as agile, we're not able to offer the innovative customer experience that we'd like to with the same efficiency or the speed…"

– Rob Nichols, CEO, American Bankers Association, speaking to his first year on the job in 2016 (quote from February 2019)

Roughly ~1-2% of US banks switch core providers each year (vs. ~20% up for contract renewal given ~5-year average contracts)

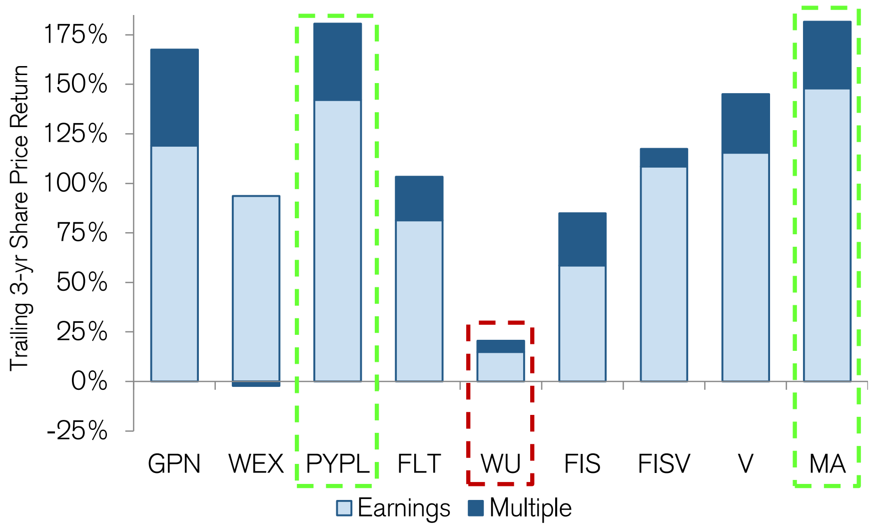


Source: Company reports, Aite Group, Credit Suisse estimates

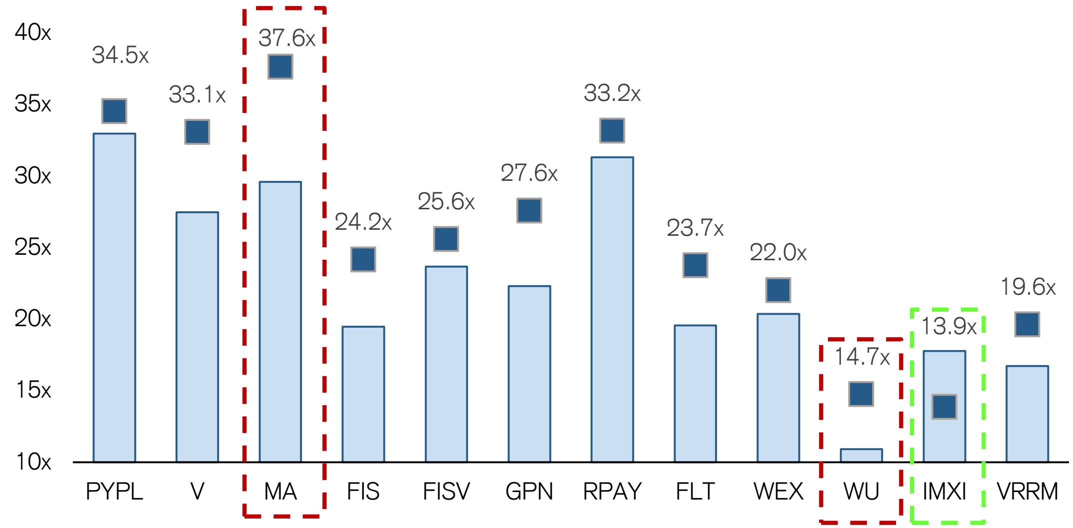
Valuations mostly at or above 3-year averages

But most of the stock price moves have been from earnings, not multiples

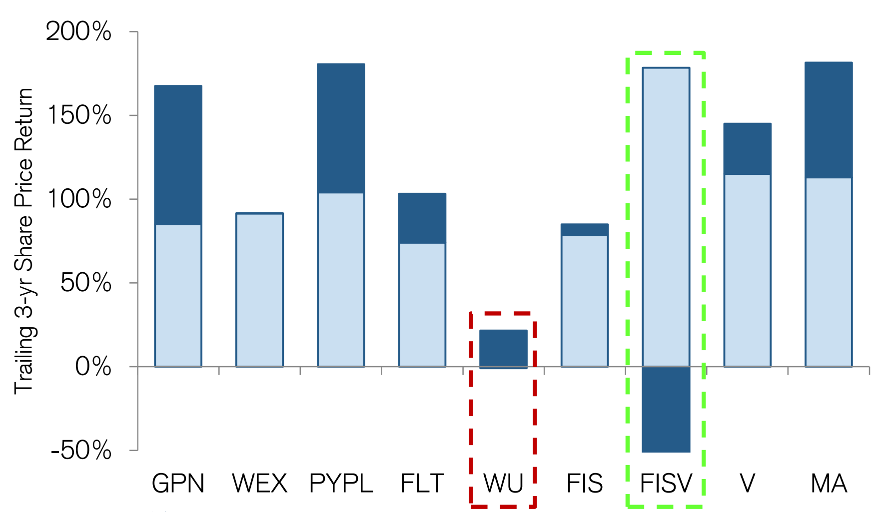
3-year price change – explained by earnings vs. multiple expansion(1)



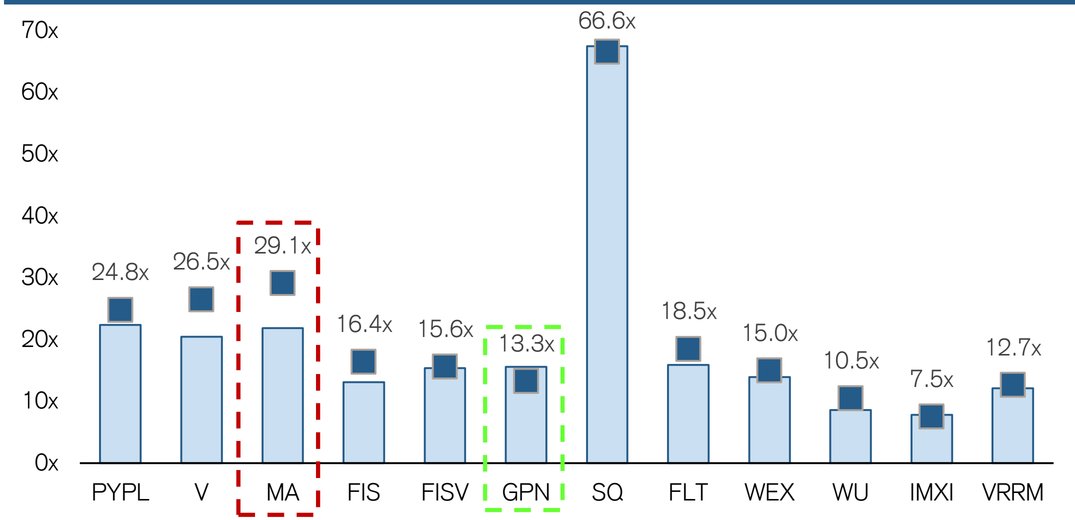
NTM P/E – Current vs. 3-year Median



3-year price change – explained by EBITDA vs. multiple expansion



NTM EV/EBITDA – Current vs. 3-year Median



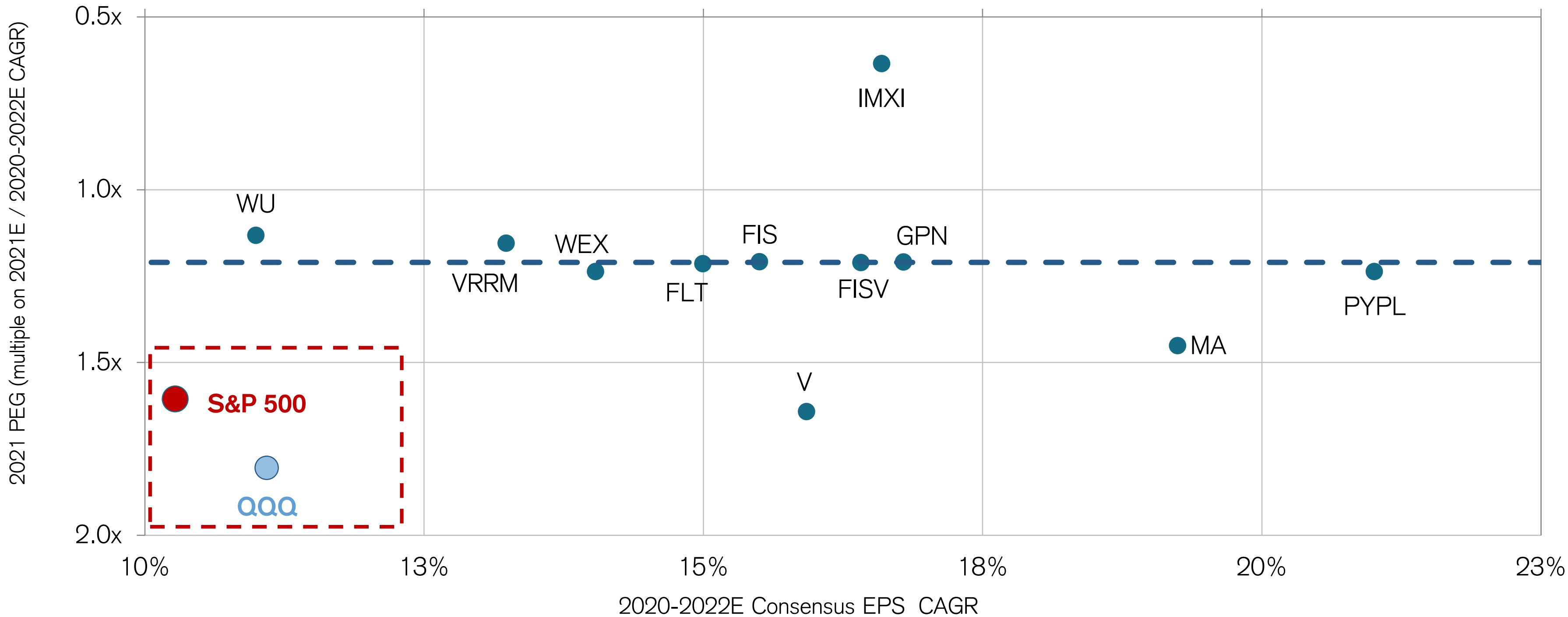
Source: Company reports, OnDeck, Credit Suisse research estimates
(1) Exclusions – SQ (results are NM), RPAY, and VRRM do not have sufficient data to provide this breakout

Median PEG ratio of ~1.2x

High valuation multiples, but more reasonable vs. growth, market

- Payments stocks appear expensive at first glance given mid-20s or higher P/E multiples, but on a growth adjusted basis valuations appear more reasonable (company dependent).
- For context, we show Nasdaq 100 tracking the QQQ (tech-centric) and the broader market (S&P 500) – more expensive on a multiple-to-growth basis than our sector coverage median.

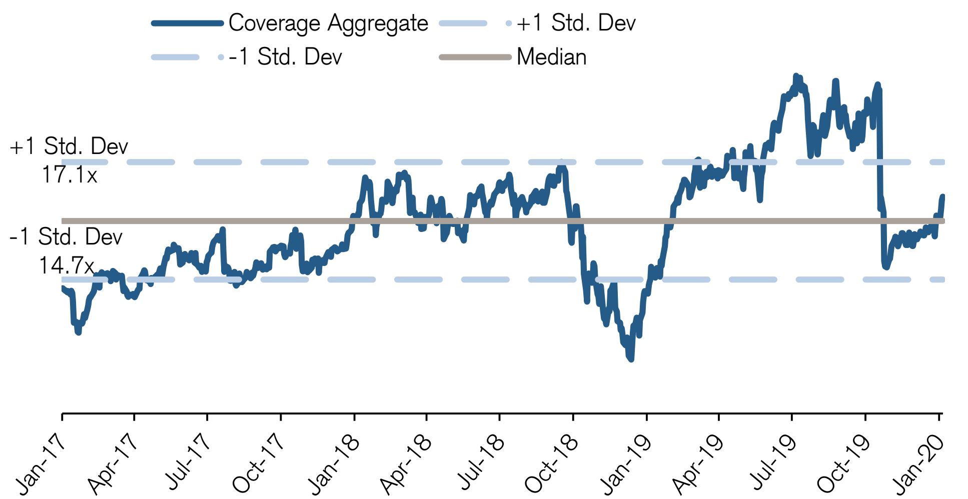
PEG ratio (P/E on 2021 estimates vs. 2020-2022E EPS CAGR); when compared the technology sector ETF (QQQ) and the broader market (S&P 500), valuation appears less demanding (i.e. adjusted for growth)



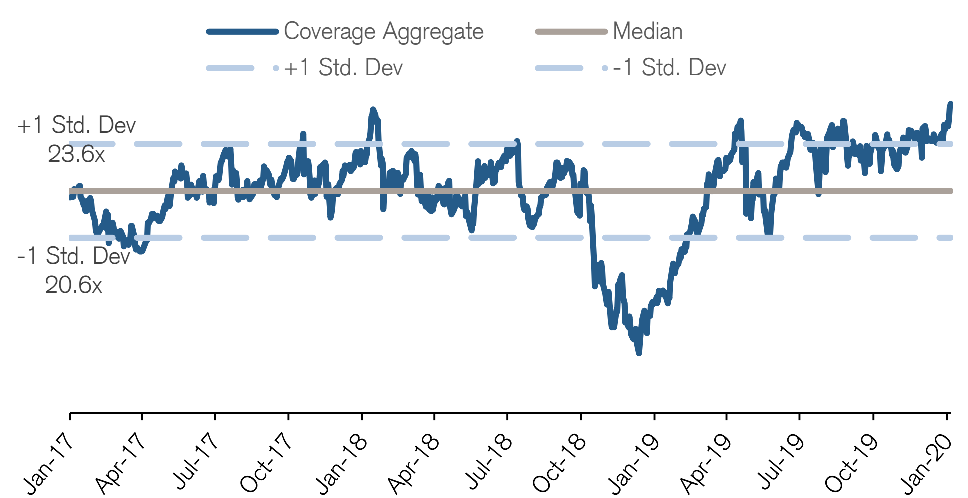
Source: Company reports, FactSet, Credit Suisse estimates, Excluding SQ (not within bounds) and RPAY, IMXI 2022 EPS CSe (due to lack of consensus)

Payments, Processors, & FinTech sector valuation
Trades at a premium to S&P, currently about inline with average

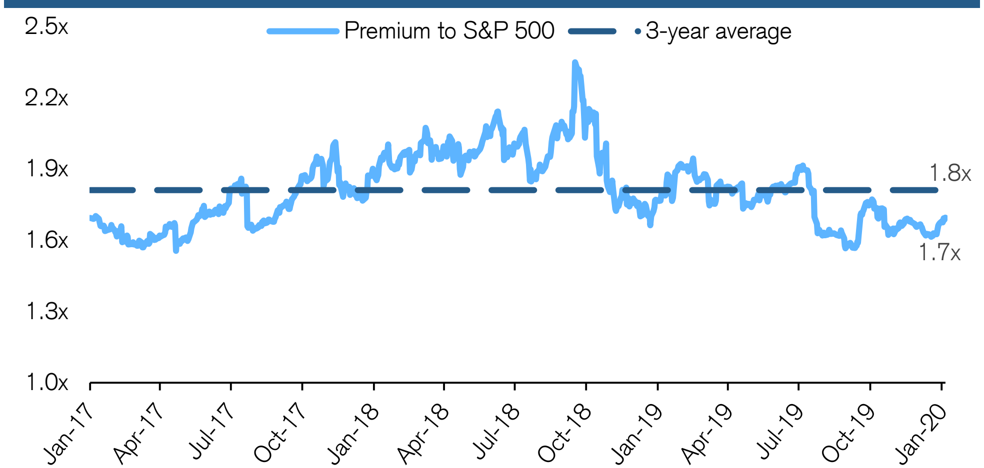
Sector 3-year historical median NTM EV/EBITDA



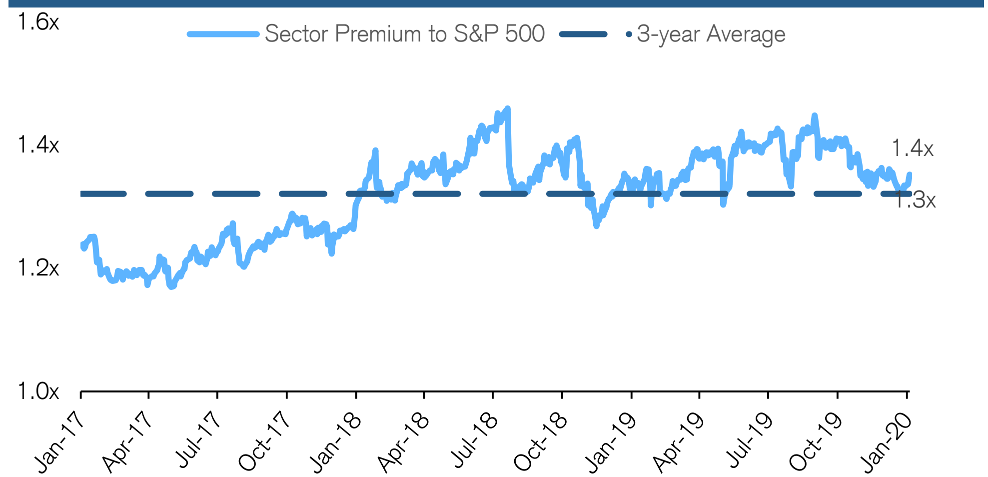
Sector 3-year historical median NTM P/E



Sector 3-year NTM EV/EBITDA premium to S&P 500 Index



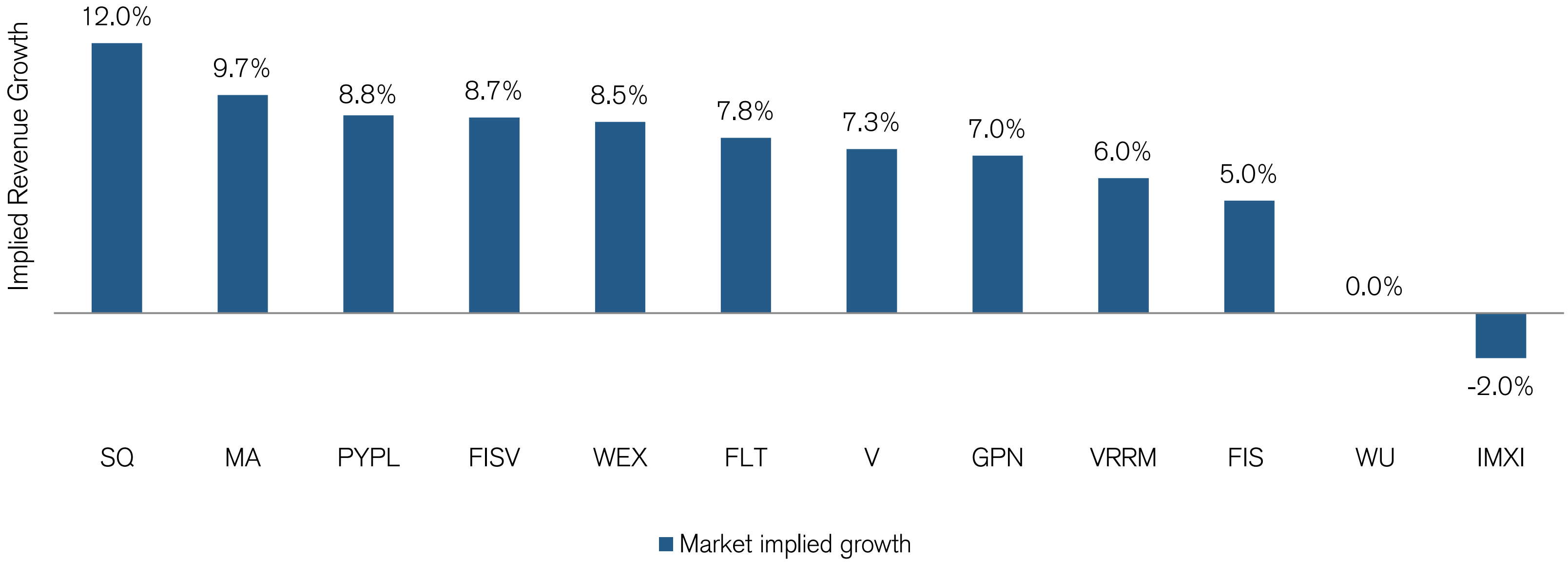
Sector 3-year NTM P/E premium to S&P 500 Index



Source: Company reports, FactSet, Credit Suisse estimates; Sector includes CS payments coverage universe (excluding RPAY and SQ P/E - NM)

HOLT® "What's Priced In" Analysis via Credit Suisse HOLT team

Implied 10-year revenue CAGR based on HOLT proprietary methodology



Methodology

- This analysis is based on the HOLT DCF framework and uses our Research forecasts as a starting point for 2019-2021
- EBITDA margins: 2019- 2023 using CS Research estimates, then assumed constant
- Sales growth: 2019-2021 based on research, 2022-2028 solved for the sales CAGR required to get to today's price
- After the 10-year explicit forecast, the HOLT methodology calculates the terminal value by fading returns on capital and growth towards cost of capital and GDP growth respectively

Source: Company reports, Credit Suisse estimates

Payments macro dashboard

A view of some of the macro and sector-related items we track

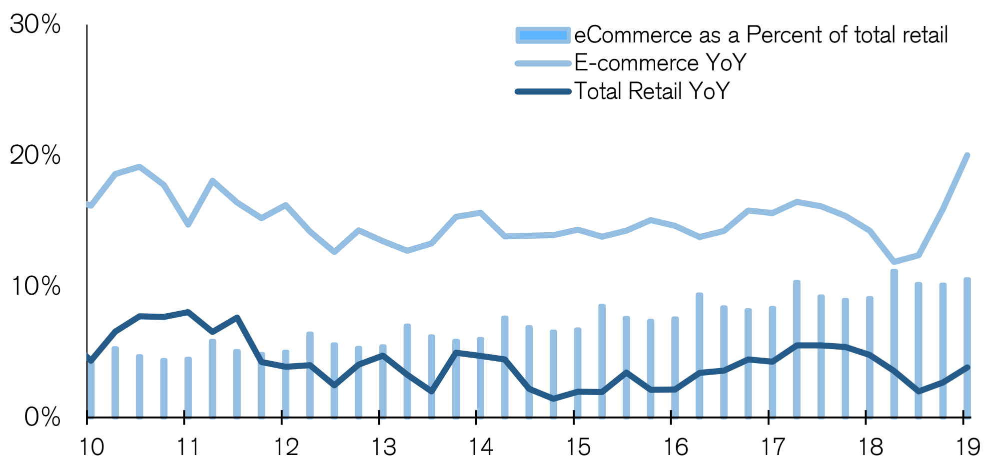
Metric	Comments	Direction
US retail sales	~30bps deceleration Q4 2019 vs. Q3 2019; December read (M/M) beat expectations by ~10bps, following a slight weakening from the summer months (but a strong December - ~6% YoY - boosted by Cyber Monday falling in December this year); Q1 seasonally lowest quarter of year, but coming off of an easier prior year comp; Note: we reference non-seasonally adjusted data	–
Global retail sales	Flattish in Q4 2019 QTD (through November) vs. Q3 2019 (CS economics team global consumption index) to ~3.1%; Above longer term trend of ~2.4% YoY monthly growth (10-year average); On a monthly basis November flat vs. October as well	–
US eCommerce	Q3 2019 was a strong eComm quarter, showing a ~500 bps acceleration (to ~20%) vs. Q2 2019, though aggregate retail sales suggest slight weakness in retail as a whole; Adobe reports suggest Cyber Monday sales hit a record $9.4b (+~19% vs PY) and estimate a ~14% YoY increase for Q4 2019 online sales; Q3 2019 US retail sales eCommerce report showed the highest YoY quarterly increase in over a decade (~20%); Mastercard SpendingPulse suggests US eComm up ~19% (Nov 1st - Dec 24th) inline with last year's strong holiday season (also ~19%)	↑
USD strength (DXY)	+150bps YoY in Q4 2019 vs. +340bps YoY in Q3 2019 (DXY quarterly, daily average); Overall, strong dollar trends have continued (above 200 day moving average), USD stronger against EUR, BRL, and AUD, ~flat vs. CAD, and weaker vs. GBP; Stronger dollar can have a "triple whammy" negative impact for payments (translation/re-measurement, demand destruction, and take rates)	–
FX Vol (CVIX)	Q4 2019 volatility down sequentially ~1900 bps to ~25%; FX volatility is below the longer term average of ~8, at ~5 currently, having decreased from levels seen at the beginning of the quarter. Note: CVIX is Deutsche Bank's measure of currency trading volatility. Increased FX volatility is benefits cross-border yields	↓
US retail gasoline prices	Quarterly average growth retail gas price per gallon improved ~550bps (to -2%) Q4 2019 vs. Q3 2019, albeit off of a much easier comp; Monthly prices are down sequentially (-47 bps M/M), continuation of a trend coming from a YTD high in May of 2019 and now below 3-year average of ~$2.60 (at a Q4 of ~$2.55); V/MA ~MSD % of US volumes at gas stations; Summary is gas prices are still down YoY, but less than last quarter	↑
IATA	+340bps Q4 2019 QTD through November vs. +370bps YoY in Q3 2019; Growth comes in below longer term trends (~5% avg), for Europe and Latin America in particular (multi-year lows), with North America also weak (albeit off the lows, still below average); Note: IATA airline data provides tourism reads, with tourism representing ~50-60% or more of cross-border card volumes	–
Visa & Barclaycard UK	Visa UK spending index up ~20bps YoY Q4 2019 vs. Q3 2019 down ~1.4%, with a rebound in December (+~80bps); Barclaycard up ~110bps Q4 2019 vs. up ~150bps Q3 2019 (decelerated ~40bps); Visa UK noted 15th straight YoY monthly decline in December, while Barclaycard noted December monthly retail sales up ~10bps with consumer confidence at 2019 highs (weak in December buoyed by a mediocre holiday season)	–
NFIB SMB confidence	Q4 2019 decelerated ~30 bps QoQ from Q3 2019 to a level of 103.5; currently off of recent all-time highs in the index (August 2018 ~108), now slightly down sequentially but stabilizing and above longer term averages; Note: SMB payments volumes are the highest yielding for merchant acquirers (vs. larger merchants)	–
First Data SpendTrend	~60bps acceleration Q4 2019 vs. Q3 2019 for All Industries data, while Retail-specific data showed a ~70bps acceleration vs. Q3 2019 levels (better eComm [~170bps acceleration vs. Q3] and an also strong YoY in-store [~30bps acceleration vs. Q3]); Positive reads all around in December vs. November with all Retail accelerating ~250bps and All Industries ~110bps; Note: SpendTrend is a macro-economic indicator based on aggregate SSS activity in the First Data POS network	↑
US card issuer volumes	Q4 2019 credit card volume decel ~70 bps from Q3 2019 (big banks only); Q4 2019 debit card volume decel ~40 bps vs Q3 2019; total carded volume decel ~60 bps in Q4 2019 vs Q3 2019 (big banks only); Long-term trends for issuer volume are largely intact, though overall lower growth rates vs 2018, but still on aggregate at HSD (~8% growth for all carded YoY); Note: US issuer volume includes BOA, C, JPM, USB, WFC credit card volumes, and BOA, JPM, USB, WFC debit card volumes	–

Source: the BLOOMBERG PROFESSIONAL™ service, FactSet, US Census Bureau, Company reports, NFIB, First Data, Visa, Barclays, IATA, Credit Suisse estimates

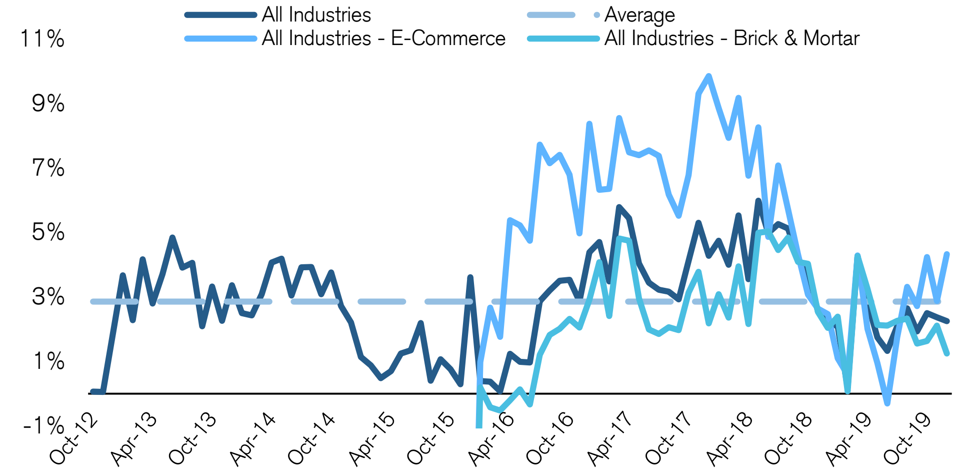
What's happening right now…macro and industry data backdrop

US Census Bureau & SpendTrend suggest eCommerce will continue to shine

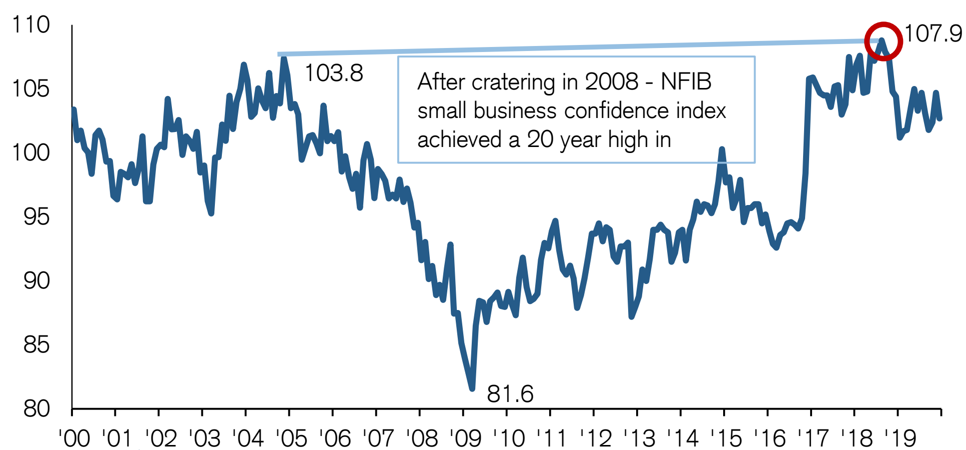
YoY Growth in e-Commerce retail sales has moderated over the past 10 years but still averages nearly triple total retail sales. As a % of total retail sales, e-Commerce has grown to 10% in 2019 from 1% in 2001



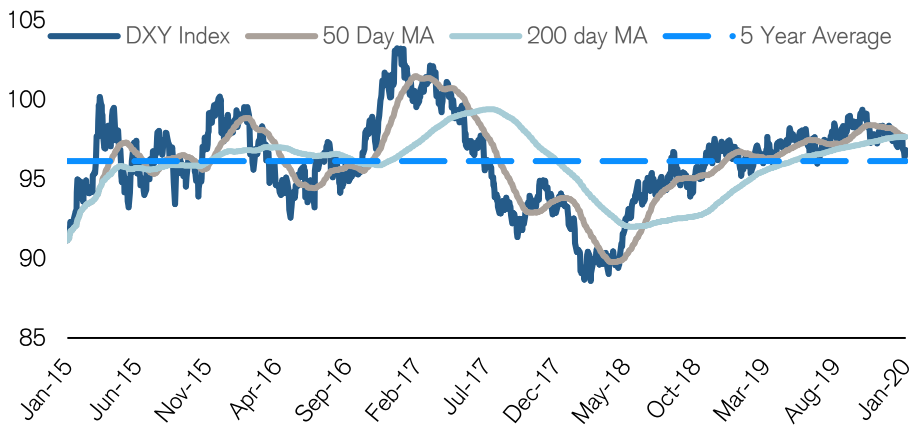
First Data Spend Trend (all industries SSS POS data) quarterly growth sits below the longer-term trend but off of longer-term lows earlier in 2019



NFIB Small Business Confidence Index (1986 = 100); after cratering in 2008, the SMB confidence index achieved a 20-year high in August 2018



DXY index is at 2-year highs, at stronger levels than previously (negative for cross-border card purchase volumes)



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Source: FactSet, First Data SpendTrend, NFIB, US Census Bureau, Credit Suisse research

Payments, Processors, & FinTech detailed valuation table

Valuation across P/E, EV/Sales, EV/EBITDA, and relevant CAGRs

Ticker	Target Price	Rating	Price ($)	Market Cap ($mm)	EV ($mm)	Net Debt / EBITDA (2)	Sales 2020E	Sales 2021E	Sales 19-21E CAGR	EV/Sales	Sales Multiple-to-growth	Adj. EBITDA 2020E	Adj. EBITDA 2021E	Adj. EBITDA 19-21E CAGR	EV/ EBITDA	EBITDA margin %	EBITDA Multiple-to-growth	Adj. EPS 2020E	Adj. EPS 2021E	Adj. EPS 19-21E CAGR	P/E	EPS Multiple-to-growth	3-Year Average PE
Payments																							
V	228	OP	207	462,639	465,948	0.2x	25,453	28,443	11%	16.4x	1.5x	17,887	20,347	13%	22.9x	70%	1.8x	6.20	7.23	15%	28.5x	1.9x	27.6x
MA	350	OP	325	331,420	333,021	0.2x	19,190	21,732	13%	15.3x	1.1x	11,896	13,688	16%	24.3x	62%	1.6x	9.06	10.74	18%	30.3x	1.7x	30.0x
PYPL	135	OP	118	141,829	136,331	(1.2x)	20,771	24,364	17%	5.6x	0.3x	5,599	6,612	18%	20.6x	27%	1.1x	3.49	4.23	17%	27.9x	1.6x	32.4x
FIS	170	OP	149	92,292	111,717	5.4x	13,552	14,565	19%	7.7x	0.4x	6,079	6,801	27%	16.4x	45%	0.6x	6.36	7.42	16%	20.1x	1.3x	19.4x
FISV	133	NEUTRAL	122	85,557	106,560	7.1x	15,460	16,486	7%	6.5x	1.0x	6,180	6,655	19%	16.0x	40%	0.8x	4.97	5.87	21%	20.8x	1.0x	23.7x
GPN	230	OP	200	60,707	68,468	4.8x	9,101	9,585	30%	7.1x	0.2x	3,538	4,030	34%	17.0x	39%	0.5x	7.56	9.04	21%	22.1x	1.1x	22.4x
SQ	84	OP	69	33,419	33,287	(0.3x)	2,840	3,664	28%	9.1x	0.3x	530	759	35%	43.9x	19%	1.2x	0.95	1.31	30%	52.8x	1.8x	-
(1) ADYEN-	NC	NC	€ 828	€ 25,630	€ 25,567	(0.3x)	€ 3,402	€ 4,542	36%	5.6x	0.2x	€ 397	€ 576	43%	44.4x	12%	1.0x	€ 9.58	€ 13.79	43%	60.0x	1.4x	NM
JKHY	NC	NC	152	11,761	11,739	(0.0x)	1,665	1,779	7%	6.6x	0.9x	532	586	7%	20.0x	32%	2.7x	3.62	4.13	8%	36.9x	4.4x	33.9x
QTWO	NC	NC	88	4,950	4,768	(15.0x)	412	512	27%	9.3x	0.3x	20	43	56%	110.2x	5%	2.0x	0.09	0.50	110%	176.7x	1.6x	NM
ACIW	NC	NC	37	4,430	5,801	4.5x	1,492	1,564	11%	3.7x	0.3x	431	460	21%	12.6x	29%	0.6x	1.80	2.00	27%	18.3x	0.7x	31.1x
EVOP	NC	NC	29	2,394	2,181	2.6x	647	704	9%	3.1x	0.4x	176	196	11%	11.1x	27%	1.0x	0.71	0.86	18%	33.1x	1.8x	38.8x
(3) RPAY	19	OP	16	910	848	N/A	215	259	26%	3.3x	0.1x	63	79	29%	10.8x	29%	0.4x	0.54	0.72	9%	22.1x	2.5x	31.0x
GDOT	NC	NC	29	1,595	751	(3.2x)	1,058	1,120	3%	0.7x	0.2x	174	202	(8%)	3.7x	16%	NM	1.68	2.14	(12%)	13.6x	NM	18.9x
Median						**0.2x**			**15%**	**6.5x**	**0.3x**			**20%**	**18.5x**	**29%**	**1.0x**			**18%**	**28.2x**	**1.6x**	**28.8x**
B2B Payments / Other																							
FLT	335	NEUTRAL	317	28,866	31,968	2.0x	2,946	3,234	10%	9.9x	1.0x	1,737	1,936	13%	16.5x	59%	1.3x	13.64	15.65	15%	20.2x	1.3x	19.7x
WEX	-	R	222	9,879	12,031	3.3x	1,929	2,091	10%	5.8x	0.6x	827	910	13%	13.2x	43%	1.0x	10.59	11.99	14%	18.5x	1.3x	20.3x
VRRM	17.5	OP	16	2,632	3,361	3.3x	505	537	10%	6.3x	0.6x	265	283	9%	11.9x	52%	1.3x	0.81	0.91	17%	17.5x	1.1x	16.8x
EPAY	NC	NC	55	2,522	2,565	0.4x	449	496	8%	5.2x	0.6x	104	117	8%	21.9x	23%	2.7x	1.39	1.58	8%	34.8x	4.3x	31.0x
BILL	NC	NC	46	3,706	2,549	N/A	138	170	N/A	15.0x	N/A	(27)	(29)	N/A	-	-20%	N/A	(0.37)	(0.36)	N/A	-	N/A	-
Median						**2.6x**			**10%**	**6.3x**	**0.6x**			**11%**	**14.9x**	**43%**	**1.3x**			**15%**	**19.4x**	**1.3x**	**20.0x**
Money Transfer																							
WU	26	UP	28	11,894	13,993	1.6x	5,288	5,422	1%	2.6x	2.3x	1,353	1,432	4%	9.8x	26%	2.5x	1.97	2.19	11%	12.7x	1.1x	11.1x
EEFT	NC	NC	167	9,347	8,997	(0.6x)	3,078	3,404	11%	2.6x	0.2x	702	802	15%	11.2x	23%	0.7x	8.13	9.28	15%	18.0x	1.2x	17.8x
MGI	NC	NC	3	211	984	3.6x	1,280	1,310	1%	0.8x	1.2x	204	216	2%	4.6x	16%	1.9x	(0.02)	0.10	NM	25.8x	NM	13.1x
IMXI	14.5	NEUTRAL	12	469	471	0.0x	371	426	15%	1.1x	0.1x	66	76	15%	6.2x	18%	0.4x	0.97	1.12	15%	10.8x	0.7x	17.7x
Median						**0.8x**			**6%**	**1.8x**	**0.7x**			**9%**	**8.0x**	**20%**	**1.3x**			**15%**	**15.3x**	**1.1x**	**15.4x**
Min						(15.0x)			1%	0.7x	0.1x			(8%)	3.7x	5%	0.4x			(12%)	10.8x	0.7x	-
25th %						(0.3x)			8%	3.1x	0.3x			10%	11.1x	20%	0.7x			14%	18.4x	1.1x	17.8x
Mean						0.9x			14%	6.1x	0.6x			18%	21.3x	32%	1.3x			21%	32.8x	1.7x	22.8x
Median						0.4x			11%	5.7x	0.4x			15%	16.2x	28%	1.1x			16%	22.1x	1.4x	21.4x
75th %						3.3x			18%	7.5x	1.0x			25%	21.6x	42%	1.8x			21%	32.4x	1.8x	31.0x
Max						7.1x			36%	16.4x	2.3x			56%	110.2x	70%	2.7x			110%	176.7x	4.4x	38.8x

Source: Company reports, FactSet, Credit Suisse estimates

(1) Gross Profit is reported Net Revenue - which is revenue less interchange and other payaways, (2) International companies EBITDA on an annual basis, (3) Repay historicals and shares from CS model, FactSet does not have pro-forma financials in database or updated share count

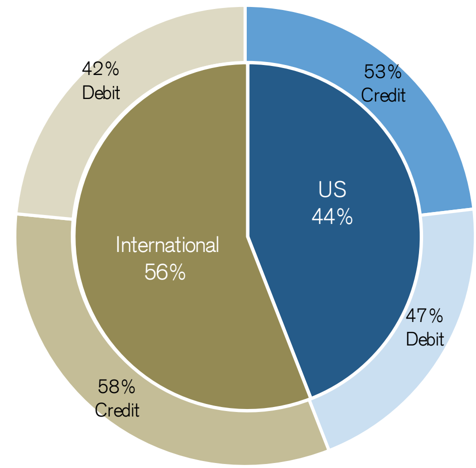
Visa (V)

Visa Europe and Contactless in the US ahead

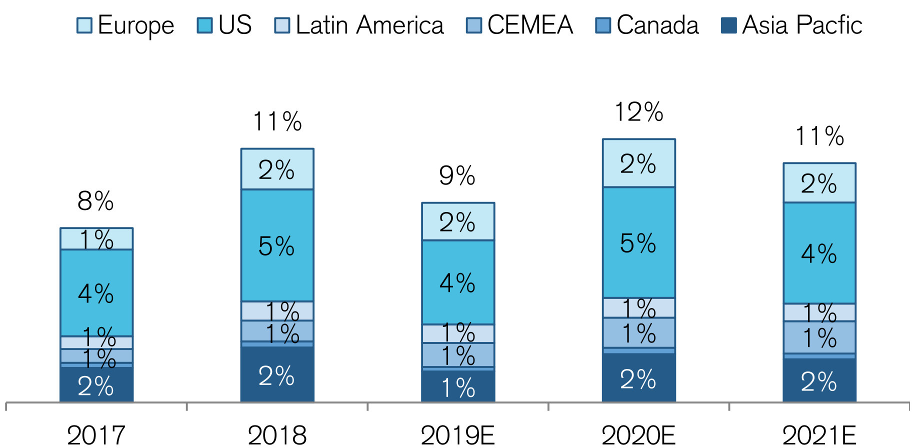
CS Rating	**OP**
CS Target Price	**$228**

- Mid- to high-teens EPS compounder featuring higher relative exposure to the US, UK, and debit (vs. MA higher international and credit).
- ~50% of contracts renewed in FY 2019 and 1H 2020, boosting incentives in FY 2020 (laps in FY 2021).
- Expect share stabilization and pricing in Europe over the coming quarters (with platform migration completed late 2018, value-added services, processing share, etc.).
- Greater beneficiary of US contactless rollout given mix (~45% of volumes vs. ~35% for MA).

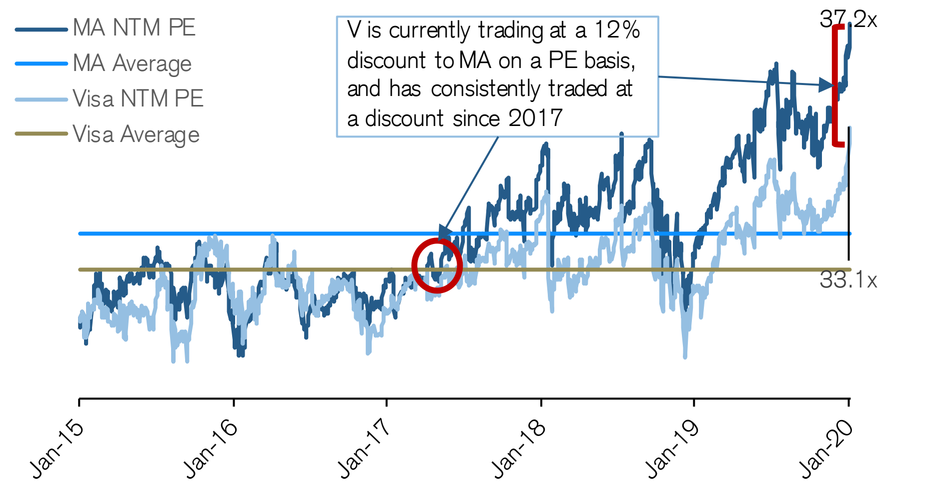
Visa's volumes are weighted more toward US & debit relative to Mastercard (which has higher exposure to International and credit)



Visa organic, ex-FX volume growth more driven by US vs. Mastercard, with ~65% of volumes international (vs. 55% for Visa)



5-Year NTM P/E; MA has consistently traded at a premium vs. V, dating back to 2016



Source: Company reports, FactSet, Credit Suisse estimates

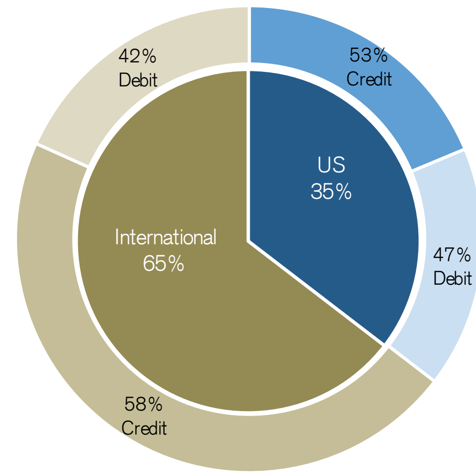
Mastercard (MA)

Attractive Regional Mix, high teens compounder

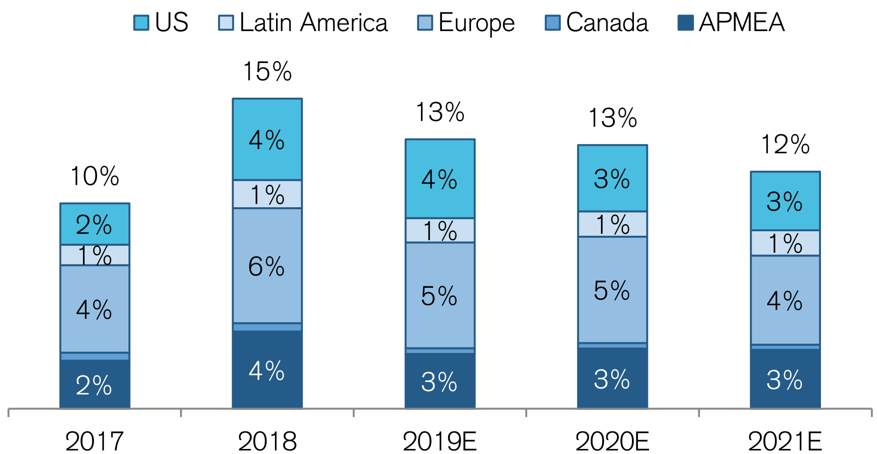
CS Rating	OP
CS Target Price	$350

- High-teens EPS compounder featuring higher relative exposure to faster-growth international markets (relative to V, although trading at a ~4x-turn premium on NTM EPS).
- Acquisitions (Vocalink, Transfast, Nets [pending close]) support a multi-rail approach and efforts to attract B2B flows (Mastercard Track), along with Transactis in bill-pay (Mastercard Bill Pay Exchange).
- Maestro card conversions supportive of volume and revenue growth (~still 443mm remain vs. ~2.2b Mastercard branded).

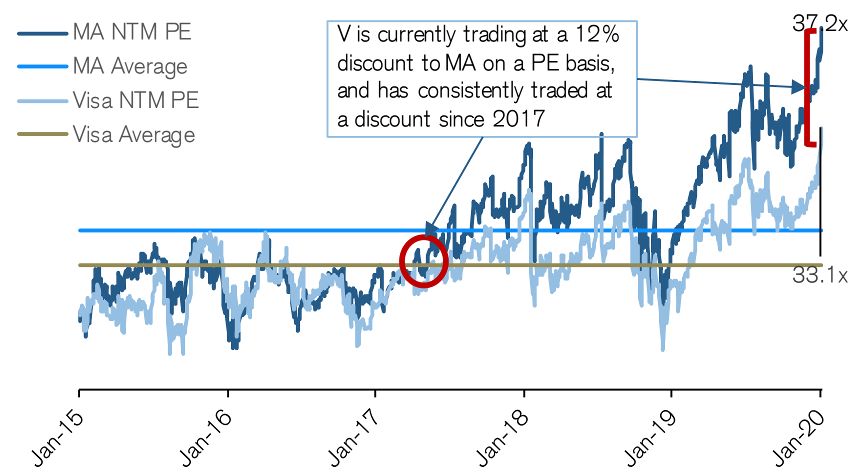
Mastercard's volumes are weighted more toward International & credit relative to Visa (which has higher exposure to US & debit)



Mastercard has an organic, ex-FX volume growth premium to Visa, driven by exposure to faster growing geographies



5-Year NTM P/E; MA has consistently traded at a premium vs. V, dating back to 2016



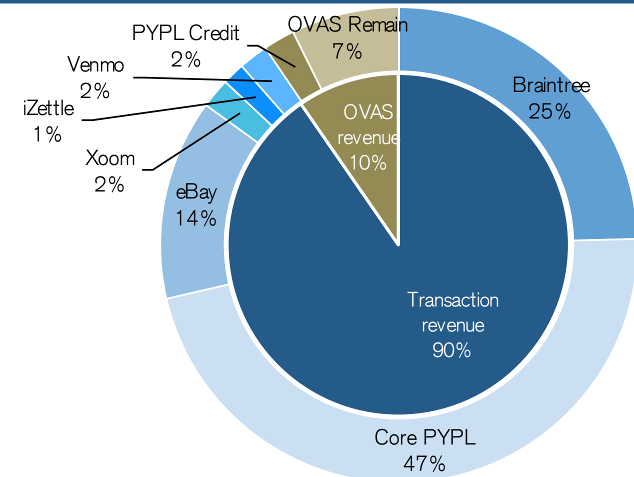
PayPal (PYPL)

Best way to win a fight, not to get into a fight

CS Rating	OP
CS Target Price	$135

- eCommerce pure play and share gainer, informed by our true TAM analysis (global eCommerce, online travel, eFood delivery, eTicketing, online charitable donations, ride-sharing, crowdfunding, mobile gaming, and streaming subscriptions).
- Long list of emerging areas of upside (i.e., Braintree becoming more global, Venmo flipping from an EPS drag to boost, tech partnerships [MELI, Uber, Facebook], bill-pay, China, iZettle, Honey).
- eBay headwind manageable and likely accompanied by previously restricted marketplace partnerships.

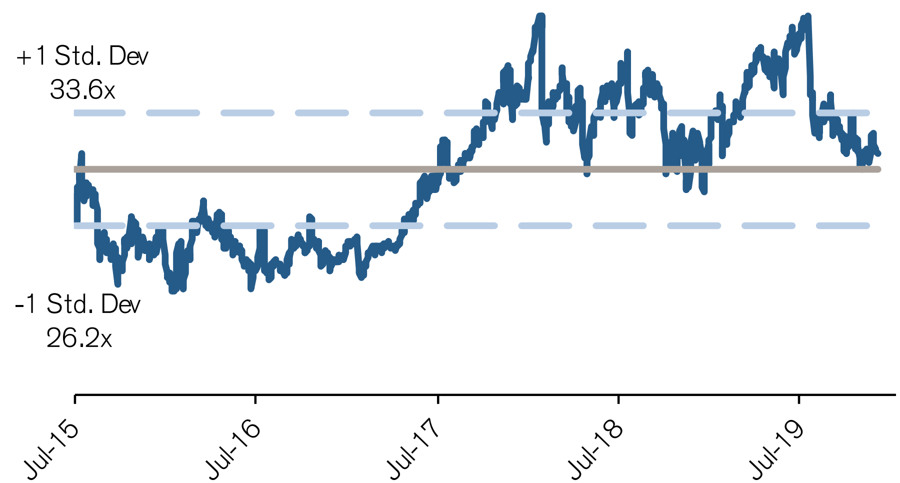
2019E revenue mix, with the vast majority of monetization via transaction-based revenue (Braintree ~25% of total)



TPV Build – We model eBay contributing a slight drag to volumes, but rolling off over time instead of a distinct point in time

	2018A	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
US TPV	332,340	424,450	121,535	129,824	134,282	150,641	536,283	664,117	820,369
YoY ex eBay OA expiry	-	-	-	-	*27%*	*27%*	-	-	-
eBay OA expiry impact	-	-	-	-	*(1%)*	*(1%)*	-	-	-
YoY		*28%*	*27%*	*27%*	*26%*	*26%*	*26%*	*24%*	*24%*
2-year		*56%*	*55%*	*55%*	*54%*	*53%*	*54%*	*50%*	*47%*
International TPV	246,079	291,753	78,954	84,163	85,759	102,669	351,545	426,654	516,251
YoY FXN ex eBay OA expiry	-	-	-	-	*24%*	*24%*	-	-	-
eBay OA expiry impact	-	-	-	-	*(1%)*	*(1%)*	-	-	-
YoY FXN	-	-	*25%*	*24%*	*23%*	*23%*	-	-	-
2-year FXN	-	-	*47%*	*48%*	*48%*	*48%*	-	-	-
Total TPV	578,419	716,202	200,489	213,988	220,041	253,310	887,828	1,090,771	1,336,620
YoY Organic FXN	*25%*	*24%*	*26%*	*26%*	*25%*	*24%*	*25%*	*23%*	*23%*

PayPal's P/E has inflected since mid-2016's "Choice" decision



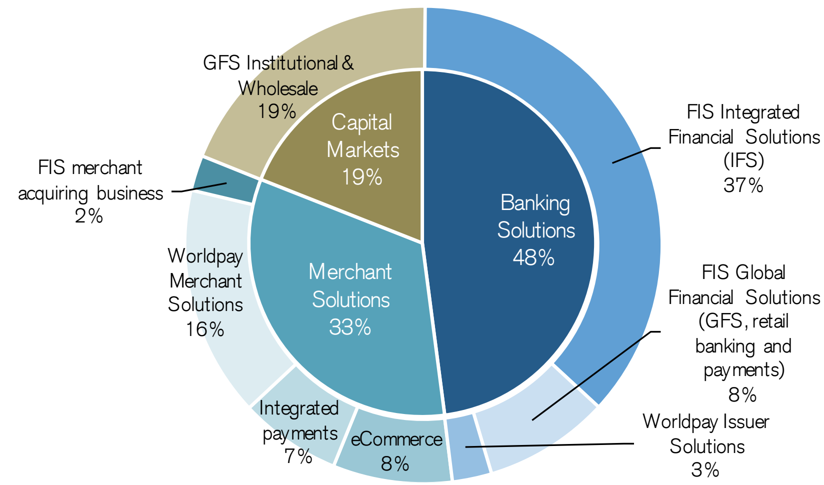
Source: Company reports, FactSet, Credit Suisse estimates

CS Rating	OP
CS Target Price	$170

Fidelity National Information Services (FIS)
Accelerating top line for the foreseeable future

- Acceleration in top line in 2020, 2021, and possibly 2022; revenue synergies from two deals benefiting the Merchant Solutions business in 2020 (FIS-WP, VNTV-WP).
- Meaningful exposure to high-growth channels, with ~45% of merchant acquiring in global eCommerce and partnered software; longer-term in-store expansion in new countries (i.e., 6 today vs. GPN at 33).
- Bank technology segments (Banking & Capital Markets) are positioned to sustain their current topline trajectory, fueled by a healthy bank IT spend environment (+4.5% through 2021) and an increasing need for banks to modernize their infrastructure by leaning on technology providers.

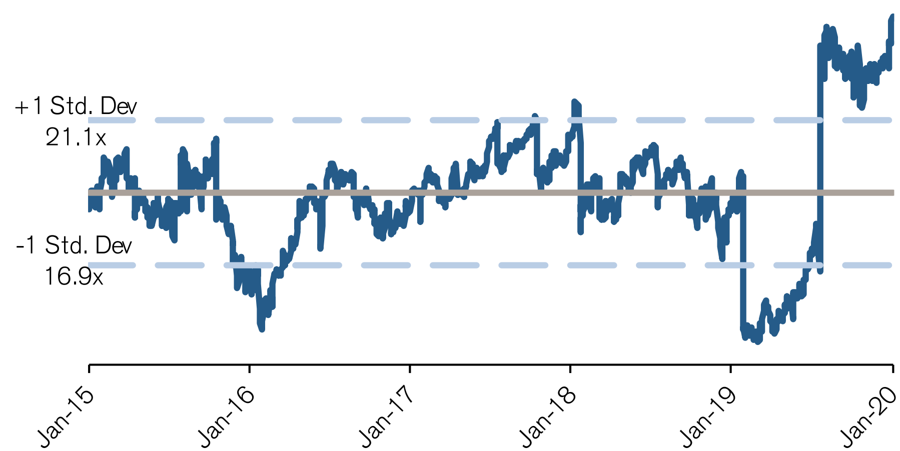
Estimated business mix (2019E) of the combined FIS-WP entity



FIS set to accelerate top-line growth in 2020, 2021, and possibly 2022, benefiting from two deals' worth of revenue synergies

	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Total revenue	12,730	3,258	3,435	3,429	3,602	13,724	14,795	15,965
YoY reported	*3%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*
YoY FXN	-	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*
Inorganic contribution to growth (%)	-	*1%*	*1%*	*1%*	*1%*	*1%*	*0%*	*0%*
Revenue synergies run-rate ($)	-	*110*	*155*	*200*	*250*	*250*	*450*	*620*
Revenue synergies contribution to growth (%)	-	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
YoY organic FXN (w/ synergies)	-	*7%*	*7%*	*7%*	*7%*	*7%*	*8%*	*8%*
2-year	-	-	-	-	*12%*	*6%*	*12%*	*13%*
YoY organic FXN ex-synergies	-	*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	*7%*
2-year	-	*0%*	*0%*	*0%*	*12%*	-	*12%*	*13%*

FIS has seen multiple expansion since announcing the Worldpay acquisition (gaining a leading eCommerce payments business)



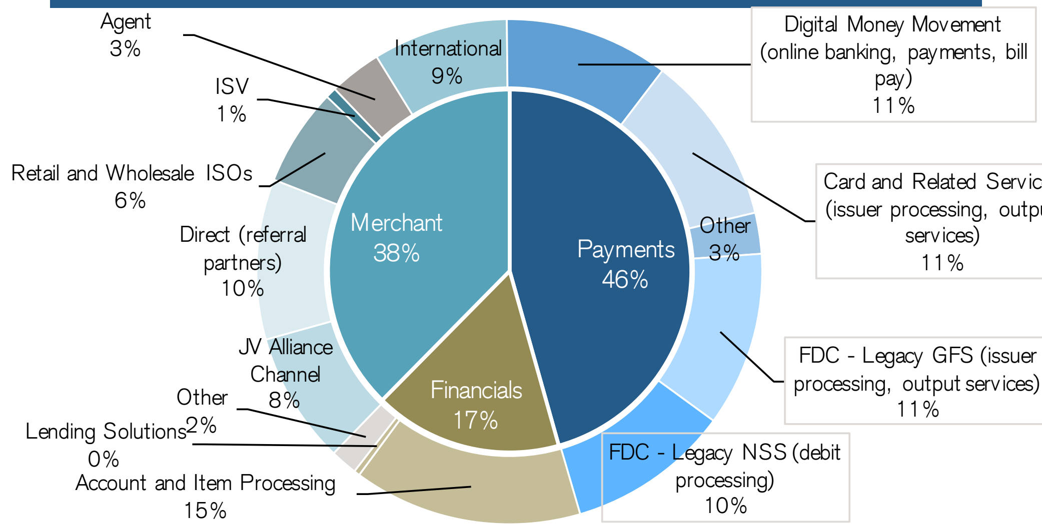
Source: Company reports, FactSet, Credit Suisse estimates

CS Rating	NEUTRAL
CS Target Price	$133

Fiserv (FISV)
Scale begets scale

- FDC undervalued thesis now validated by market (trends having improved to +7% organic in GBS NA, increase in share price since acquisition, etc.).
- Exposure to attractive swim lanes (ISV, eCommerce, international) and “crown jewels” assets (Clover, CardConnect, Latin American merchant acquiring business), albeit making up a smaller portion of the overall business; GBS faces tougher compares ahead.
- We expect bank tech (Payments & Financials) to have MSD growth medium-term driven by healthy bank IT spending and an increasing need for small and medium-sized financial institutions to lean on their core providers to modernize.

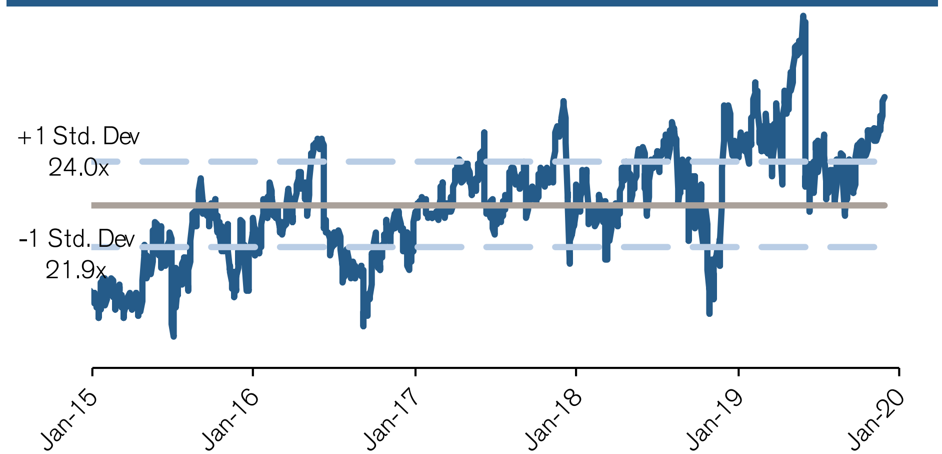
Estimated business mix (2019E) of the combined FISV-FDC entity



FISV will benefit from revenue synergies driving reported revenue growth higher in both 2020 and potentially 2021

	2018A	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Total Adj. Revenue	13,902	14,498	3,679	3,853	3,817	4,017	15,366	16,447	17,607
YoY reported	0%	4%	6%	6%	6%	7%	6%	7%	7%
YoY Organic	0%	5%	6%	6%	6%	7%	6%	7%	7%
YoY FXN Organic (w/ Synergies)	0%	6%	7%	7%	7%	7%	7%	7%	7%
Run-rate Synergies ($)	-	20	40	68	97	126	126	270	430
Incremental Synergies (%)	0%	0%	0%	1%	1%	1%	1%	3%	4%
YoY FXN Organic ex-Synergies	0%	6%	7%	6%	6%	6%	6%	6%	6%
2-year FXN Organic ex-Synergies	-	-	-	-	-	12%	12%	12%	12%
Inorganic % to growth	2%	1%	0%	0%	0%	0%	0%	0%	0%

Similar to FIS, FISV has seen multiple expansion following the announcement of its merger (with FDC) in early 2019



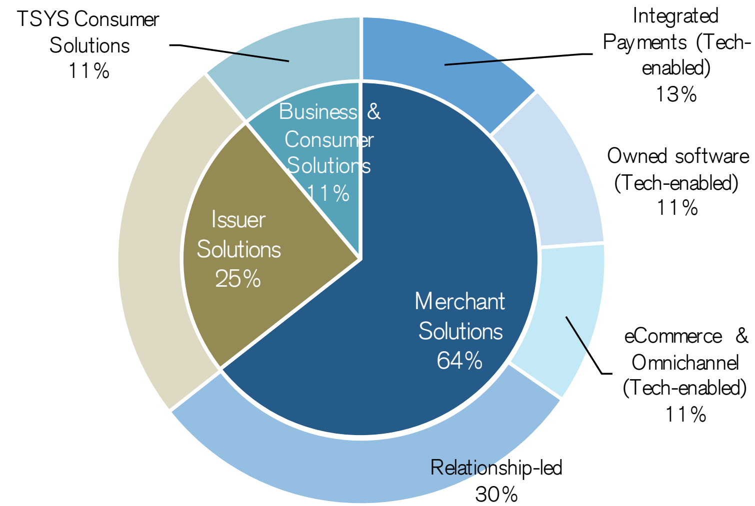
Source: Company reports, FactSet, Credit Suisse estimates

Global Payments (GPN)
In all the right swim lanes

CS Rating	**OP**
CS Target Price	**$230**

- ~22% EPS CAGR (2019-221E), supported by business mix analysis suggesting organic ex-FX revenue growth ~8-11% medium-term (plus M&A), along with ~200bps annual margin expansion (including ~$325mm in guided cost synergies).
- Highest relative exposure to the fastest growing channels: 1) ~37% owned & partnered software growing ~10-14%; 2) ~17% global eCommerce & omnichannel growing ~15-18%; 3) ~20% International growing ~10%+; and 4) an emphasis on SMB and multi-nationals.
- Leading credit issuer processor with dominant share in the US, UK, Ireland, Canada, and China (+5-7% growth vs. industry +3%); improved ability to win bank partnerships and joint ventures.
- Our preferred pick amongst the three mega-mergers given it provides with the fastest revenue growth as a payments pure play with the lowest leverage and the least dependence on revenue synergies.

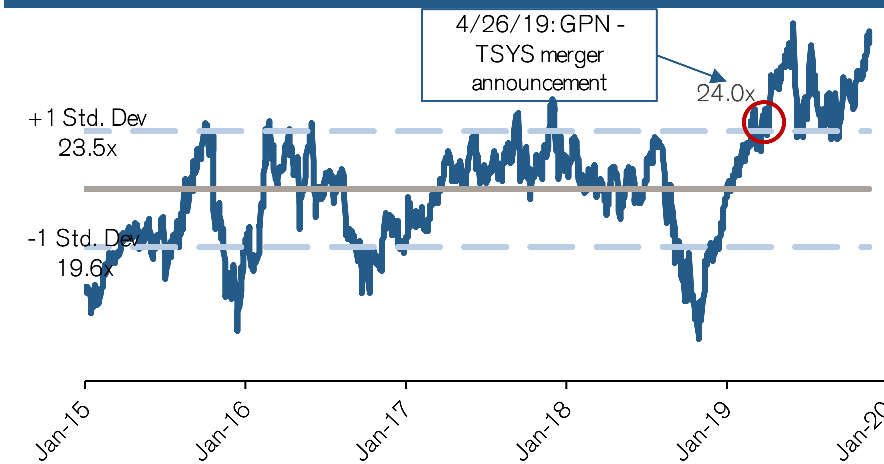
Estimated business mix (2019E) of the combined GPN-TSS entity



We expect Global Payments to maintain an organic growth range of +8-11%, bolstered by a vertical software M&A strategy

	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Total adjusted revenue	**7,128**	**1,866**	**1,943**	**2,028**	**2,018**	**7,855**	**8,679**	**9,532**
YoY reported	-	*8%*	*10%*	*11%*	*11%*	*10%*	*10%*	*10%*
YoY Organic	-	*8%*	*9%*	*10%*	*10%*	*9%*	*10%*	*10%*
YoY FXN Organic (ex-Synergies)	-	*8%*	*8%*	*10%*	*10%*	*9%*	*10%*	*9%*
Run-rate Synergies ($)	*5*	*10*	*15*	*25*	*40*	*40*	*110*	*150*
Incremental Synergies (%)	-	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*	*1%*
YoY FXN Organic (w/Synergies)	-	*8%*	*9%*	*10%*	*10%*	*9%*	*10%*	*10%*
Inorganic contribution to growth (%)	-	*1%*	*1%*	*1%*	*1%*	*1%*	*0%*	*0%*

GPN has historically traded at a low-20x multiple, with estimates typically low due to continued M&A (verticalized software emphasis)



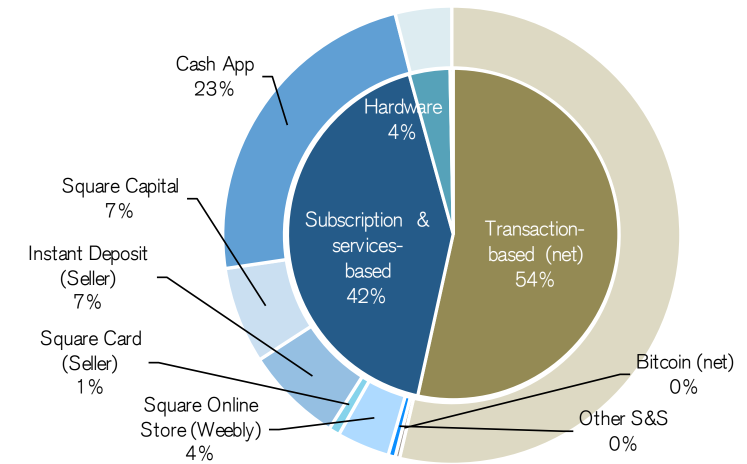
Square (SQ)

Recycling monetization (sellers & Cash App)

CS Rating	**OP**
CS Target Price	**$84**

- Intersection of software + payments, with a 3x "recycling" (seller ecosystem, Cash App/Card, and Business Debit/ID).
- Attractive set-up for 2020 with its initial guide out of the way, two recent pricing actions (in-store processing, Instant Transfer), and a March analyst day to bridge the gap until we begin to see benefits from re-investment (late 2020 and into 1H 2021).
- Upside in Cash App, omnichannel (Weebly), scaling of recently introduced products, B2B (Square Card) and potential new products (credit card, expense management, AP/AR partnership, etc.).

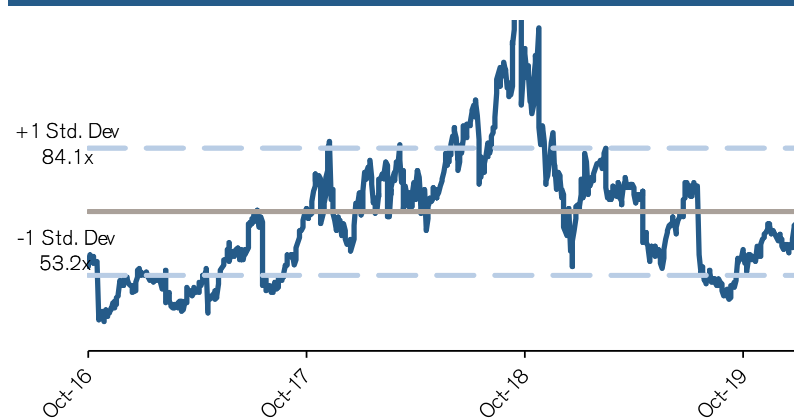
Square sources ~54% of its revenue via the core seller transaction-based business, with another ~42% in additional S&S revenue



We model GPV stabilizing in the mid-20%s, with potential for improvement as marketing spend returns begin (2H 2020 -1H2021)

SQ	2018A	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Gross Payment Volume (GPV)	84,655	106,068	27,782	32,678	34,721	35,300	130,481	161,796	197,829
QoQ	-	-	-2%	18%	6%	2%	-	-	-
Discrete contribution to GPV (%)	-	-	-	-	-	-	-	-	-
YoY organic	30%	25%	23%	22%	23%	24%	23%	24%	22%
2-year	61%	55%	50%	47%	48%	48%	48%	47%	46%
% of GPV - by seller type									
>$500K	23%	26%	28%	28%	29%	29%	29%	30%	31%
$125K-$500K	28%	28%	28%	28%	28%	28%	28%	28%	28%
<$125K	50%	46%	44%	44%	43%	43%	43%	42%	41%
Volume >$500K	19,177	27,467	7,779	9,150	10,069	10,237	37,235	47,789	60,412
YoY	55%	43%	50%	31%	32%	33%	36%	28%	26%
2-year	122%	98%	95%	79%	73%	73%	79%	64%	55%

EV/EBITDA multiple on NTM estimates, peaking in 2018 as volumes were stable in the low ~30%s and S&S revenue was accelerating



Source: Company reports, FactSet, Credit Suisse estimates

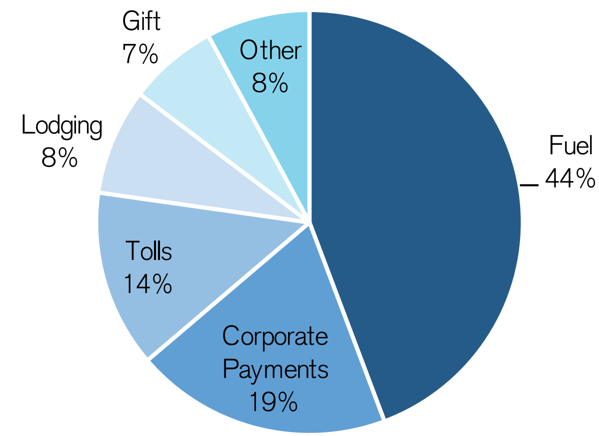
FleetCor Technologies (FLT)

King of the cross-sell

CS Rating	NEUTRAL
CS Target Price	$335

- Approaching 60% of revenues ex-fuel (and just ~14% of revenue exposed to fuel prices vs. ~25% for WEX).
- Four main verticals (Fuel, Corporate Payments, Lodging, Tolls), share similar appealing characteristics (recurring revenue, high margins, network effects, similar distribution, scale) & overlapping customer bases.
- "Beyond Fuel", faster-growth platforms in corporate payments & Brazil, and the prospect for more of what FleetCor does best (cross-sell & accretive M&A).

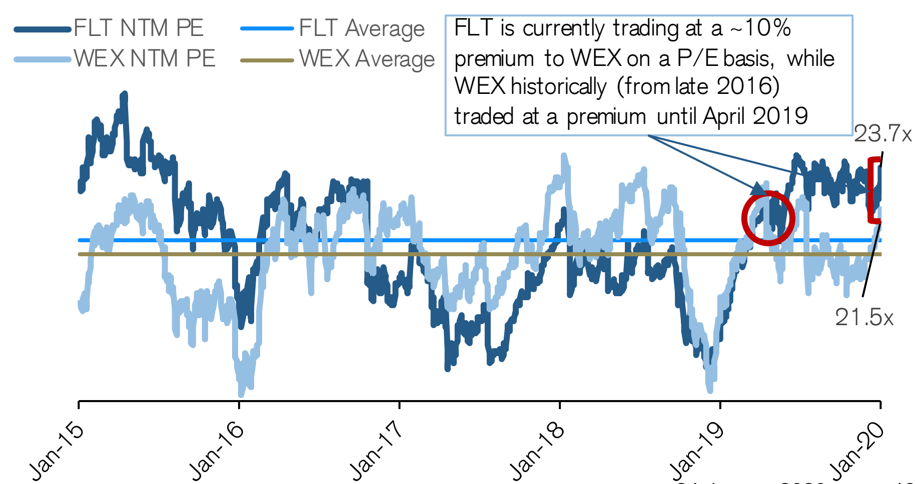
FleetCor has diversified away from the core fuel card business, with ~60% of revenue ex-fuel (Corporate Payments, Lodging, Tolls, 2019E)



Key to modeling FleetCor is uncovering the 2-year organic, macro-neutral (ex-fuel & FX) growth rate

	2018A	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Total net revenue	2,433	2,657	711	725	774	783	2,993	3,302	3,629
YoY	13%	9%	14%	13%	14%	11%	13%	10%	10%
YoY organic	-	11%	13%	10%	11%	12%	11%	10%	10%
YoY macro neutral	-	11%	15%	12%	13%	10%	12%	10%	10%
YoY macro neutral organic	11%	12%	12%	11%	10%	10%	11%	10%	10%
2-year macro neutral organic	-	22%	23%	23%	22%	22%	23%	21%	20%
Inorganic %	3%	2%	4%	2%	2%	0%	2%	0%	0%
"Like for like" adjustments	61	13	-	-	-	-	-	-	-

FLT is deserving of its premium multiple given a combination of consistent organic performance and accretive M&A



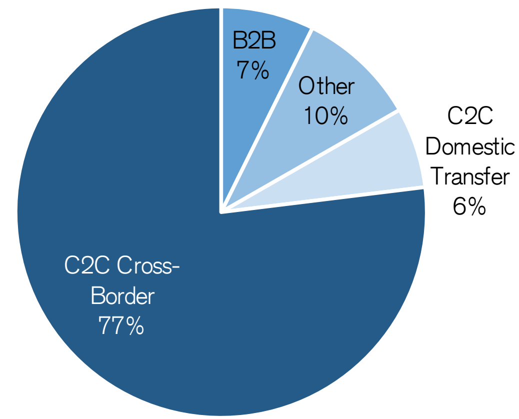
Source: Company reports, FactSet, Credit Suisse estimates

Western Union (WU)

Hard-to-replicate network, but slow growth and competition

- Stock now trading at a ~3x-turn premium vs. historical average and well off its low of ~9x (market appears to have digested recent good news, i.e., 3-year targets provided at investor day, October 2019).
- Continued competitive pressures from both incumbents and FinTechs and a declining US transfer business (~6% of revenue).
- Bullish on the underlying platform/asset value, but we await either a more attractive entry point or further signs of traction in online white-labelling (TAM expansive partnering).

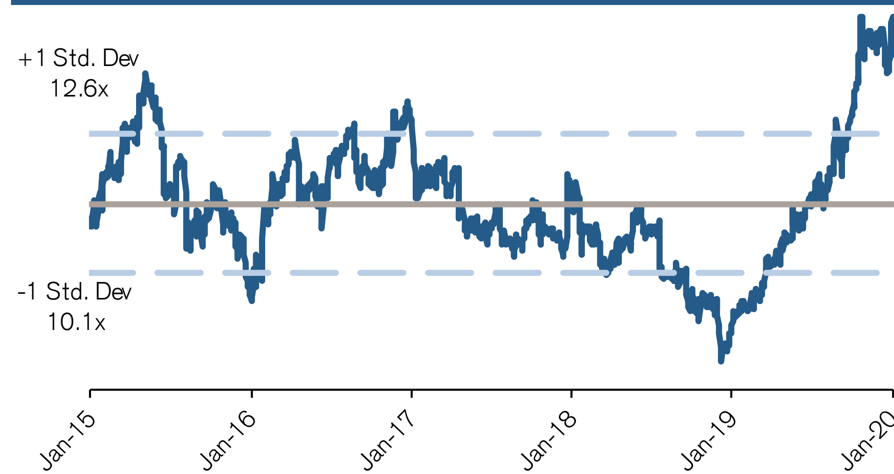
Western Union receives ~80% of revenue via the core C2C business, while the C2C segment makes up a single-digit component (2019E)



We parse out Western Union's 2-year organic, ex-FX, ex-Argentina inflation benefit, and model the LSD growth (in-line with guidance)

	2018	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Total revenue	**5,590**	**5,315**	**1,273**	**1,333**	**1,333**	**1,353**	**5,292**	**5,425**	**5,585**
YoY	*1%*	*(5%)*	*(5%)*	*(1%)*	*2%*	*2%*	*(0%)*	*3%*	*3%*
YoY FX Neutral	*3%*	*(1%)*	*(2%)*	*1%*	*2%*	*2%*	*1%*	*3%*	*3%*
YoY organic	*1%*	*(1%)*	*2%*	*2%*	*2%*	*2%*	*2%*	*3%*	*3%*
YoY organic FX Neutral	***3%***	***3%***	***5%***	***4%***	***2%***	***2%***	***3%***	***3%***	***3%***
2-year organic FX neutral	*3%*	*7%*	*6%*	*8%*	*6%*	*5%*	*6%*	*6%*	*5%*
Argentina Inflation benefit	*1%*	*2%*	*1%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
YoY organic FX Neutral ex-Argentina	***2%***	***1%***	***4%***	***4%***	***2%***	***2%***	***3%***	***3%***	***3%***
2-year FX neutral ex-Argentina benefit	*2%*	*4%*	*3%*	*6%*	*4%*	*3%*	*4%*	*5%*	*5%*

Western Union has benefited from multiple expansion following the announcement of its cost-savings initiative and 3-year targets



Source: Company reports, FactSet, Credit Suisse estimates

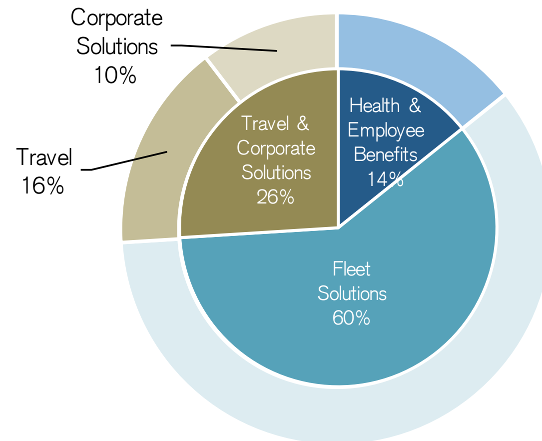
WEX (WEX)

Exposed to attractive FinTech end markets

CS Rating	R
CS Target Price	-

- Positive on the underlying businesses and the longer term.
- Expectations for organic deceleration in the Fleet segment beginning Q2 2020 (initial lapping of Chevron and Shell, alongside a noted recent weakness in SSS at -2.5% in Q3 2019), suggesting slower growth existing 2020.
- Higher relative fuel exposure vs. FleetCor (~25% of revenue vs. ~14%).
- Corporate Payments revenue approaching ~10% of total (vs. ~20% for FleetCor).

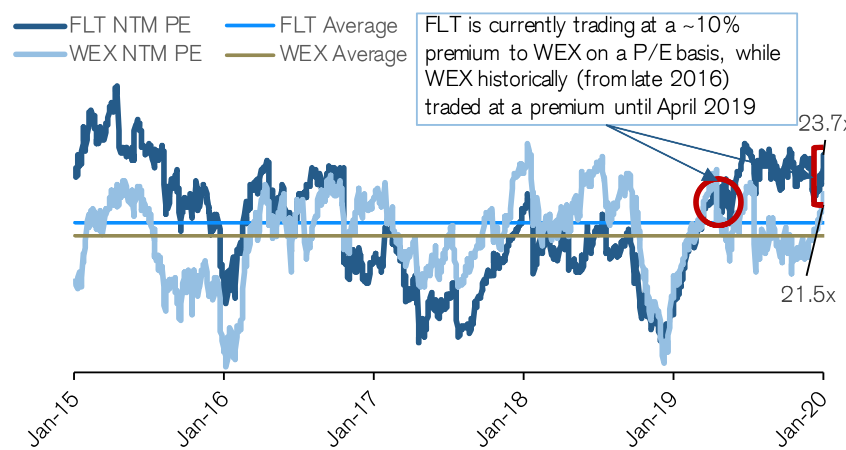
WEX business is heavier fuel (Fleet Solutions) and US vs. FleetCor, with Corporate Payments approaching~10% of revenue



For WEX, similar to FLT, we look at the 2-year organic, macro-neutral, growth; 2H 2020 Fleet segment lapping 2 large portfolio conversions

	2018A	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E
Fleet solutions segment revenue	975	1,060	265	285	296	301	1,148	1,203	1,260
YoY	19%	9%	14%	7%	7%	7%	8%	5%	5%
"Macro Adjusted" ex-FX, ex-Fuel	12%	12%	12%	8%	7%	7%	8%	5%	5%
Organic FXN (ex-FX, ex-Fuel, ex-M&A)	12%	10%	9%	5%	7%	7%	7%	5%	5%
2-year Organic FX Neutral	17%	22%	13%	18%	19%	18%	17%	12%	10%
FX impact %	0%	(1%)	(0%)	(0%)	(0%)	0%	(0%)	0%	0%
Fuel impact %	7%	(2%)	2%	(1%)	0%	0%	0%	(0%)	(0%)
Inorganic %	0%	1%	3%	3%	0%	0%	1%	0%	0%

FLT and WEX have swapped premiums over the past few years (WEX more of a premium in 2018 vs. FLT in 2019)



Source: Company reports, FactSet, Credit Suisse estimates

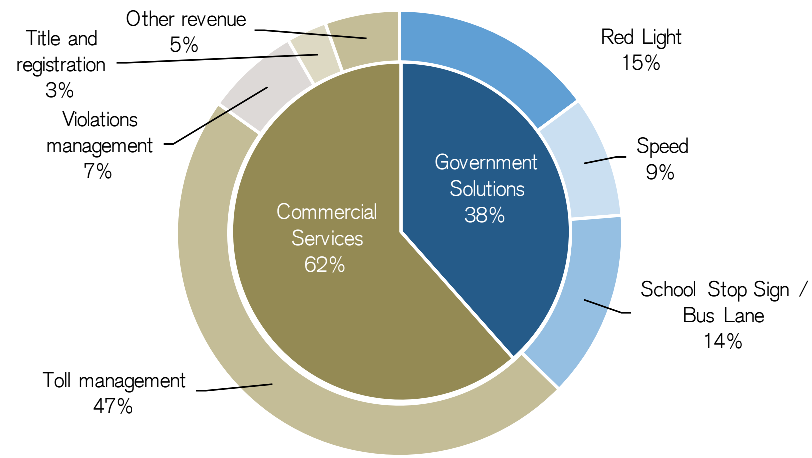
Verra Mobility (VRRM)

Leader in tolling payments & traffic safety solutions

CS Rating	OP
CS Target Price	$17.5

- Share leader in both segments, and we expect sustained mid-single-digit+ growth (in-line with medium-term guidance of Government +2-4%, Commercial +6-8%, with a boost via M&A, Europe, and new initiatives).
- Future opportunities ahead with NYC school-bus cameras and congestion pricing in other markets (currently taking a "wait-and-see" approach on congestion).
- We are optimistic on the European expansion (~$350mm TAM), given initial agreements (tolling authorities, rental car companies) and relationships with US Rental Car Companies (existing customers) compose 40%+ of the market.

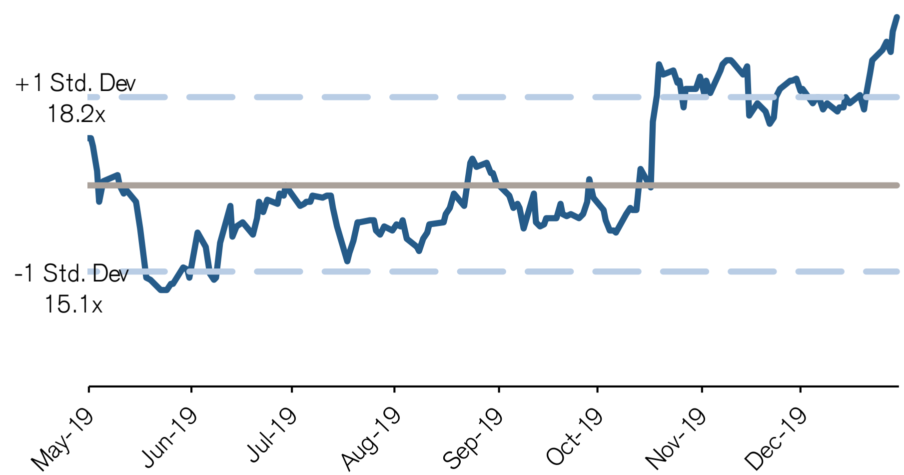
Verra Mobility is split roughly ~60/40 across its two segments, and it is the undisputed share leader in both



We discretely model components of Government Solutions given numerous moving parts (NYC schools, Miami and Texas red light, etc.)

Government Solutions segment	2018	2019E	2020E	2021E	2022E
Red light	76	68	61	60	58
Reported YoY	*2%*	*(10%)*	*(11%)*	*(2%)*	*(2%)*
Discrete contract impacts (bps)	*-271 bps*	*-768 bps*	*-880 bps*	*0 bps*	*0 bps*
Speed (school, city)	36	41	66	91	98
Reported YoY	*4%*	*15%*	*63%*	*37%*	*8%*
Discrete contract impacts - NYC (bps)	*-*	*1360 bps*	*6175 bps*	*3559 bps*	*700 bps*
YoY ex-discrete impacts	*4%*	*1%*	*1%*	*1%*	*1%*
Other (school stop, bus lane)	31	34	38	41	45
Reported YoY	*9%*	*10%*	*10%*	*9%*	*8%*
Total segment revenue (ex-product)	**142**	**144**	**165**	**192**	**201**
Reported YoY	*4%*	*1%*	*15%*	*16%*	*5%*
Implied underlying organic YoY	*5%*	*-3%*	*-2%*	*4%*	*4%*
Total discrete contact impacts (bps)	*-146 bps*	*-22 bps*	*1391 bps*	*1474 bps*	*369 bps*

Valuation history (P/E on a NTM-basis) since SPAC merger in March 2019 (post the acquisition of HTA, largest competitor, in 2018)



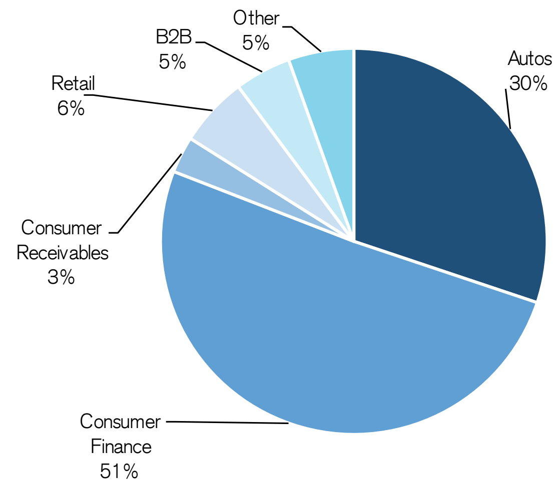
Repay (RPAY)

Integrated Payments in niche verticals, and expanding beyond

CS Rating	OP
CS Target Price	$19

- We expect further debit card penetration of existing verticals, entry into new verticals, new merchants & ISV partners to drive organic growth.
- Entry into new verticals (B2B, Healthcare).
- Benefits from scale and processing cost leverage (in part due to TriSource acquisition, insourcing prior back-end partner); expect gross margin expansion with flattish EBITDA margins.
- Valuation reasonable for a ~mid- to high-teens top-line grower with a continued boost from M&A.

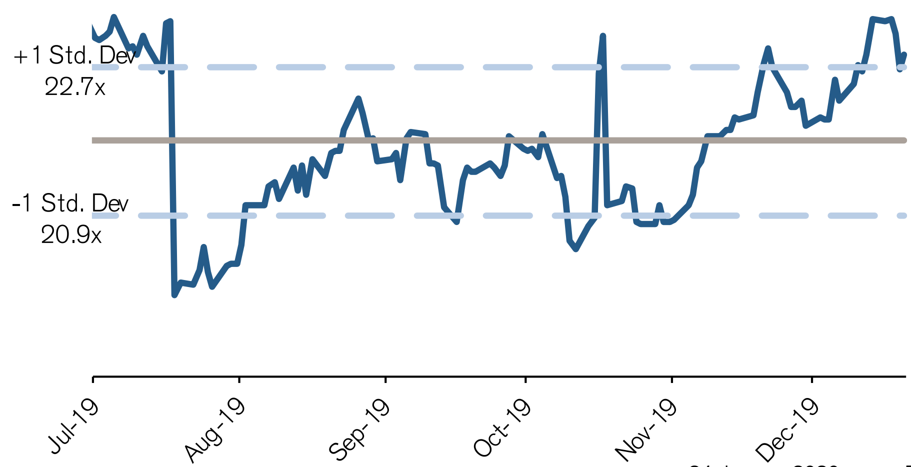
Repay's card volumes are most heavily weighted toward personal loans (consumer finance), with auto loans the 2nd largest component



Repay organic 2-year card payment volume build – we model organic growth in the high teens, plus ~3,100bps of inorganic contributions

	2018	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E
Card payment volume ($)	7,452	10,608	4,001	3,816	3,894	3,987	15,697	18,052
QoQ	-	-	*20%*	*-5%*	*2%*	*2%*	-	-
YoY	*42%*	*42%*	*64%*	*72%*	*49%*	*20%*	*48%*	*15%*
2-year	-	*84%*	*96%*	*99%*	*88%*	*87%*	*90%*	*63%*
Organic Volume growth	*21%*	*24%*	*19%*	*18%*	*17%*	*16%*	*17%*	*15%*
2-year organic volume	-	*45%*	*39%*	*45%*	*44%*	*39%*	*42%*	*32%*
Inorganic Volume	1,124	1,342	1,110	1,200	830	120	3,260	-
Inorganic Volume growth	*21%*	*18%*	*46%*	*54%*	*32%*	*4%*	*31%*	-

Valuation history (EV/EBITDA on a NTM-basis) since SPAC merger in Q3 2019 (attractive vs. expectations for mid-high teens topline)



Source: Company reports, FactSet, Credit Suisse estimates

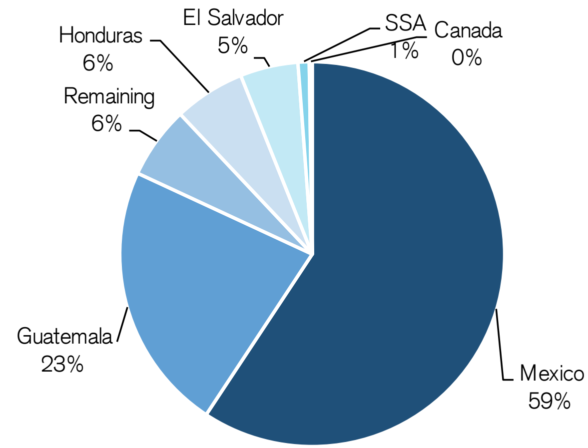
International Money Express (IXMI)

Focused money remittance provider

CS Rating	NEUTRAL
CS Target Price	$14.5

- Operates within a large addressable market and is a share gainer within that opportunity (high-quality tech, targeted geographical focus).
- Numerous nascent initiatives in motion (Africa inbound, Canada outbound, white-labeling with Latin American banks, general purpose reloadable [GPR] card) to support growth.
- Historically gained incremental share at ~40% in the US-Mexico corridor (~60% of volume) but a deceleration noted in YTD 2019 numbers (Q3 2019) to ~27% (though we note remittance volumes are traditionally volatile on a month-to-month basis due to exogenous factors)

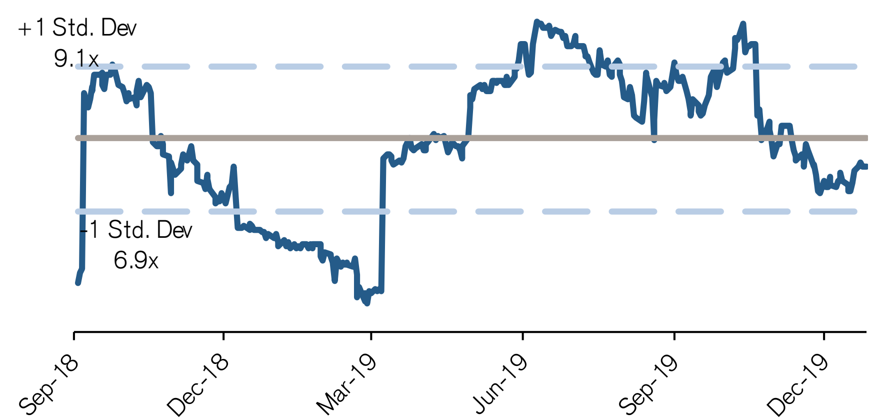
Intermex sources ~2/3rds of its volume (2019E) via the US-into-Mexico corridor (maintains #2 share in largest remittance corridor in the world)



Intermex remittance volume build – we model continued share gains in its two biggest remittance corridors (US-Mexico, US-Guatemala)

	2017	2018	2019E	2020E
US -> Mexico Inbound Volume ($b)	$ 29	$ 32	$ 35	$ 37
Growth		*11%*	*8%*	*6%*
IMXI share	15%	17%	18%	19%
IMXI Mexico Volume	4,321	5,617	6,315	6,879
Growth	-	*30%*	*12%*	*9%*
Incremental share	***38%***	***41%***	***27%***	***27%***
% of IMXI volume	*63%*	*63%*	*60%*	*56%*
US -> Guatemala Inbound Volume	7.4	8.4	9.4	10.4
Growth		*0*	*12%*	*11%*
IMXI share	22%	24%	25%	27%
IMXI Guatemala Volume	1,601	2,016	2,390	2,773
Growth	*0%*	*26%*	*19%*	*16%*
Incremental share	***41%***	***42%***	***37%***	***37%***
% of IMXI volume	*23%*	*23%*	*23%*	*23%*

Valuation history (EV/EBITDA on a NTM-basis) since SPAC merger in Q3 2018 (trading at a low absolute level, and more so vs. growth)



Payments & Payments-related FinTech private company map

US-focused mapping, including select global/regional platforms

- $41b in global FinTech investment in 2018 and $25b YTD in 2019 through Q3; $120b in the last 5 years.

Merchant Acquiring/Service Providers

PayFac enablement
Amaryllis
Finix Payments
Infinicept
Payrix

Other
AuthVia
Emergent
Flow
Flutterwave
Rapyd
RS2
Text2Pay
PPRO
ReCharge Payments

iPOS
CitiXsys
Revel
ShopKeep
SumUp
Toast
TouchBistro
Upserve
Veloce POS (CAN)
Vend

ISO/Acquirers/PSPs
Billing Tree
BlueSnap
Checkout.com
Clearent
Fattmerchant
Gravity Payments
Merrick Bank
NETS
North American Bancard
Nuvei Tech.
Paragon Payments
PayNearMe
PaySafe
Pineapple Payments
Priority Payment
Real Page
Shift4
Stripe
Tidal Commerce
Titanium Payments
Tribe
Yapstone

Bank IT

Core Processors
Alkami
Correlation
Finastra
Finxact
Mambu
Neocova
NYMBUS

BaaS
11:FS Foundry
Avaloq
Bankable
Cambr
ClearBank
Deposit Solutions
Fidor Bank
Railsbank
solarisBank
Starling Bank
Treezor

Additional Services
Allied Payment Network
Apiture
Blend
Backbase
ClearSale
Fisoc
Hydrogen Platform
Mistral Mobile
nCino
Synapse
Thought Machine
Treasury Prime
Vesta

Neo / Challenger Banks

Consumer Digital Banking

Europe
Atom Bank (UK)
Curve (UK)
Monese (UK)
Monzo (UK)
N26 (GER)
Numbrs (UK)
Raisin (GER)
Revolut (UK)
Starling Bank (UK)

US
Aspiration
Chime
Current
Dave.com
Greenlight
Marcus (GS)
MoneyLion
Stash
Varo Money
Zenus

ROW
:86 400 (AUS)
Dough (AUS)
Klar (MEX)
NuBank (Brazil)
OlaMoney (India)
Volt Bank (AUS)
Xinja (AUS)

Digital Lending

SMB Lending / Banking
BlueVine
FundBox
FundingOptions
Greensill
Joust
Judo Bank
Kabbage
Loan Builder
Neptune Financial
Oak North
On Deck Capital
Payability

Alternative Consumer Lending

Europe
Habito
Klarna
Kreditech
LoanDepot

ROW
Credit Culture (SG)
Creditas (Brazil)
Simpl (India)

Other
Credit Karma
Built Technologies

US
Affirm
Avant
Clara
Earnest
Elevate
Laybuy
LendingHome
Marlette (Best Egg)
Prosper
SoFi
Upstart

Remittances
NIUM (formerly InstaRem)
Remitly
RTGS.global
Transferwise
World Remit

C2B & P2P
Dwolla
NETELLER
PayQwick
Skrill
Trustly
Toss (Korea)
Verse (Europe)

Cryptocurrency (wallets, payments)
Binance
BitPay
Blockchain
Circle
Coinbase
Dash

Connectivity / Payments APIs
Button
Mobeewave
Plaid
Tink
Token
Truelayer
Yapily
Yodlee

Personal Finances
Acorns
Albert
Betterment
Deserve
DriveWealth
Ibotta
Moven
Robinhood
Wealthsimple (CAN)
Weatlhfront

Issuer Processing
CoreCard
Galileo Fin. Technologies
Extend
i2c
InComm
Marqeta
Stripe Issuing
VPay

Networks
Early Warning (Zelle)
Faster Payments (UK)
RTP (The Clearning House)
RuPay (India)
Smartlink
UnionPay (China)

Super Apps & Diversified
Ant Financial
Go-Jek
Grab
Paytm
Rappi

B2B Payments

AP / AR
AvidXchange
Billtrust
HighRadius
MineralTree
Modulr
PayFi
Paystand
Tipalti

Corp. cards & Exp. Mgmt.
Brex
Divvy
Expensify
Radius Payment
Tide

Payroll
BambooHR
Gusto
Kickfin
PayActiv

Cross-Border
Airwallex
CurrencyCloud
EBANX
Flywire
Payoneer
Ping-Pong
Ripple
Veem

Instant Payments
Ingo Money
PayFi

The Credit Suisse Payments, Processors, & FinTech Top 40 Industry Themes

40 topics we expect to be top of mind for investors and industry participants

Global eCommerce & Software-led Payments

1. Global eCommerce as a key source of growth
2. eCommerce (and omnichannel) acquiring platforms
3. Secure Remote Commerce (SRC)
4. Checkout buttons/digital wallets
5. Increasing complexity in global eComm/Omnichannel
6. Fraud & chargebacks on card-based transactions
7. Payout capabilities coming into focus
8. PayFacs and the rise of the "aggregator" model
9. Rationale for software-enabled payments

NextGen FinTech Ecosystems

10. Continued consolidation and scaling of platforms
11. Open Banking (APIs) and Account Connectivity
12. BigTech in FinTech, highlighting Apple's FinTech efforts
13. Unbanked and Underbanked opportunity for US FinTechs
14. P2P as a customer acquisition and engagement tool
15. Global remittance market innovation
16. FinTech-driven credit (consumer offerings)
17. FinTech-driven credit for merchants (micro & SMB lending)
18. Digitally native expectations

Drivers of Cash-to-Card Conversion

19. "Push-to-card" payments unlocking new payment flows
20. Contactless payments
21. Loyalty & rewards becoming easier to spend
22. Long runway for card penetration in both EM & DM markets
23. Cross-border payments volumes

B2B/Corporate Payments

24. B2B payments coming of age
25. Virtual cards in B2B Payments
26. Next leg of B2B payments puts SMB services in focus

Back-End Banking Innovation

27. "Faster payments" & "RTP" become more real
28. Issuer Processing key drivers and overview
29. Bank Tech key drivers and outlook
30. Modern Issuing Platforms

Regulation & Litigation

31. Two-Factor Authentication Implications
32. Trends in Global Payments Regulation
33. European Payments Regulation
34. US vs. International FinTech regulations and market dynamics
35. Industrial Loan Company (ILC) bank licenses for US FinTechs

Threats to Monitor for the Existing Ecosystem

36. Amazon's building blocks in Payments & FinTech
37. Alipay & WeChat expand acceptance beyond China
38. Cryptocurrency impact on the payments ecosystem
39. Emergence of modern platforms in EM
40. National payment schemes, alternatives to V and MA

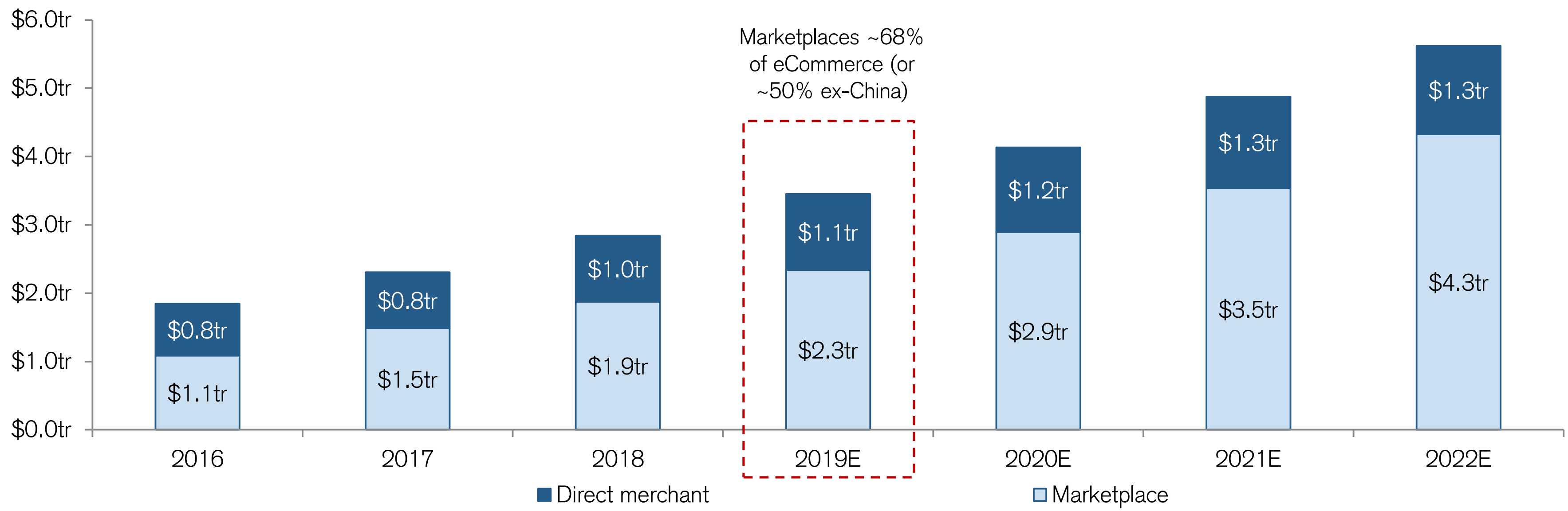
Global eCommerce & Software-led Payments

1. Global eCommerce as a key source of growth

eCommerce a mid-high teens grower, Marketplaces even faster

- It is a fast-growing TAM overall, which (depending on the source and definition of what is in scope) generally suggests a ~$3.5tr global market growing ~mid-teens to high teens (vs. ~4-5% PCE).
- One way to segment eCommerce is Marketplace vs. Non-marketplace (direct merchant). When viewed in this manner, Marketplace eCommerce is a faster-growth sub-segment (~low-20% CAGR through 2022 vs. ~mid-teens for the “rest” of eCommerce); a further, even faster-growing sub-segment is cross-border eCommerce (addressed separately in this presentation).
- We note that China meaningfully skews these data given it makes up ~50% of global eCommerce and is dominated by Alibaba-owned marketplaces (Marketplaces make up ~68% of eCommerce including China, and we estimate Marketplaces make up ~50% of global eCommerce excluding China).

Global eCommerce is a ~$3.5tr global market, with Marketplaces-based eCommerce sales expected to be a key driver of total market growth (~23% CAGR 2018-2022 vs. direct merchant eCommerce growing more at a high-single-digit pace)



Source: Payoneer, eMarketer, Credit Suisse research

1. Global eCommerce as a key source of growth

Many large, developed markets still at just ~10-15% penetration

- The global retail eCommerce market is about $3.5tr today, although $1.8tr of that is in China, a meaningful portion of which is considered less addressable to many payments platforms.

- In China, the majority of volumes are done through Alipay and WeChat closed-loop systems, particularly with Alibaba [Tmall land Taobao] and JD.com as the dominant marketplaces.

- Still low levels of eCommerce penetration in large developed markets (including the US), particularly when viewed vs. penetration levels that are 2-3x higher in South Korea, UK, and China, suggest stable growth ahead.

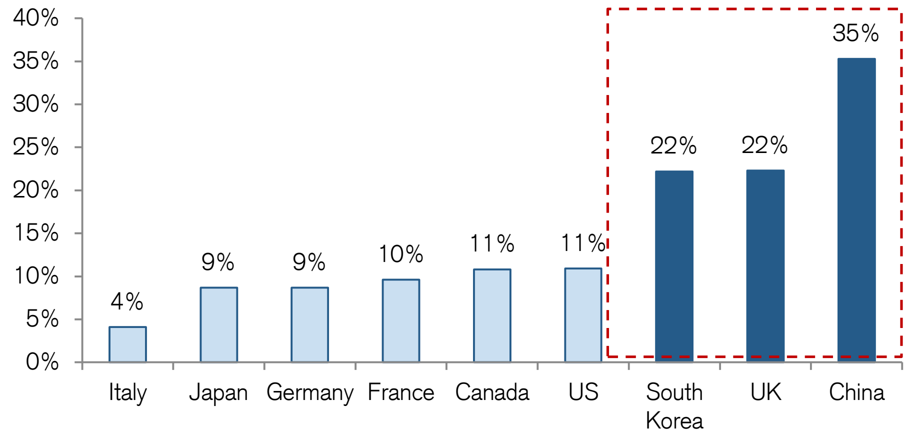
- A subset of drivers supportive of growth persistence include:

  1. Continued faster delivery times (supported by improvements in logistics infrastructure),

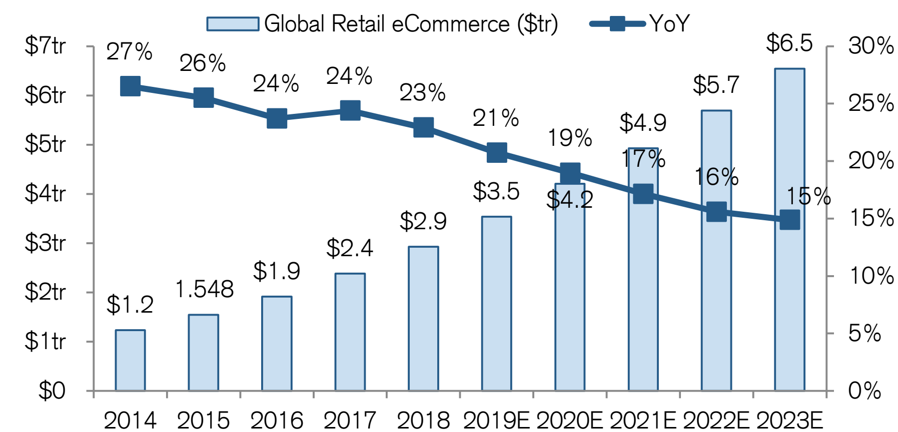
  2. Rising mobile penetration and conversion rates (supported by stored/tokenized credentials and eWallets), and

  3. Increasing availability of alternative payments methods (both for country-specific use cases and for the underbanked).

Numerous large, developed markets still at just ~10-15% penetration of retail sales, suggesting meaningful eCommerce runway remains



Global eCommerce is approaching ~$4tr in annual volumes, growing at a mid- to high-teens pace (albeit bolstered by China)



1. Global eCommerce as a key source of growth

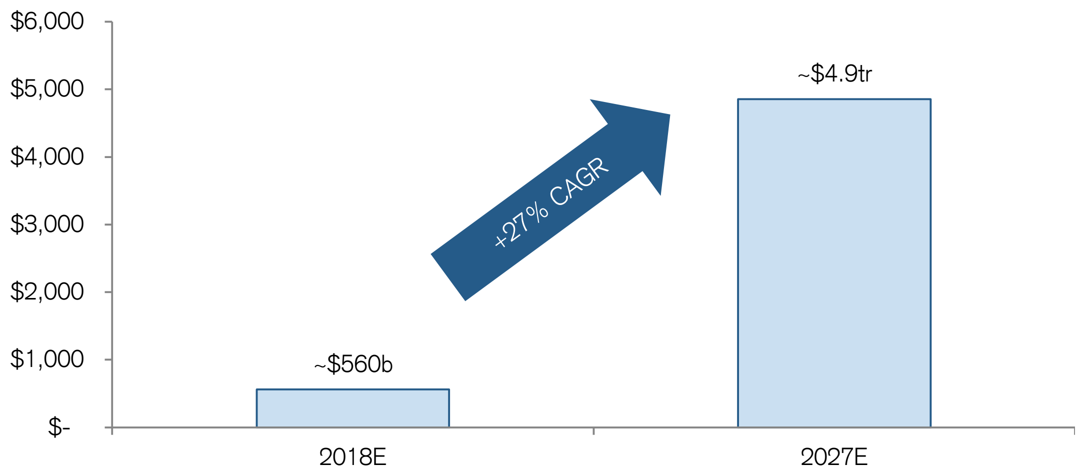
Cross-border the fastest growing sub-segment of eCommerce

- Cross-border eCommerce is becoming an increasingly important component of the overall online commerce market and as a driver of cross-border payments volumes (cross-border eCommerce now makes up ~50% of cross-border card volumes for the networks vs. ~70% five years ago, with travel-related purchases comprising the remaining portion).

- Cross-border eCommerce growth: (1) Zion Market Research expects cross-border eCommerce to grow at a +27% CAGR 2018-2027E; (2) Forrester expects a +17% CAGR (vs. +12% for overall B2C eCommerce) and estimates cross-border eCommerce is ~20% of the market, with ~2/3rds of cross-border done via marketplaces; and (3) Worldpay had forecast ~25% CAGR 2015-2020 vs. ~16% CAGR for eCommerce overall.

- Reasons for the growth: (1) improved localization (language, look and feel); (2) more payments method choices; (3) means to gain access to goods not available in local markets; (4) means to benefit from lower priced goods; and (5) improved logistics.

Cross-border eCommerce is expected to grow 2x broader eCommerce (~mid-high 20%s vs. ~mid-teens for eCommerce overall), per Zion Market Research

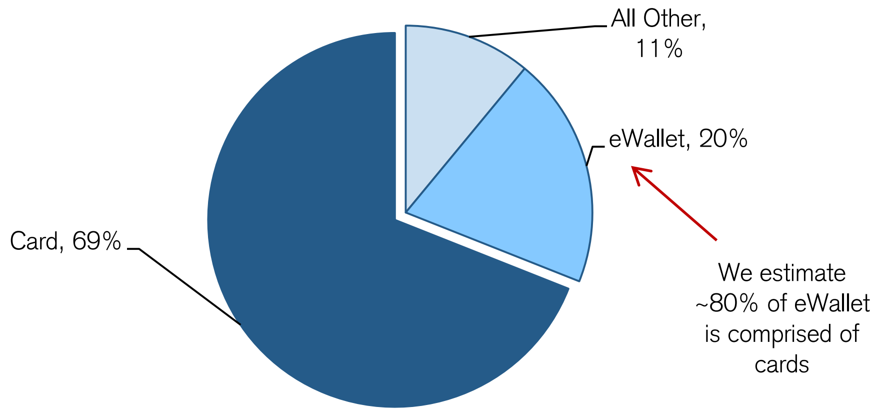


1. Global eCommerce as a key source of growth

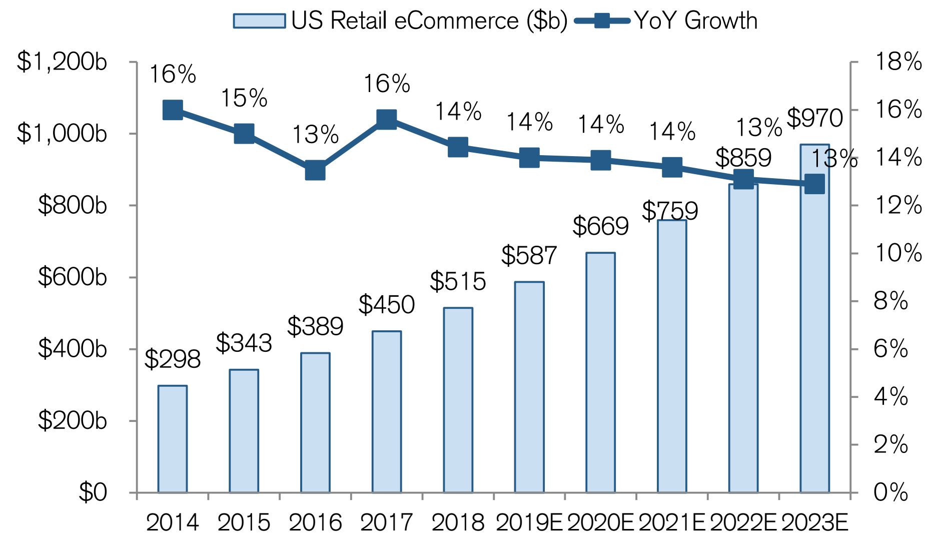
US market focus – eComm still growing 3-4x faster vs. in-store

- US eCommerce market is approaching ~$600b and has been growing roughly mid-teens (expected to continue at a similar pace).
- It represents a meaningful growth driver for Visa and Mastercard given card mix for eCommerce transactions is significantly higher vs. in-store in the US (~roughly 85% vs. ~50%).
- eCommerce is still only ~12-13% of Mastercard's total volume, per its most recent disclosures.
- Amazon US GMV (CS est.) for 2019E is roughly ~$210b, which implies Amazon makes up ~35% of the US eCommerce market (but will make up ~55% of total growth).

North American eCommerce payments by card were~70% of transactions (2018); when combined with eWallet transactions, it suggests card payments are a part of ~85% of eCommerce



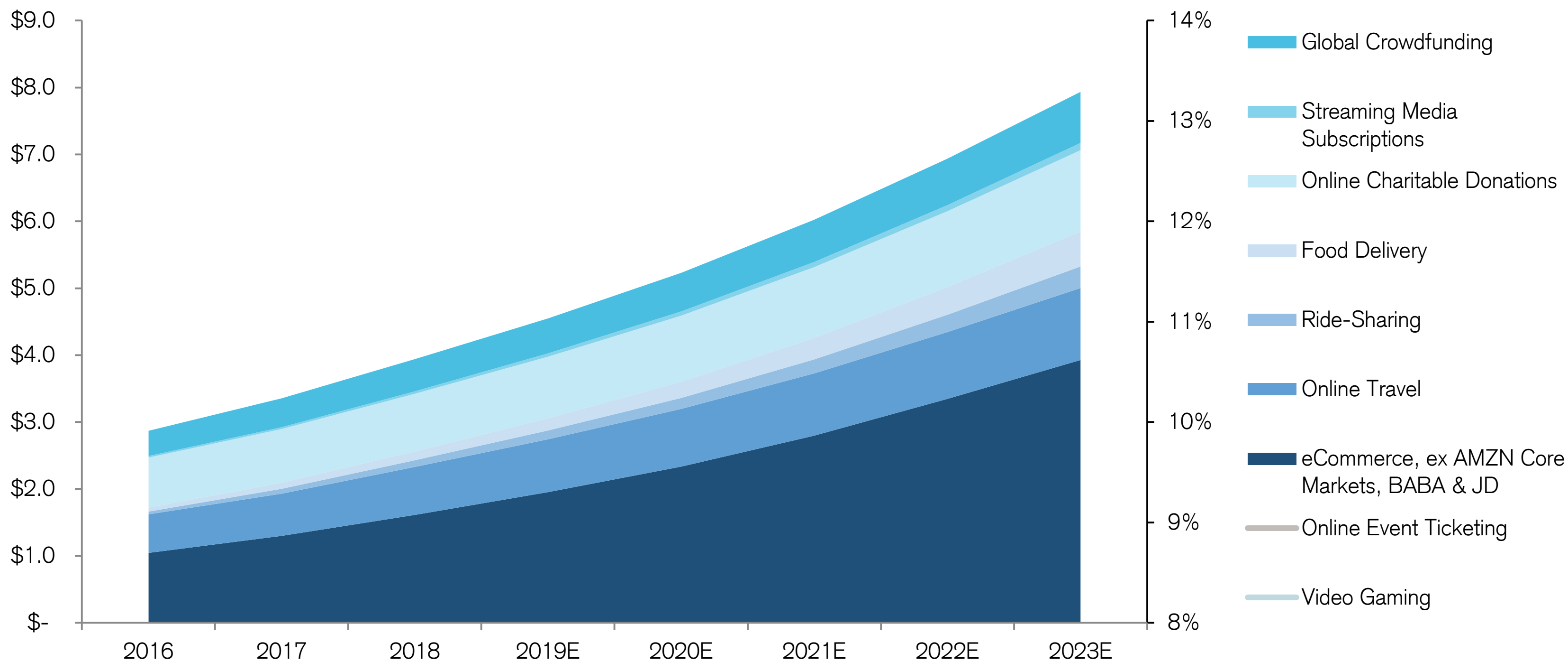
US Retail eCommerce sits at ~$600b today but is projected to reach ~$1tr by 2023 (growing at a ~mid-teens CAGR)



1. Global eCommerce as a key source of growth
PayPal's "True TAM" for its core business

- Given various data sources include or exclude portions of "eCommerce" (for PayPal specifically – although broadly applicable to many other payments platforms as well), we constructed a "True TAM" that we estimate to be ~$4tr today, growing toward ~$8tr by 2023E.
- Our PayPal "True TAM" model is inclusive of global eCommerce, eTravel, eFood delivery, eTicketing, online charitable donations, ride-sharing, crowdfunding, gaming, & streaming subscriptions (does not include bill-pay, Alibaba & JD.com, and the majority of Amazon).
- This adds up to confidence in the persistence of growth (often underappreciated in payments) and annual compounding.

For PayPal specifically, although broadly applicable to many other payments platforms, we constructed a "True TAM" that we estimate to be ~$4tr today, growing toward ~$8tr by 2023E



1. Global eCommerce as a key source of growth
True TAM assumptions and rationale

Global Category	TAM Assumptions & Rationale	2018-2023E CAGR	2019E Size ($b)	% of TAM
eCommerce, ex AMZN Core Markets, BABA & JD	Euromonitor Global Online Retail Estimates. CS estimates for Amazon (Stephen Ju), excluding Amazon Core markets, assuming they represent 80% of AMZN 3P & 1P ex-shipping). Assume BABA and JD eCommerce volume as unaddressable and GMV forecasted with consensus estimates.	17%	$1,952	42%
Online Travel	Global online travel forecasts informed by CS Global OTA Industry Model (Stephen Ju), and is inclusive of assumptions around vacation rentals and sharing economy rentals.	8%	$790	17%
Ride-Sharing	Assumes Uber and Lyft represent 50% of the global ride-sharing market, with their global share declining slightly in each year in our forecast (assumes additional regional competitors gain share). We utilize Uber & Lyft ride-sharing consensus estimates.	27%	$131	3%
Food Delivery	Euromonitor estimates for Global Food Delivery market size (i.e.,GrubHub, UberEats, DoorDash, Postmates, Delivery Hero, Takeaway.com, Deliveroo, Just Eat, restaurant websites, etc.).	32%	$180	4%
Online Event Ticketing	Assumes ~$47b market size in 2017, with a ~7% CAGR through the forecast period. Market sizing base sourced via ResearchAndMarkets.com.	7%	$54	1%
Online Charitable Donations	Forecasts assume US Charitable donation market has 50% global market share and grows ~7% annually (a slight premium to historical trend growth in the US of 5%). US market historical figures sourced from nonprofitssource.com.	7%	$923	20%
Streaming Media Subscriptions	We utilize CS revenue estimates for Netflix (Douglas Mitchelson) and Spotify (Brian Russo), and assume these two platforms represent 75% and 40% of the 2018 global video and music streaming markets, respectively. We then assume slight annual share loss (i.e., additional platforms grow faster off of a smaller base, gaining share) of the global video and music streaming markets, respectively.	22%	$50	1%
Video gaming	Category includes in-game purchase of virtual goods (e.g., points, tools, additions) that video game players use to enhance their gaming experience. We assume a ~14% CAGR through the forecast period, with our assumptions informed by CS video game industry model (Stephen Ju).	14%	$95	2%
Crowdfunding (Reward-based & Pre-financing, ex-China)	Statista estimates for reward-based crowdfunding, and pre-financing (e.g., Kickstarter), ex-China. Forecast assumes the US, UK, France and Canada represent the majority of the global crowdfunding market, with their global share declining slightly each year in our forecast (assumes other countries gain share). We utilized Kickstarter project funding mix data (successfully funded projects, categories by dollars raised), to inform our addressable assumption.	10%	$522	11%
Total		14%	$4,696	100%

Source: Company data, eMarketer, Phocuswright, Euromonitor, ResearchAndMarkets.com, nonprofitsource.com, Statista, Credit Suisse estimates

2. Global eCommerce (and omnichannel) acquiring platforms

Large eCommerce payments providers (summary)

- eCommerce payments providers compete on:
  - Authorization & fraud rates
  - Global acceptance methods
  - Conversion rates
  - Ease of integration
  - Ease of ongoing operations
  - Omnichannel capabilities
  - Vertical or segment expertise
  - Additional software & services
  - Pricing
  - Service & support
- Stripe has become a much more meaningful competitor, for both SMB and larger multi-nationals (now ~40 countries of local acquiring, 25+ unique forms of payment acceptance [aiming toward 50 in 2020], 100+ payout countries by 2020). Payments volume has reached "hundreds of billions", headcount is at ~2.5k, and valuation most recently $35b – all indicative of a more scaled competitor. Our industry discussions suggests that Stripe has been appearing in and winning more RFPs, armed with its more fulsome global capabilities, ease of integration, and access via a single API. Innovation cadence resulting in numerous new offerings (e.g., Stripe Issuing, Stripe Corporate Cards, chargeback protection, Stripe Capital, Stripe Terminal for omnichannel, etc.). Leading marketplaces offering in Stripe Connect.

	Braintree A PayPal Service	stripe	adyen	worldpay	globalpayments	First Data is now fiserv.
2019E eCommerce volumes	~$290b	"Hundreds of billions"	~$230b	~$400b	~$160b	~$375b
	+25-30% YoY (inclusive of gateway and PayPal button transactions)	"Hundreds of billions" (disclosed by management, we estimate that volumes are slightly below those of Adyen & Braintree when including PayPal transactions)	(Adjusts volume down ~10% [assumption] to remove offline/in-store volumes)	(CS est. based on legacy WP disclosures, $279b in 2017, assumed 20% YoY growth in 2018 and 2019)	(based on $900mm eComm & Omni revenue, adjusted to ~$720mm ex-network fees, grossed up assuming ~50bps net acquiring spread)	(CS est. based on an assumed lower yield given mix of volume that is processing only, along with disclosure that eCommerce was ~$500mm in revenue in 2016 growing mid-teens)

2. Global eCommerce (and omnichannel) acquiring platforms

Large eCommerce payments providers (detail)

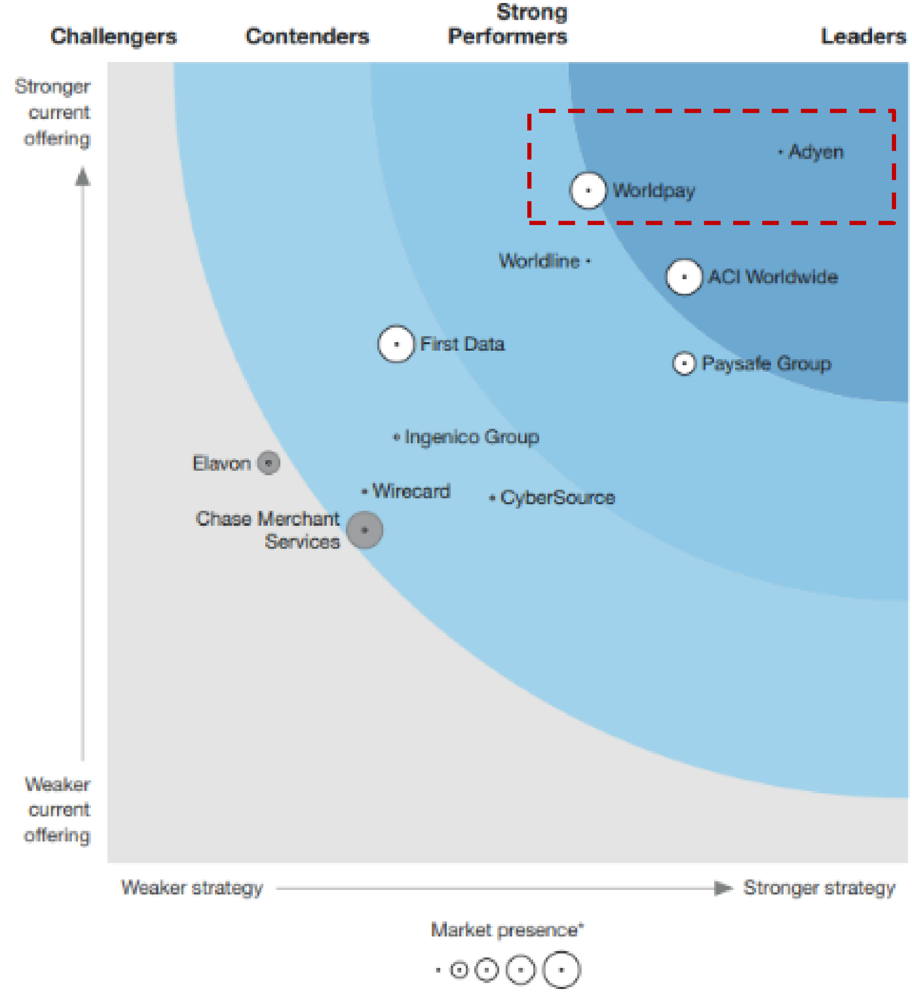
Metric	Braintree (A PayPal Service)	stripe	adyen	worldpay	globalpayments	First Data is now fiserv
Valuation	$31-$47b (CS est.), depending on extent to which PayPal button transactions done on Braintree merchant sites are included	$35b (September 2019 financing)	~$26b	$43b acquisition price (now a part of FIS)	~$60b (when combined with TSS acquisition)	Global Business Solutions (GBS) was ~2/3rd of First Data revenue, acquired by Fiserv for ~$22b in 2019
2019E eCommerce volume	~$290b estimate, +25-30% YoY (inclusive of gateway and PayPal button transactions)	"Hundreds of billions" (disclosed by management, we estimate that volumes are slightly below Adyen & Braintree when including PayPal transactions)	~$230b (Adjusts volume down ~10% (assumption) to remove offline/in-store volumes)	~$400b (CS est. based on legacy WP disclosures, $279b in 2017, assumed 20% YoY growth in 2018 and 2019)	~$160b (based on $900mm eComm & Omni revenue, adjusted to ~$780mm ex-network fees, grossed up assuming ~50bps net acquiring spread)	~$375b (CS est. based on an assumed lower yield given mix of volume that is processing only, along with disclosure that eCommerce was ~$500mm in revenue in 2016 growing mid-teens)
Geographic	- 130+ currencies, 45+ countries - Available for merchants based in US, Canada, Australia, Europe, Singapore, Hong Kong, Malaysia, and New Zealand - Merchant base more US-focused	- ~40 countries by end 2019 (with local/domestic acquiring) - Aiming for 95+ acceptance countries (domestically) - Gaining some traction with merchants in Europe and Asia	- 56% of revenue from Europe in 2018 - 29% North America - 15% AsiaPac, LatAm, and Rest of World	- UK/Europe heavy given legacy Worldpay roots - 146 countries, 126 currencies	- 33 countries of local presence (including local support staff on the ground serving local merchants); potential to move to ~38 supported by TSYS physical locations - eCommerce business in 60 markets, 135+ currencies	- 50+ countries and "hundreds" of currencies", with noted more recent expansion into Mexico, Australia, and China - Over 100 countries with First Data clients (including in-store)
Acceptance methods	~25 unique forms of payment globally, given business is largely US-focused; PPRO investment/partnership has the potential to expand LPMs	25+ unique forms of payment globally by year-end 2019 (aiming toward doubling this number to 50 during 2020); first non-bank to integrate with Cartes Bancaires (France)	250+ payment methods	300+ payments methods (potentially expanding due to recent agreement with ACI Worldwide)	140 payment methods	250+ payment methods
Processing partners & licensing	- Regional banking relationships for processing (banks with acquiring licenses), e.g., Wells Fargo and Chase Paymentech in the US, AIB Merchant Services in Europe, NAB in Australia, etc. - PayPal does not serve as an acquirer in any market (acts as either a PayFac or ISO, depending on merchant size)	- Stripe serves as a merchant acquirer (direct licenses via the card networks) in virtually all markets (including all of Europe)	- Began ramping efforts to get local licenses in 2013/2014 - Adyen owns direct licenses in Europe - Applying for a US bank license (faster merchant payout)	- Offers direct domestic /local acquiring in 58 markets (with another 88 with cross-border capabilities) - Just obtained an acquiring license in New Zealand (March 2019)	- 58 owned domestic acquiring licenses - Differentiation via local market, in-store presence at scale (i.e., local merchants doing in-store in ~33 markets, including local support for all merchants, including SMB) - Unified Commerce Platform (UCP) provides a single omni-channel payments capability via a single API integration	- 50-55 markets "which we are licensed to acquire from merchants", partially with owned licenses and partially via sponsorships (with plans to expand self-sponsorship in a few new markets in 2020); Act as a direct acquirer and manage own sponsors in these countries
Customer segment	- Wide range, including SMB and large merchants (e.g., Uber, Airbnb) - Self-service service largely aimed at SMB, but ability to scale with larger merchants - Within the smaller merchant category, tends to skew more toward SMB vs. startup vs. Stripe)	- Spans full gamut of merchants, with a focus on start-ups/SMB community, but also working with enterprise level merchants (Lyft, Target, UnderArmour, etc.) - Shopify Payments partner (expands start-up/SMB reach) - Increasing large enterprise wins (RFP processes)	- Focused on enterprise (large, global, eCommerce and omni-channel) - Expanding into mid-market - Not focused on SMB and/or micro merchant segment	- Larger merchants, many of which require live contact/support - Cross-border leader globally - Global digital retailers and leading online travel sites	- Focused almost exclusively on the SMB segment, along with multi-national corporations that require cross-border capabilities	- Serve a range of merchants from the largest retailers and platforms (PayPal, Yapstone, etc.) to smaller business via Clover (although not quite into the micro-merchant segment, given even Clover's average merchant is larger than Square's); gains SMB exposure via bank distribution channel (Bank of America, Wells Fargo, PNC, etc.)
Number of merchants	- "23mm merchants on the platform" (inclusive of standalone PayPal button-only merchants)	- "Millions of businesses on Stripe"	- 3.4k as of December 2017 (last disclosure); this was down from 4.5k December 2016 (focused on higher quality merchants); no longer disclosed	- ~1mm merchants in total for WP (inclusive of offline only merchants)	- 2.5mm merchant locations via Global Payments; 820k via TSYS	- 6mm+ merchant locations
Pricing Approach	- 2.9% + $0.30 for full-stack in the US - Lower in Europe (e.g., 1.9% + €0.30) - Priced differently by region (volume discounts for large customers negotiated) - $0.10 per trans + $49 per month for gateway	- 2.9% + $0.30 in the US for standard, smaller merchant pricing (although larger merchants and/or platforms are able to negotiate based on volumes, which is similar to competitors) - Lower in Europe (e.g., 1.4% + €0.25 for European cards, 2.9% + €0.25 for non-European cards) - Priced differently in each region	Interchange ++ (net yield ~22bps, which is a blend of fully acquired and gateway, ~70% vs. 30% mix)	Mix of bundled and interchange plus (net yield ~31bps on legacy WP eCommerce business)	Priced to value given high touch sales support ~80bps acquiring spread	Interchange ++ for larger merchants, and could employ a bundled approach for smaller merchants; processing only fees (either a small bps figure or cents per transaction for processing only relationships); competitive on pricing, in part due to scale (i.e., ~40% share in the US, largest acquirer globally)
Additional services	- Braintree Extend (contextual commerce/sell on another platform) - In-store payments (US, UK, Australia, although set to expand due to iZettle acquisition)	- Stripe Billing (recurring business models), Atlas (incorporation, tax & legal services), Radar (machine learning applied to fraud), Chargeback Protection (40bps "insurance"), Stripe Terminal (programmable offline POS), Stripe Sigma (business data platform), Stripe Issuing (card issuance, including corporate cards), Stripe Capital (lending via bank partner), Premium Support (for complex cases), although support is offered to all merchants (with phone-based support available as well depending on case)	- RevenueProtect risk management solution (being offered to merchants separately, including non-processing clients) - In-store payments and terminal (Unified Commerce), customer insights, revenue optimization, and other features - Launched card issuance business November 2019	- AuthMax to increase auth rates for CNP - Card issuance capabilities - in-store offerings (omnichannel solutions) - Data dashboard for customer insights, etc. - Increased data (FIS issuer processing & banking relationships) to aid in increasing authorization rates (management expects ~200bps potential increase, from mid-80%s to high 80%s)	- 60+ lenders connected via API (merchant cash advance, no B/S risk) - In-store API-based terminals - Card issuance capabilities - Issuer processing business (potential fro improved authorization rates, SCA capabilities, economics) - Payroll services (e.g., Heartland Payroll) - High-touch local support in 33 markets	- Clover POS for in-store capabilities (omnichannel) - Owns both STAR and Accel debit networks (low cost debit routing), along with Acculynk (least-cost routing gateway supporting optimized online transaction routing) helps to prioritize based on approvals, costs, etc. - Card issuance capabilities
Go-to-market	- Self-service via Drop-in ("a few lines of code") for smaller merchants/developers or Customer UI - Combined salesforce with PayPal means a greater presence in countries outside core US/Europe	- Growing Business Development / Salesforce (largely self-serve to developers/startups, but high-touch for larger merchants)	- Salesforce on commission - Must ensure regional involvement - Work streams to ensure sales & engineering coordination	- Salesforce on commission, including a Global eCommerce sales team (expanding in 2019)	- 3.5k direct sales people (including ~3k from Global Payments and ~500 from TSYS)	Combination of bank partners (both revenue share & JVs), direct sales, and other partners (agents, ISOs, ISV through CardConnect and BluePay); S-1 filing from 2015 suggests ~2.3k sales people
Marketplaces offering	Braintree Marketplace offering, bolstered by the acquisition of Hyperwallet for improving the payout capabilities	Stripe Connect (marketplaces & platforms), along with recently expanded payout capabilities (aiming for 100+ payout countries [over local bank rails], 90% users with instant payouts, and 1-2 day payouts everywhere, per Stripe Sessions 2019 in SF)	Adyen for Platforms, which aims to smooth onboarding of merchants, funds movement/payouts, etc. easy and compliant; Recent notable client win in eBay	In addition to working with Marketplaces merchants (pure-play eCommerce), also offers programs for Payment Facilitators (onboarding sub-merchants, collecting payments, reducing risk, etc.)	Works with marketplaces, in keeping aligned with overall company strategy of focusing on more niche verticals, SMB, and multi-nationals, where services and added capabilities are valued and compensated	Noted emphasis on Marketplaces, on-demand platforms, and aggregators at 2018 investor day, along with capabilities in digital disbursements, etc.; Programs tailed for Payment Facilitators as well (e.g., PayPal as a notable customer)
Employees	500+	~2,500 (vs. ~2k+ at Stripe Sessions September 2019, 2.5k end-year 2019 aim per CEO, 11FS June 2019)	~900 as of end 2018	~8.2k as of end 2018	~11k for Global Payments; ~13k for TSYS (TSYS includes issuer processing business)	~22k at First Data (where merchant acquiring was ~2/3 of the business)
Other	- Single contract and integration for PayPal and Venmo appealing to smaller merchants (single contract)	- GPTN foundation (Global Payments & Treasury Network) - Large investors include Tiger Global, Capital G, General Catalyst, etc. - Acquired Touchtech Payments in April 2019 (SCA technology) - Fast moving engineering team (250+ new features added TTM as of Stripe Sessions 2019) - Single integration to access global capabilities of Stripe	- No single merchant customization (unless applicable to broader platform) - Top 10 merchants 31% of 2018 net revenue (33% of 2017 revenue) - Top 120 merchants 69% of revenue (2017 stat) - Single integration to access global capabilities of Adyen	- Will customize for clients, "consultancy services" on market expansion - Defines eCommerce as pure play eCommerce merchant volume only (i.e., the eCommerce associated with an omnichannel client is not included, and thus, the actual size of the total eCommerce business is by definition under-stated to an extent) - Potentially > 1 integrations to access WP global capabilities	- Vertical specific expertise and high-touch customer support, even for SMB level merchants - Defines eCommerce as CNP for both pure-play eCommerce merchants and the eCommerce/CNP portion of their omnichannel merchant clients - Single integration to (UCP) access global capabilities of Global Payments	- Notable clients in Dell, Lyft, Apple, Yapstone, PayPal, etc. - A single integration to reach global, omnichannel capabilities (including more unique, local footprints in high-value markets like India, Argentina, South Korea, and Philippines) - Rapid Connect can serve as a middleware layer (although requires an added hop for transaction data) - Multiple gateways and platforms (e.g. Payeezy, CardPointe, Clover Gateway, etc.)

Source: Company reports, Credit Suisse estimates

2. Global eCommerce (and omnichannel) acquiring platforms

Forrester's global payments provider assessment

- Forrester's assessment of global omnichannel payment providers suggests Adyen and Worldpay are leading the pack.
- Adyen's strengths were identified as global capabilities, single platform, and omnichannel solutions (homegrown terminal software and hardware).
- Worldpay scored well on global platform and infrastructure, along with added services (e.g., AuthMax cited).
- We expect an increasing trend toward merchants consolidating acquirers around a few global omnichannel providers (displacing local acquirers).



*A gray marker indicates incomplete vendor participation.

Source: Forrester (The Forrester Wave™: Global Merchant Payment Providers, Q4 2018); Forrester excludes Braintree and Stripe due to their historical CNP focus (vs. omnichannel); also excludes large bank acquirers that use third-party processing technology (e.g., Wells, Citi, Bank of America Merchant Services)

2. Global eCommerce (and omnichannel) acquiring platforms
Stripe additional service offerings “beyond payments”

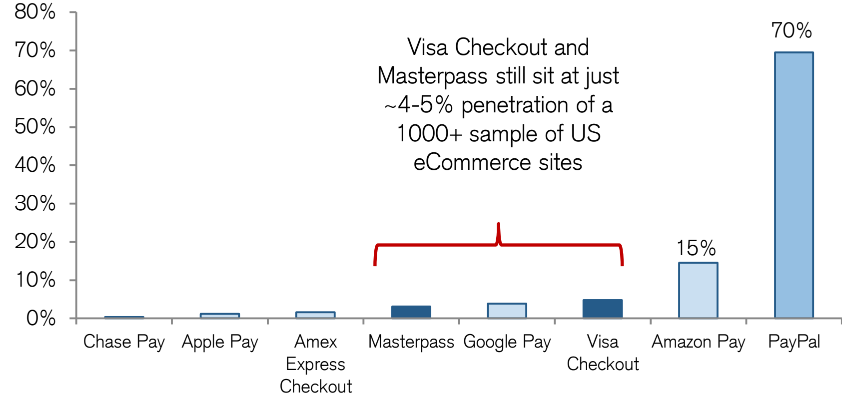
Stripe additional service	Description	Pricing
Billing	Offering for subscription and/or recurring billing businesses, including ability to customize pricing (e.g., usage-based, tiered, billing frequency, one-time charges, etc.).	0.40%
Connect and Connect Payouts	For marketplaces and platforms, enabling account setup (i.e., onboarding, 1099 reporting, KYC), including Stripe Instant Payout to a debit card (Visa Direct) and standard ACH transfers.	0.25% or $2 per account + $0.25 per ACH payout; Instant Payout 1.5%
Radar	Machine-learning enabled fraud, with the ability to adapt to changing fraud patterns. Allows fraud teams to take action quickly once fraud patterns emerge. Chargeback Protection, insurance against chargeback disputes (i.e., pay a fixed 40bps in exchange for ability to redirect focus back on the business). No evidence submission is required, Stripe effectively takes on the risk.	$0.04 per transaction; included for those paying standard pricing; 0.40% for Chargeback protection
Sigma	Reporting and data analytics (standard and custom SQL queries) for business operations/intelligence, accounting, finance, and product management teams.	$0.014 - $0.02 per charge + $10-$100 monthly infrastructure fee
Atlas	Outsourced offering for business start-up and formation, ranging from corporation filing (Delaware), IP documentation, stock issuance for founders, tax ID (EIN), bank account opening, Stripe accounts, etc.	$500 one-time fee, along with ongoing costs for Delaware filings, tax prep, etc.
Issuing	Card issuance platform for both physical and virtual cards. Use cases include employee expense cards, virtual cards for couriers to pay via mobile, etc. Can also support the entire card stack for digital banks. Includes features such as dynamic spending limits, merchant category controls, per-user bookkeeping, and other controls. Both Visa and Mastercard cards are able to be built.	Stripe will earn a revenue share on interchange earned on card usage, along with potential program management fees
Premium Support	While all Stripe accounts get 24/7 phone, email, and chat support, this is a white glove, dedicated support offering with a named individual person as account manager (i.e., prioritized responses).	Starts at $1,000 per month
Terminal	Unified experience for online and offline sales, and provides a seamless customer experience across channels. Ability to build custom POS software, all linked to EMV compliant card readers (hardware).	2.7% + 0.05 for in-store payments; Hardware options $59 and $299
Works with Stripe	Expands the service offerings and integration (stickiness) of Stripe's platform via a marketplace of third-party apps that integrate with Stripe (e.g., accounting, shipping, tax calculation, inventory management).	By third-party app
Corporate Card	Instant sign-up corporate expense card, no personal guarantee required. 2% cash back on top two spend categories, and 1% cash back on everything else, includes $50k in free payment processing. Implements custom spend controls (i.e. by merchant category) with real-time expensing. Integrated with Expensify and Quickbooks Online.	No fees (annual, foreign, late), no interest (must pay balance in full monthly)
Capital	Similar to Square capital - quick and easy onboarding for SMB loans. Repayment is not a term structured interest payment, but is deducted from daily sales of the merchant as a fixed %.	One-time flat fee, no interest, paid as a % of daily sales

Source: Company reports

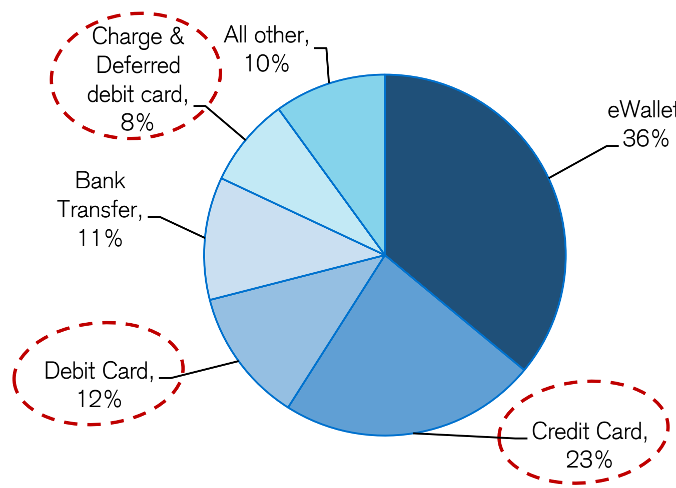
3. Secure Remote Commerce (SRC)
The network's unified payments button, an "easier sell"

- EMV SRC aims to create a "virtual payment terminal", mimicking the offline world where all payments methods come through the same terminal, along with a set of authentication and security standards
- While Visa Checkout and Masterpass gained limited traction, we believe the SRC button will be an "easier sell" (relative to separate buttons from V, MA, and AXP) to all parts of the traditional "four-party model"
  - Consumer - less cluttered checkout
  - Bank card issuers - increased eCommerce volumes
  - Merchants - increased online conversion, a single integration vs. multiple, and potentially reduced acceptance costs
  - Merchant Acquirers - potentially increased volumes (and possibly fewer transactions siphoned off to PayPal, Amazon Pay, etc.) and likely higher conversion over time (closing gap vs. wallet oriented alternatives)
  - Networks – carve out a role alongside wallets (that have longer-term disintermediation risk associated with them)
- Risk to PayPal (and Amazon Pay), although we believe the most readily addressable audience for an SRC button is consumers currently manually entering cards (43% globally, 66% in the US) vs. PayPal's ~300mm active users (and ~23mm accepting merchants) and network effects
- Rollout schedule: Began with a few merchants in October 2019, more slated for Q1 2020 following the holiday season

Visa Checkout & Masterpass failed to gain meaningful traction, although we suspect SRC will be an "easier sell"



~43% of Global eCommerce (and ~66% in the US) is done via card (most readily addressable portion for the SRC button)

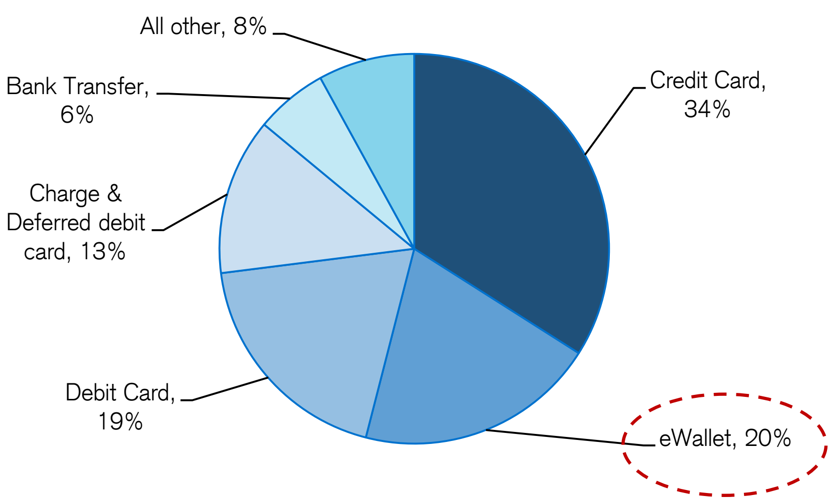


4. Checkout buttons & digital wallets

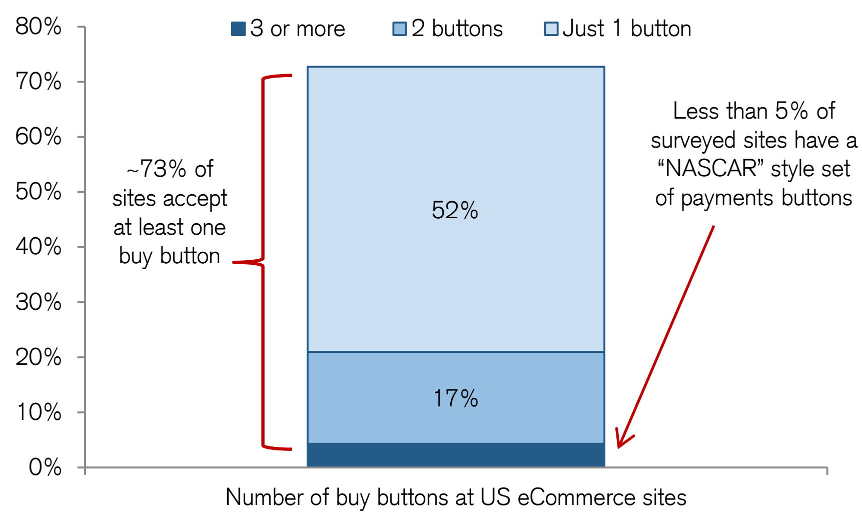
eWallets ~20% of North American eCommerce; 33% by 2020

- Approximately ~20% of North American eCommerce occurs via checkout buttons, as of 2018; Worldpay expects this to reach 33% by 2020.
- Close to 3/4ths of US eCommerce sites have at least one checkout button; this has been relatively stable since 2017.
- The basic value proposition is increased conversion (via reduced manual entry) and security & trust (card numbers not passed to the merchant).

eWallets make up ~20% of North American eCommerce payments, per Worldpay



Close to 3/4ths of US eCommerce sites have at least one checkout button; this has been relatively stable since 2017



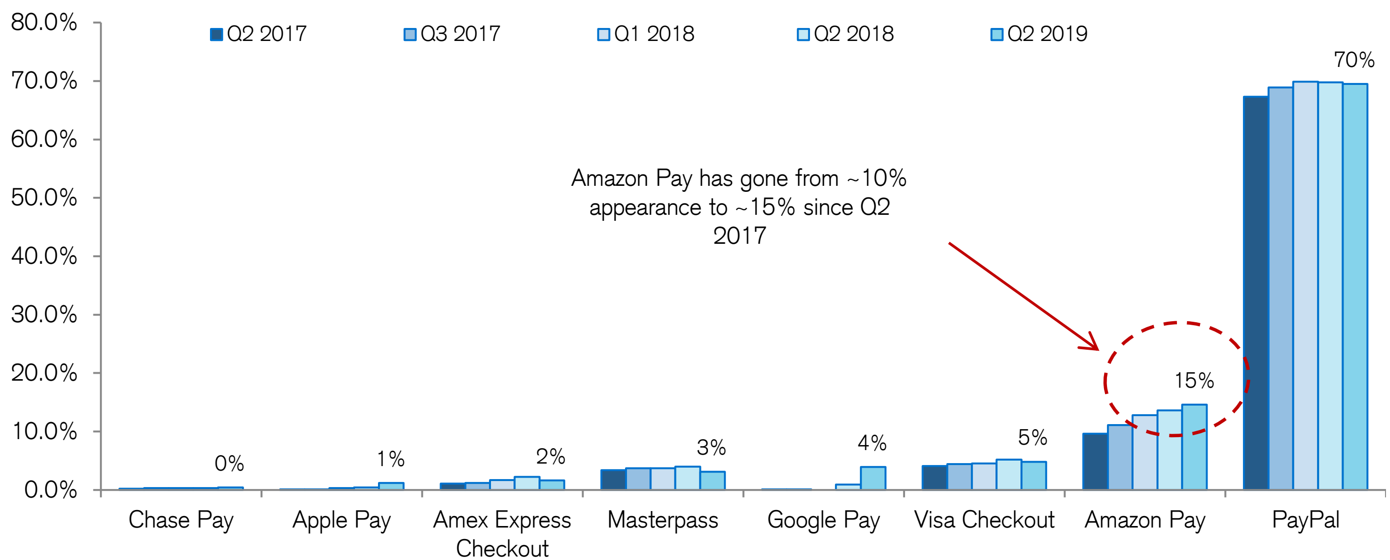
Source: Worldpay, PYMNTS.com, Credit Suisse estimates

4. Checkout buttons & digital wallets

PayPal the leader, Amazon gaining, and a new kid on the block

- PayPal remains the dominant option for merchants, appearing on ~70% of a surveyed group of US eCommerce sites (n = 1000+).
  - Amazon Pay is now appearing at ~15% of these sites, an increase of ~50% since Q2 2017.
  - Google Pay appears on ~4% of these sites, showing a meaningful uptick following its re-brand and consolidation.
- A new checkout button has emerged (October 2019 launch) in the form of the network-supported EMV SRC button, which takes the place of Visa Checkout, Masterpass, and Amex Express Checkout. We expect an "easier sell" to merchants and acceptance rates that far surpass predecessor offerings.

PayPal (~70% appearance rate) has a ~4-5x lead over its nearest competitor, which is Amazon Pay (~15% appearance rate)



4. Checkout buttons & digital wallets

Overview of the major US wallets and business models

Product	PayPal	Amazon Pay	Google Pay	Apple Pay	EMV SRC
Pricing	2.9% + $0.30 for online (US)	2.9% + $0.30 for online (US)	No fees charged by Google (online payments are considered card-not-present transaction, and card-present when done in-store)	No fees to merchants (merchants pay their standard card acceptance fees through their acquirer or PSP); Apple share in a portion of the bank issuer's interchange, ~15bps	No fees to merchants (merchants pay their standard card acceptance fees through their acquirer or PSP)
eCommerce acceptance (US)	70%	15%	4%	1.2%	October 2019 rollout, broader adoption in Q1 2020 post-holiday
Contracting required?	Must be contracted with PayPal, offering "rack rate" pricing and negotiated deals for larger merchants	Must be contracted with Amazon, offering "rack rate" pricing and negotiated deals for larger merchants	Pass-through mechanism only, no contract (integration and development work only), i.e., paying with a Google-stored card credential	Pass-through mechanism only, no contract (integration and development work only)	Pass-through mechanism only, no contract (integration and development work only); Replaces (and consolidates) Visa Checkout, Masterpass, and Amex Express Checkout
User and/or transaction statistics	~300mm active users	~33mm last reported February 2017, but ~100mm Prime subscribers & ~350mm customers, this user number is understated	Hundreds of millions of card credentials compiled by Google (although that does not equate to usage of the Google Pay button)	~275-325mm users ~12b transactions in 2019, growing ~100%+ YoY (although these statistics are largely offline in-store)	Live October 2019 at select merchants, with further expansion planned for 2020
Additional comments	• Venmo ~40mm users, monetizes same as PayPal • MercadoPago agreement expands utility (~230mm LatAm users enabled to transact at PayPal merchants)	• Amazon customers become Amazon Pay users simply by using their Amazon credentials on a third-party site (i.e., no separate registration process)	• All payments products consolidated and re-branded as "Google Pay" in early 2018 (prior offerings included Google Wallet, Google Checkout, Android Pay, etc.) • PayPal is a partner and funding option on Google Pay	• Online transactions limited to Safari browser, iPhone, iPad, or Mac devic4.9k card issuers supporting • Launched in September 2014	• We expect the merchant acquirers to be supportive (increased conversion, and also the potential to gain a small portion of PayPal "button" volumes, supportive of growth) • SRC users will still need to go through their issuers for chargebacks & disputes (similar to most other wallets)

Source: Company websites, PYMNTS.com, Glenbrook Partners, EMVCo, Credit Suisse

5. Increasing complexity in global eComm/Omnichannel

Favors tech-forward acquirers with global omnichannel scale

- Increasing complexity in global eCommerce payments favors acquirers that can address all of a merchant's payments needs across geographies and channels, driving a trend toward consolidating providers from ~10-15+ down to 3-5 more globally capable, omnichannel providers.
- Some of the largest and fastest growing areas of eCommerce have the most complicated needs (global/local payments acceptance methods, payout capabilities, and seller identification for onboarding process, etc.).
- Competition in merchant acquiring is making additional services essential (software, capital, installments, etc.).

Global reach and expanding local payments methods (LPMs)

Trend toward consolidating acquirer relationships from 10-15+ to 3-5, favoring acquirers with global capabilities

Accept the primary payment types in each country, which can vary significantly, with many payment methods country-specific (domestic schemes, eWallets, bank transfers, etc.)

Aim toward processing as many payments in-country (local acquiring capabilities), reducing interchange fees (for those on interchange ++) and increasing authorization rates

Omnichannel needs

Merchants need to deliver a seamless commerce experience across channels: in-store, in-app, and online

Value-added services

Integrated payments, business management software, inventory, payroll, card issuance, instant transfer

Financing solutions such as working capital loans (and/or cash advance programs) and ability to offer consumer installments to consumers at the POS

Customer engagement (CRM tools), marketing program management

Increasing compliance burdens

Country-specific regulations put a heavy compliance burden on merchants and their acquiring partners

Know Your Customer (KYC), PCI compliance, PSD2 and SCA requirements, Anti-money laundering (AML), OFAC sanctions are a few examples that require continued investment and effort

5. Increasing complexity in global eComm/Omnichannel

Complexity associated with 400+ LPMs globally

- While cross-border eCommerce is gaining share within the broader eCommerce market (~2x growth rates, expected to reach ~20% of B2C eCommerce by 2022), consumer payments habits remain locally and culturally specific.
- Country-specific acquiring license requirements make it burdensome and time consuming for merchant acquirers to add new countries.
  - In markets where an acquirer does not have a directly owned license, an alternative is to rent a license from an acquiring bank (i.e., "bin sponsor").
  - Generally speaking, this works just the same as owning a license, and often comes down to a decision around the level of volumes expected vs. the required investment to achieve a license.
- Consumer payment preferences by country make it difficult for local, sub-scale acquirers to compete in global eCommerce with 400+ local payment methods.
  - Checkout friction goes up when consumers are unable to pay with their preferred method, increasing their importance to merchants.
  - Adding local payment methods requires local integrations, which can take months, favoring scaled players.
  - For balance, beyond the first ~50-75 local payment methods, the volumes begin to become less incremental on a global basis (although it can still be important in specific, local markets).
- Global merchants use multiple acquirers to meet these needs, but each acquirer adds complexity to operations, favoring acquirers with global omnichannel capabilities.

Platform	Methods	Countries	Currencies
Worldpay	300+	146	126
Adyen	250+	200+	150+
PayPal (Braintree)	25 (we expect more via PPRO)	45+	130+
Stripe	25 by end 2019, 50+ planned	95+	Not disclosed
Global Payments	140	33 in-store domestic (60 inc. eComm)	135+

Worldpay estimates that local payment methods were 56% of 2017 global eCommerce, increasing to ~70% by 2022

Bank Transfers
Fast and safe
Allows your customers to pay for your goods or services by transferring money from their bank account. Examples: IDEAL, Sofort Classic

Mobile
Real-time payments
Your customers can send money using a mobile number. Example: Unified Payments Interface (UPI)

Direct Debits
Recurring transactions
Let's your customers pay you an agreed amount, on an agreed date.
Example: SEPA DD

eWallets
Easy to use
Your customers fund their eWallet to pay for online purchases.
Examples: WeChat Pay, Alipay

Local Card Schemes
Go local
Local cards work in the same way as traditional cards, in specific domestic markets. Examples: Bancontact, UnionPay

Pre-Pay
Safe and secure
Lets your customers buy a prepaid card or voucher to pay for goods or services online. Examples: NeoSurf, Paysafecard

Post-Pay
Convenient
Allows your customers to shop online and complete their payment at an affiliated outlet, store or ATM. Examples: Konbini, Multibanco

Invoices
Buy now, pay later
Your customers can buy goods or services and pay at a later date.
Example: Klarna

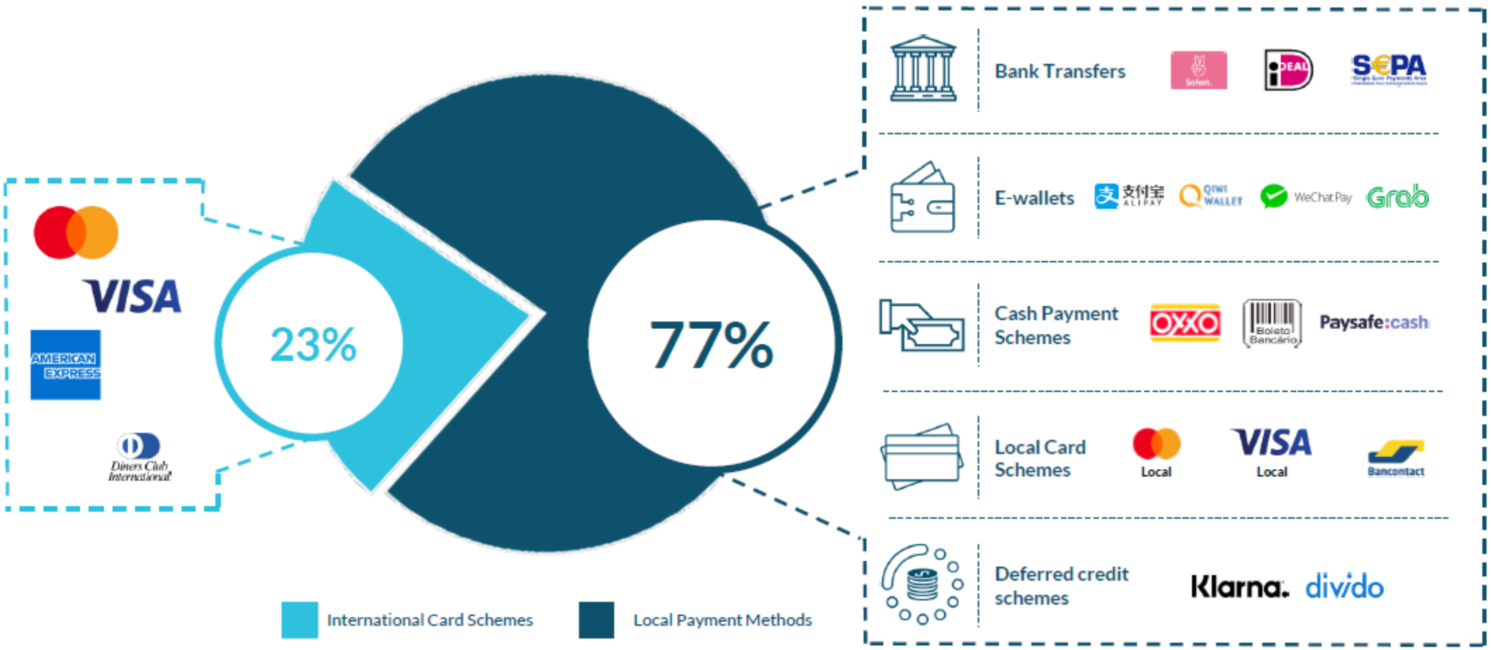
Source: Company websites, Worldpay, Forrester, PPRO, Credit Suisse research

5. Increasing complexity in global eComm/Omnichannel

PPRO offering solutions to help alleviate this complexity

- PPRO estimates that there are ~400 LPMs globally (e.g., eWallets, bank transfers, cash-based, deferred credit), up from just ~300 in 2017.
- PPRO works with 7 of the top 10 merchant acquirers to provide a single API integration, on one contract, to 150+ LPMs while also providing additional services (e.g., ongoing compliance, pricing negotiations, unified reporting, refund services, etc.).

PPRO estimates that only ~1/4th of global eCommerce is done on international card networks (although we note that localized versions of Visa and Mastercard are excluded from this figure)



Source: PPRO, Credit Suisse research

Note: PPRO data separates local V/MA cards when they are not enabled for usage outside of the countries (e.g., mainly LatAm) and the transactions are not going through the global Visa and Mastercard rails, and thus are not counted into the international credit card split

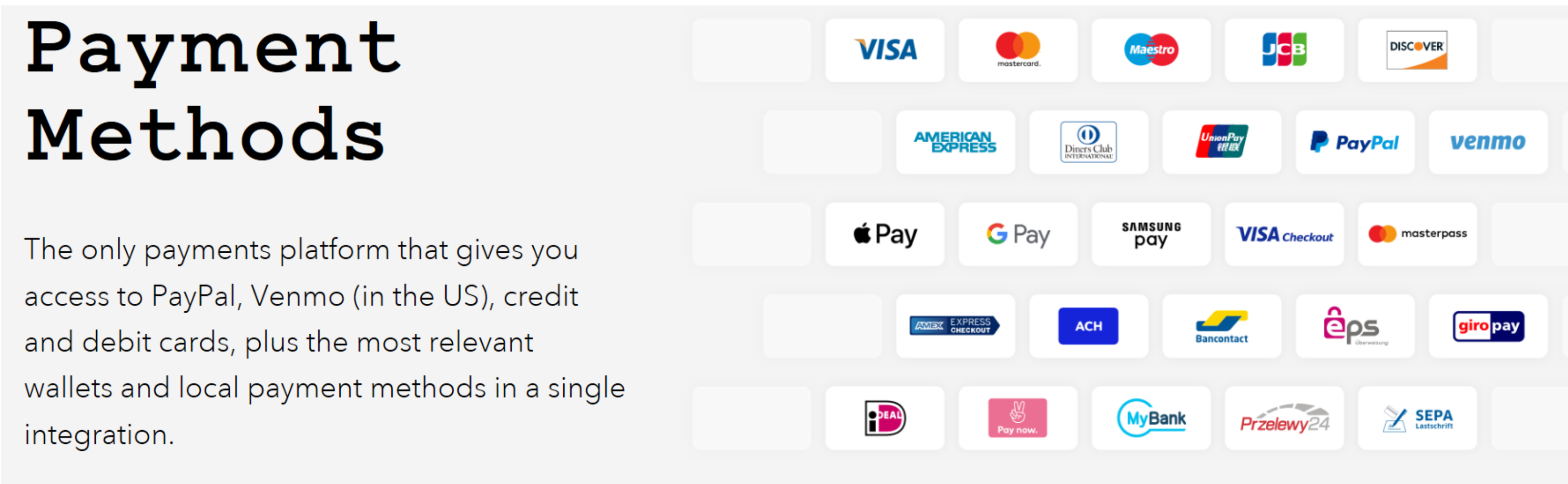
5. Increasing complexity in global eComm/Omnichannel

PayPal's Braintree beginning to expand globally

- We expect Braintree to expand more globally in part due to its partnership with PPRO (we note that PayPal led a $50mm investment in PPRO in July 2018), alongside a recently expanded acceptance list (now at 25 payment methods), and an appreciation for the importance of cross-border eCommerce inherent within PayPal.

- "Braintree is available for merchants in the United States, Canada, Australia, Europe, Singapore, Hong Kong SAR China, Malaysia, and New Zealand. In legal terms, you have to be domiciled in a supported country/region. We are working hard to bring Braintree to other countries/regions." – Braintree website

Braintree currently supports 25 payment methods, including credit & debit cards, digital wallets, and select local payment methods, although we expect this number to continue to expand over the coming years



5. Increasing complexity in global eComm/Omnichannel

Expect continued share gains for globally leading platforms

- We expect larger merchants to increasingly consolidate their payments relationships around fewer (~3-5) scaled platforms
- Share gainers will provide global acceptance across hundreds of local payments methods (card & non-card) both in-store and online
- Provide local acquiring and consumer experiences, leading to higher authorization rates, increased conversion, and reduced costs (interchange, network fees, and fraud)
- Parallel to Visa & Mastercard vs. local schemes – hard for the domestic schemes to keep up with required technology investment/innovation (e.g., share loss by European domestic schemes)

Payments platforms with an ability to provide global eComm/omnichannel payments processing along with an ability to invest/innovate will continue to demonstrate growth above industry levels, particularly as cross-border eCommerce increases in importance

"…Point blank, it's share gains. If you look at our consistent growth…Just look in any metric…Visa, MasterCard numbers in the UK.- if you look at GDP in the UK, if you look at SSS growth in the UK, those numbers tend to be 0% or 1% or whatever the number is on a given day…it's another high-single-digit quarter growth for us (GPN). So there's no doubt in my mind, it's share gains. I would say that's augmented by our focus on the small to midsized business and leading with technology. UK, in particular, is a big place for us to have our eComm and omni business…"

\- Jeff Sloan, CEO, Global Payments (October 2018)

"…It's not unusual for a large global retailer to be managing 30 to 60 and sometimes 100-plus contracts and partners…It is not unusual for a large international company to be eliminating potentially dozens of different partners and integrate one implementation across all of those regions with one set of contracts and one solution…"

\- Brian Dammeir, Head of Product, Adyen (April 2019)

"…And our competitors span the gamut -- actually, globally, outside the U.S., primarily Adyen, but who we're taking share from when we win there [are] a lot of local acquirers [we are taking share from]…around share of wallet versus market share…in eCommerce, people use multiple acquirers. They just do. No one's going to go down to one single acquirer, which is how we are here in the US typically. They'll use multiple acquirers. They've grown up with multiple acquirers. Typically, they'll use anywhere from 4 to 8. A lot of them…are historical in terms of using local acquirers to enter certain countries…"

\- Stephanie Ferris, CFO, Worldpay (now FIS) (November 2018)

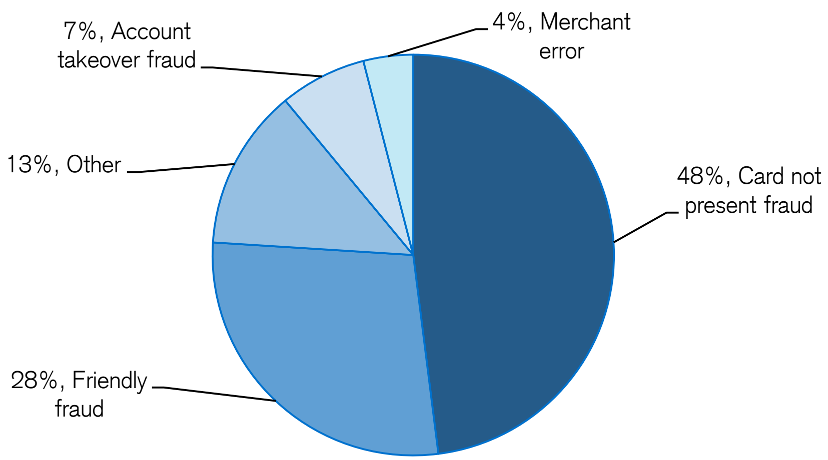
Source: Company reports, AlphaSense, Credit Suisse research

6. Fraud & chargebacks on card-based transactions

Overview of the chargeback & dispute process

- This process is part of the consumer protection provided by the card network rules (i.e., part of zero-liability consumer protection policy for unauthorized transactions dictated by both Visa and Mastercard network rules for participating issuers, acquirers, and merchants).
- Chargebacks are a forced transaction reversal initiated by the cardholder's bank when a customer disputes a transaction (i.e., this construct is often viewed as a positive for consumers, although a big negative for merchants). Verifi estimates every $1 in disputed transactions costs merchants $1.50.
- Chargebacks are an increasing burden on merchants driven by the rise of CNP fraud and the time-consuming dispute resolution process; both in terms of time and costs, dispute process can be highly manual, involving documentation, and take ~60-90 days.
- "Friendly fraud" is when a consumer makes an eCommerce purchase and then contacts the card issuer to dispute the transaction (e.g., reports item not delivered, item does not match description, claims to have cancelled the order, claims to not remember, etc.).

The largest source of chargebacks in the US is card-not-present (CNP) fraud, followed by "friendly fraud"



Typical chargeback & dispute process, which can take ~60-90 days to complete

1	Someone makes a purchase using a Visa or Mastercard
2	Cardholder initiates the chargeback by contacting their issuing bank (e.g., Bank of America, Wells Fargo, Citi, Chase, PNC)
3	Issuing bank reaches out to the merchant's bank asking for evidence to refute the claim (perhaps the merchant provides an invoice, receipt, proof of delivery of some sort, etc.)
4	Issuing bank makes a decision as to whether or not they believe the transaction was a valid one
5	Customer is informed of the decision – he/she can either accept the "proof" provided by the merchant or escalate to arbitration
6	As a last resort (issuing bank and merchant's bank are not able to agree), Visa and/or Mastercard govern an arbitration process

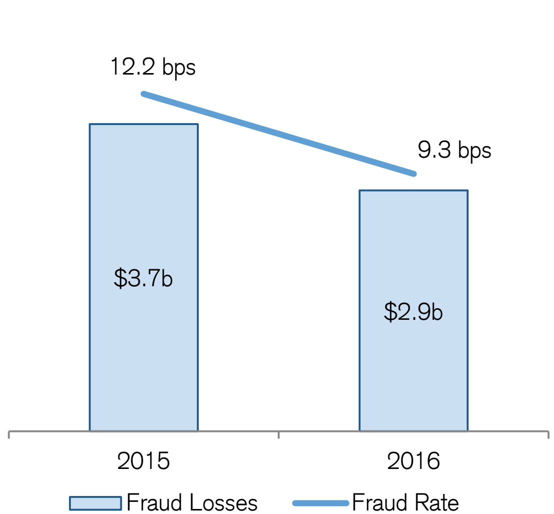
Source: Javelin Strategy & Research, Chargebacks911, Verifi, Square, Credit Suisse research

6. Fraud & chargebacks on card-based transactions

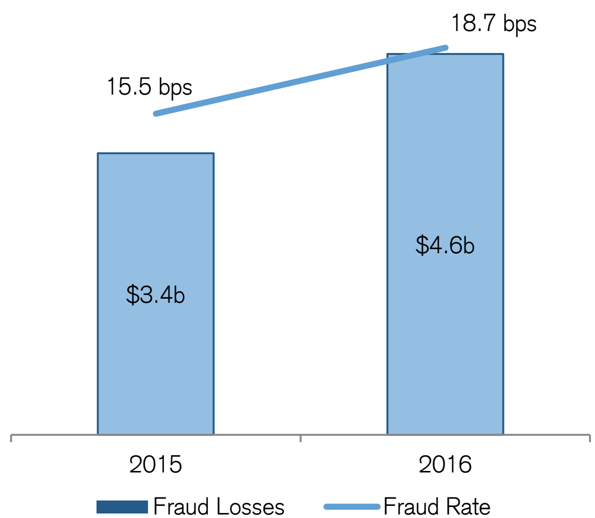
Card fraud migrating from in-store to online – Key drivers

- Migration to EMV – the migration away from magstripe “swipe” cards to chip-and-pin effectively reduced in-store counterfeit card fraud, causing criminals to shift their focus to online or card-not-present (CNP) fraud
  - 2015 EMV Liability shift in the US – Merchants that have not adopted EMV chip terminals became liable for counterfeit fraud done via EMV cards
- Data breaches – Fraudsters have access to card data, login credentials, and personal information from numerous data breaches
- eCommerce growth – High secular growth of eCommerce relative to in-store payments amplifies CNP fraud losses

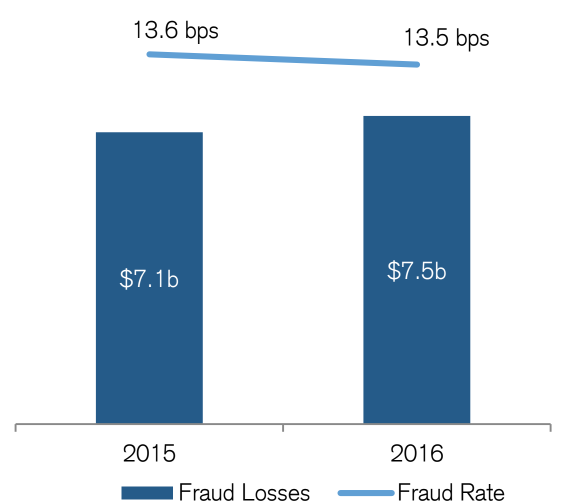
US in-store fraud losses and rates came down after EMV migration…



….while US card-not-present (CNP) fraud losses and rates increased…



…while total US market fraud losses and rates remained about the same



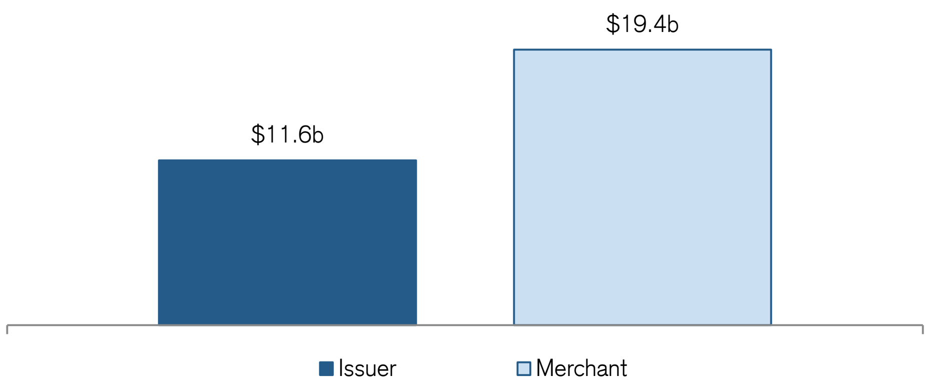
Source: Federal Reserve Bank of Atlanta, Aite Group, Credit Suisse research

6. Fraud & chargebacks on card-based transactions

Who pays for what?

- In-store transactions – Card issuers are liable for card fraud if the merchant is utilizing an EMV-enabled card reader and follows network rules in acceptance.
- Online or CNP transactions - Merchant is liable for fraud (unless the merchant is utilizing a 3D Secure authentication solution, which can shift the liability back to the issuer).
- Both Visa and Mastercard have made recent acquisitions to support chargeback-related capabilities (Visa acquisition of Verifi in June 2019, and Mastercard acquired Ethoca [March 2019]).
- In addition to costs (the actual chargebacks and fees from acquirers to support the process ranging from $10-25), merchants often have to dedicate time in responding to the dispute as well. Square does not charge merchants for chargeback disputes, while Stripe offers an insurance product (Stripe Chargeback Protection, at a cost of ~40bps) to cover all potential losses.

Of an estimated $31b of chargeback costs in 2017, roughly two-thirds of that cost burden was ultimately borne by merchants



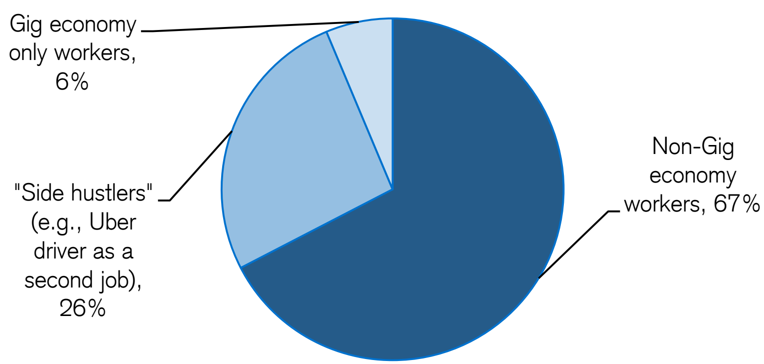
Source: Javelin Strategy & Research, Chargebacks911, Square, Credit Suisse estimates

7. Payout capabilities coming into focus

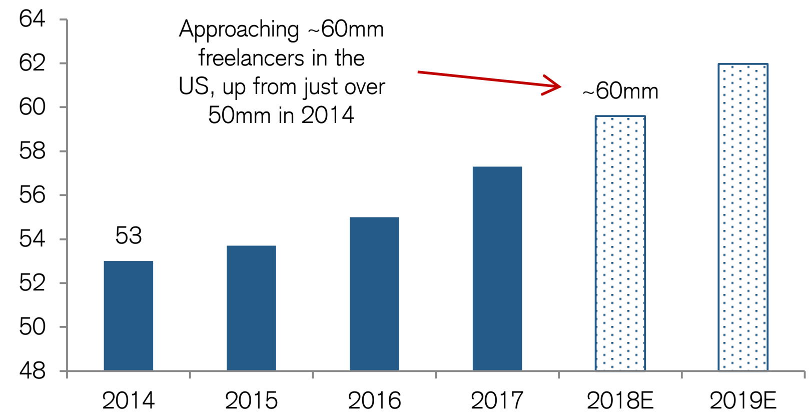
Freelancer ("Gig") economy & marketplaces growth…

- "Payouts" are funds disbursed by eCommerce marketplaces and on-demand platforms to sellers and freelancers, often leveraging local payments rails (ACH or an ACH/faster payments alternative), along with network capabilities (Visa Direct, Mastercard Send) and card issuance (attaching a card to seller account).
- The growth of the "Gig" economy (~$1.4tr in US earnings) along with the proliferation of eCommerce Marketplaces (roughly half of online sales) is increasing the importance of payout capabilities.
- Platforms provide value to consumers via increased selection of suppliers (sellers & freelancers) – two-sided network.
- Part of attracting suppliers is meeting their liquidity needs via instant payouts (e.g., Etsy seller use in purchasing supplies, TaskRabbit "Tasker", and/or Uber driver purchasing groceries later that day).

~35% of US workers are participating in the "Gig" economy



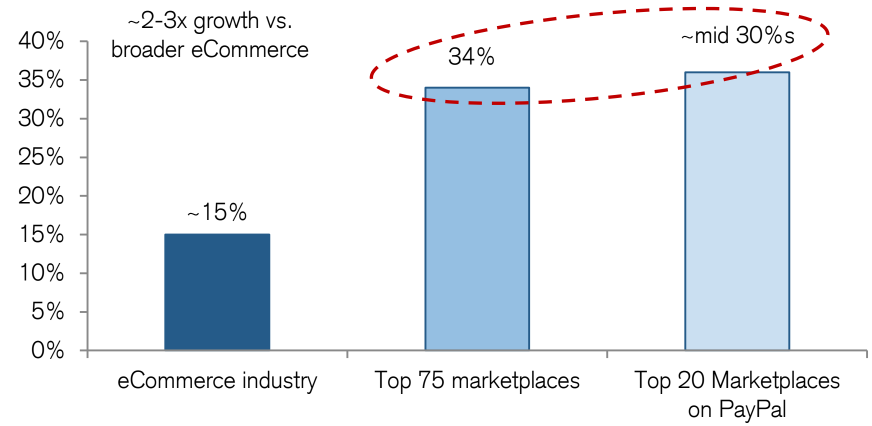
Approaching 60mm freelancers (vs. US workforce of ~160mm)



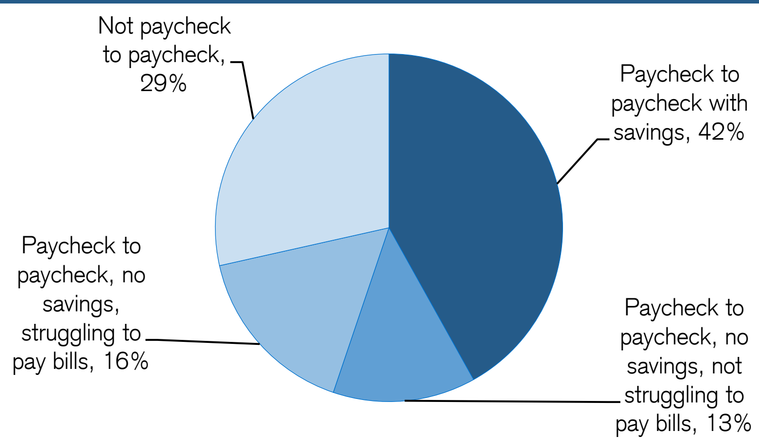
7. Payout capabilities coming into focus
…driving an increasing need for platforms to pay out fast

- Approximately 70% of Gig economy workers live paycheck to paycheck and place a high value on timeliness of payment, which creates both challenges and opportunities for platforms and payments providers.
- On-demand platforms & marketplaces that can deliver early (pay advance) or timely (instant, same-day) payments are likely to gain share vs. those with a more offline or off-platform payout experience.
- Liquidity needs create an opportunity for payments providers to meet this demand and earn fees either via instant transfer or the issuance of prepaid debit cards.
- Gig economy workers are more likely to be "underbanked", representing a financial services cross-sell opportunity.

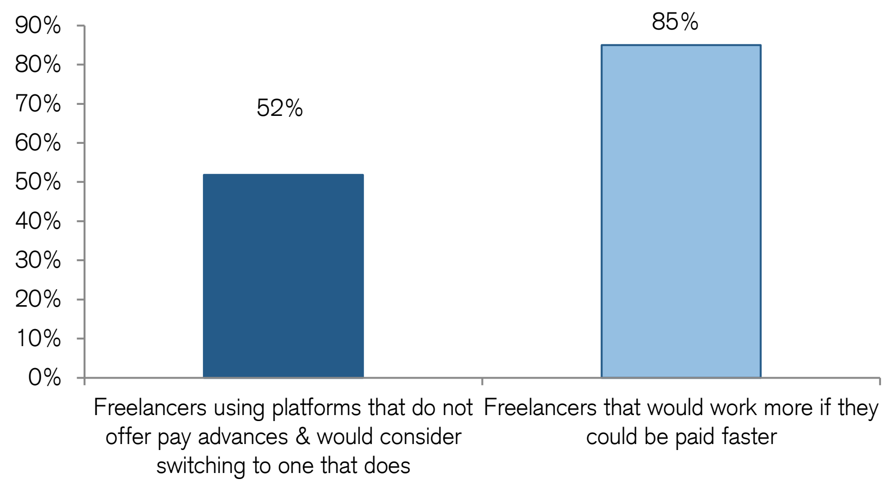
Marketplaces growth outpacing broader eCommerce growth



~70% of Gig economy workers (freelancers) live paycheck to paycheck and place high value on timelines of payment



Freelancers value timeliness of payments and would consider swapping platform or working more/less because of it

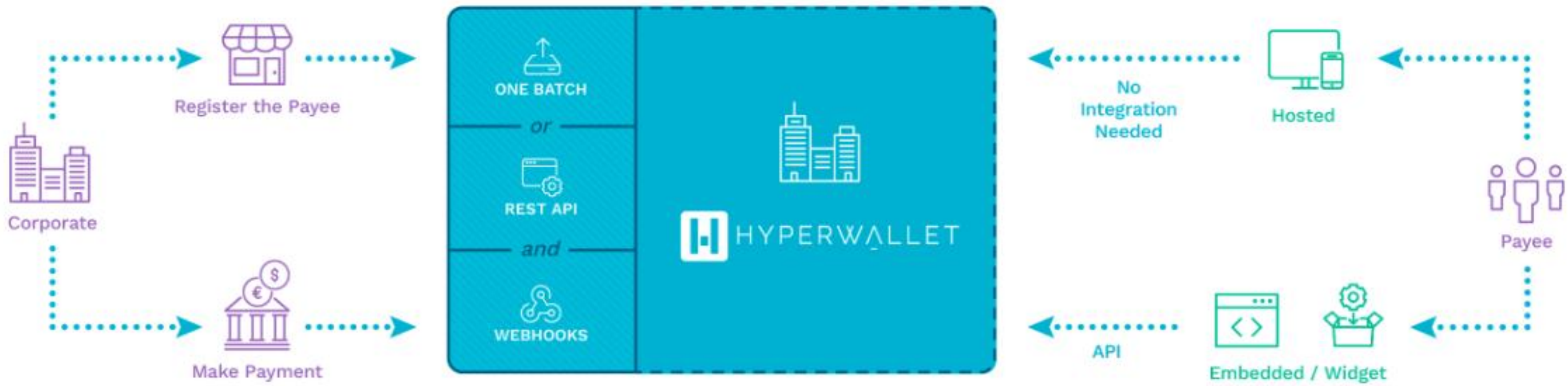


Source: Hyperwallet/PYMNTS.com Gig Economy Index, Edelman Intelligence, PayPal, Credit Suisse estimates

7. Payout capabilities coming into focus
Examples of efforts by various payments providers

- Payments providers focused on serving on-demand platforms and marketplaces have developed payout capabilities (e.g., Stripe Connect, Adyen MarketPay, BlueSnap by First Data, WePay by Chase, etc.).
- PayPal acquired Hyperwallet for $400mm in November 2018 to bolster its payout capabilities, citing the fact that merchants and service providers using on-demand platforms and marketplaces desire fast and flexible access to their earnings.
- In addition to instant transfer to debit cards (Visa Direct enabled and with ~1% fees), PayPal launched two additional ways for small businesses, marketplace sellers, and freelancers to be paid faster. Rather than being fee-based, these offerings are available to only a subset of merchants in good standing.
- PayPal Funds Now, launched in September 2018, gives merchants access to funds they earned via sales or services within their PayPal account. PayPal Instant Transfer to Bank uses real-time payments rails via The Clearing House (followed the launch of Instant Transfer to Debit Card).

PayPal acquired Hyperwallet in November 2018 for ~$400mm to enhance its global payout capabilities to better serve merchants/platforms; Hyperwallet easily integrates its global payout technology into merchant/platform's existing infrastructure via APIs



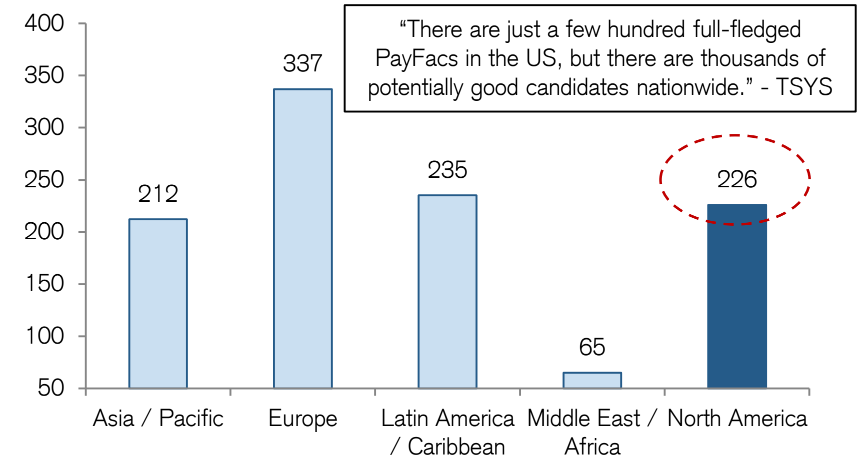
Source: Company reports, Credit Suisse estimates

8. PayFacs and the rise of the "aggregator" model

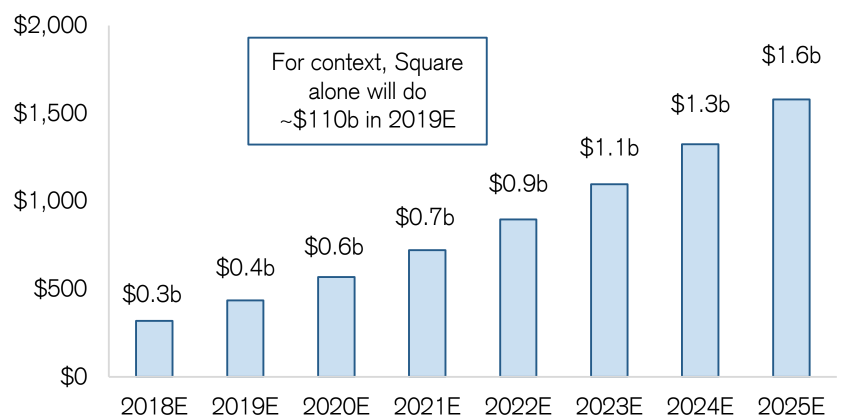
Expanding the addressable market of payments acceptance

- The original Payment Facilitator was PayPal; Square and Stripe also operate under the PayFac model; the term "PayFac" is a registered trademark owned by Worldpay
- PayFacs (notably Square) have been vital in expanding card acceptance to micro and SMB merchants over the past decade
  - Traditional acquiring bank onboarding processes have historically been more suited for larger merchants and were often lengthy and complex; approval processes could range from a week to months
  - Customer acquisition costs were also a hindrance to attracting micro & SMB merchants; the PayFac model's streamlined onboarding processes, enabling "self-serve" and digital onboard processes, as it's less profitable for direct salesforces to individually prospect SMBs
- Companies becoming PayFacs generally can be grouped into three buckets:
  1. Core commerce platforms/payments companies (e.g., Square, Stripe, PayPal, BlueSnap, PagSeguro, SumUp), although even within this group, both PayFac and non-PayFac models can be employed (e.g., Stripe can serve as both PayFac and ISO)
  2. Integrated Software Vendors (ISVs) with vertical-specific SaaS offerings (e.g., software to help manage a restaurant or fitness center), which have a payments aspect to their software and/or workflow (e.g., Toast, Mindbody, Lightspeed)
  3. Marketplaces and related technology platforms that "take payments in-house" (e.g., Etsy, Shopify, Wix, Yapstone)

226 PayFacs are registered with Mastercard in North America



Payment volumes attached to PayFac sub-merchant portfolios are expected to reach $700b by 2021E (ex-PayPal, Square, Stripe)



Source: Mastercard, Double Diamond Group, Infinicept, Stripe, Credit Suisse research, AZ Payments

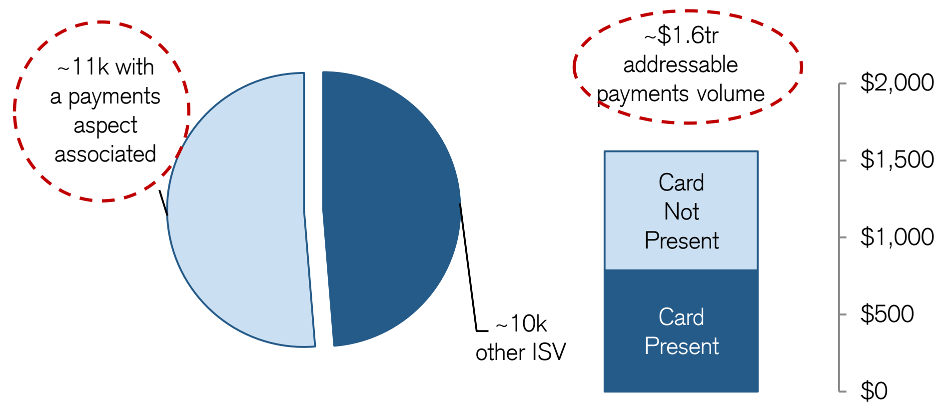
8. PayFacs and the rise of the "aggregator" model

Advantages exist for ISVs & platforms that become PayFacs…

The advantages of becoming a PayFac largely revolve around (1) maximizing revenue generation, (2) faster onboarding of sub-merchants, and (3) increased control & ownership of experience

1. Building a more meaningful revenue stream
   - Ownership of the payments experience, as a PayFac maximizes the revenue the ISV or platform earns on each transaction (i.e., ability to maintain all payments net revenue)
   - Must be evaluated vs. revenue share opportunities via a traditional integration payments relationship with a merchant acquirer (e.g., integration and revenue share with a traditional merchant acquirer, which takes on the payments risk and responsibilities, but pays a "lead gen" fee to the ISV in exchange for sourcing the volume)
2. Faster onboarding of sub-merchant
   - Sub-merchants avoid lengthy application processes required to receive merchant accounts via traditional acquiring bank onboarding
3. Increased control of experience
   - Control pricing of payments to underlying sub-merchants
   - Single point of contact for customer service (software & payments); consolidation in the merchant acquiring space has led to reduced service levels for ISVs partnering with acquirers
   - Ability to improve processes for your merchants (e.g., chargeback handling, funding) given ownership of those processes
   - Portability of merchant contracts (in case change of acquirer)

There are ~20k SaaS platforms in the US, ~11k are ISVs with approximately ~$1.6tr in potentially addressable payments volume; larger ISVs are addressable as potential PayFacs



Advantages of becoming a PayFac for ISVs & tech platforms (vs. a traditional integrated payments relationship)	
Revenue generation	• Create a recurring revenue stream (combination of software + payments is powerful) • Must be weighed vs. revenue share opportunities via a traditional integrated payments relationship
Fast onboarding of sub-merchants	• Sub-merchants avoid lengthy application processes required to receive merchant accounts
Control of customer experience	• Consolidation in the merchant acquiring space has led to reduced service levels for ISVs partnering with acquirers; so, take control of that, bring in-house

Source: Infinicept, Credit Suisse estimates; Note: $1.6tr from 2015 analysis represents a gross opportunity for conversion to the Payment Facilitator model (i.e., portions of volumes that flow through ISVs but are actually owned/managed by ISOs and bank acquirers, along with traditional integrated payments, that could potentially migrate to the Payment Facilitator model

8. PayFacs and the rise of the "aggregator" model

…but must be weighed against the requirements and alternatives

Our view is that over the near to medium term, becoming a full-fledged Payment Facilitator will make sense for select scaled platforms & ISVs that operate in specific vertical markets (which limits the medium-term risk to traditional acquirers, but also provides meaning opportunities for enablers of this transition)…

- Requires hiring payments expertise (both technical aspect and business processes such as chargebacks, fraud, data privacy, PCI compliance)
- Meaningful payments volumes would be required to justify the upfront and ongoing costs of becoming a PayFac; Illustratively, if net revenue on payments volume was 75-100bps to the PayFac, it is not unreasonable to think that close to $50-75mm in volume would be required to cover ~$500k–1mm in ongoing costs
- ISVs and platforms in specific verticals and with a more domestic focus can more easily justify PayFac start-up costs (i.e., less complexity, reduced fraud, and increased homogeneity of sub-merchants) vs. a global marketplace that brings on vast sub-merchant types and cross-border complexities

…while remaining ISVs, marketplaces, and platforms are more likely to opt for alternative solutions (which generally means reduced revenue share and control, but also reduced responsibility and investment)

- Hybrid solutions, including the "Managed PayFac" alternative – options that allow for many of the advantages of being a PayFac, such as speedy onboarding, reduced support & compliance burdens, etc., although revenue generation can be reduced
- Traditional payments partnership – traditional integrated payments providers (e.g., OpenEdge, Worldpay, CardConnect); come with lower revenue shares (wide range of ~10-80%) but zero risk and reduced support & compliance responsibilities

What are the traditional steps, processes, and costs associated with becoming a full-fledged Payment Facilitator? (but platforms are emerging to meaningfully reduce the time and costs associated with the process below)

Hiring team to manage capability
Requires team of full-time employees to manage business, legal, and engineering processes, along with building a customer service function, etc.

Payments systems set-up (13-27 months, ~$650k – $1.1mm)
Acquiring processor (bank) sponsorship, potential gateway integrations, Level 1 PCI DSS certification, building initial merchant dashboard and payout systems; could require consultants/advisors

Merchant onboarding & compliance (11-38 months, ~$1.8mm)
Develop merchant underwriting and onboarding procedures (e.g., ID verification, risk scoring systems), along with compliance with various licenses and card network requirements, data retention & privacy, etc.

Ongoing management of capability (~$200k – $ millions per year)
Per account costs for onboarding & monitoring, risk monitoring, fraud prevention, chargeback process handling (i.e., responding with evidence submissions, reporting [1099s], annual compliance validation, etc.)

Additional costs to consider longer term
- International expansion (some of the above, but for a new market)
- Technical & procedural changes due to changing regulations (e.g., PSD2)

Platforms & consultancies such as **Payrix, Finix, Infinicept, Amaryllis, etc.** are beginning to emerge to help reduce the time & costs associated with transitioning from an ISV to a PayFac.

Source: Stripe, Agile Payments, Credit Suisse research

8. PayFacs and the rise of the "aggregator" model

Sample of a "Hybrid" alternative, Stripe Connect

Stripe Connect allows ISVs, marketplaces, and other platforms to "act like a PayFac, but not be a PayFac"

- Stripe Connect was built specifically for platforms and marketplaces
- Allows the Stripe client to stay outside the flow of funds but still offer the onboarding speed and elements of control/experience of full-fledge PayFacs
- Stripe Connect is API-first and allows the platform partner to:
  - Launch quickly with minimal upfront costs
  - Enable payments acceptance and payouts to sub-merchants
  - Still offer fast onboarding via fully customizable onboarding flows, with Stripe responsible for all KYC, AML, OFAC compliance, etc.
  - Scale globally without new market start-up costs (including not having to open bank accounts and legal entities in various regions)
  - Allows Stripe to handle all payment processing, acquiring processor relationships (i.e., Wells Fargo in the US for Stripe), support (24x7), compliance, further global expansion over time, tax reporting, etc.
- The platform (customer of Stripe) maintains the ability to determine pricing and fees charged to merchants (i.e., adding a margin on top of Stripe fees), allowing for a degree of monetization of the payments aspect of their business, in addition to the advantages outlined above
  - Revenue = fees charged to sub-merchants
  - Cost of revenue = fees from Stripe

Stripe Connect partners that have opted to use this alternative (examples by sub-segment)	
On-demand marketplaces	• Lyft • Instacart • Postmates • Thumbtack
eCommerce platforms	• Shopify • Squarespace • Wufoo • WooCommerce
Crowdfunding	• Kickstarter • Indiegogo • Zola • GoFundMe
Travel & Events	• Wetravel • Bookeo • Tripleseat • FareHarbor
Software platforms	• OpenTable • DocuSign • ChowNow • Salesforce

Source: Stripe, Credit Suisse research

8. PayFacs and the rise of the "aggregator" model
Difference between ISOs and PayFacs

Although often bucketed together in industry conversations, PayFacs are distinct from ISOs. Blurring this topic further, service providers often act as both (e.g., Stripe, Square, PayPal are all PayFacs and operate as ISOs for larger merchants).

- Independent Sales Organization (ISOs), like PayFacs, help to onboard SMBs into the payments ecosystem.
- Merchants that work with ISOs contract directly with the underlying acquiring bank and (historically) have gone through a more traditional onboarding process, which generally leads to PayFacs having meaningfully faster (i.e., minutes vs. weeks) onboarding processes.
- PayFacs generally have greater levels of control (i.e., funding and ownership of merchant relationships) but also assume greater risks.

Aspect of business	PayFacs	ISOs
Merchant of record?	• Merchants of record have their own master Merchant ID (MID) • Sub-merchants do not have their own MID (their payments are aggregated under the master MID)	• Varies by contract with underlying acquiring bank
Size of merchants/ sub-merchants	• Smaller, generally < $1mm in V and/or MA volumes (per network rules, although enforcement varies)	• Larger merchants that are not able to be onboarded via the PayFac model
Portability of merchants?	• Owns the sub-merchant relationship and can take sub-merchants to another acquiring bank sponsor	• Varies by contract with underlying acquiring bank (making the merchant relationship beholden to the sponsor bank)
Onboarding directly?	• Onboards sub-merchants directly • If sub-merchants exceed volume thresholds, they may be required to contract directly with the acquiring bank	• Onboarding done through the acquiring sponsor bank
Onboarding speed?	• Fast, can happen within minutes • Creates their own application process and underwriting criteria	• Time consuming, traditional merchant account application • Beholden to underlying acquiring bank process and criteria
Risk assumption?	• Takes on risk of chargebacks, fraud, failure to perform, etc. across its portfolio of sub-merchants • Ensures PCI, KYC, AML, OFAC, etc. compliance	• Wholesale ISOs take on risk • Retails ISOs do not take on risk (the risk is absorbed by the underlying wholesale ISO and/or acquiring bank)
Fund flows & payouts?	• Controls the flow of funds (and all associated reporting) • Handles payouts to sub-merchants	• Does not actually touch the money (acquiring bank controls, and handles payouts)

Source: PaymentFacilitator.com, Stripe, Credit Suisse research

8. PayFacs and the rise of the "aggregator" model

ISV or PayFac? It's not that simple…

ISV (with revenue share) — **In between exists a range of (often negotiable) options with varying degrees of control over experience, portability, revenue, costs, and risks** — **Full-fledged PayFac**

	ISV partners with integrated payments provider	**Emerging "Hybrid Approach"**	**"Managed Payment Facilitator"**	**Full-fledged PayFac**
Revenue	Typically ~20-80% of net revenue (ex-interchange, network fees, and other) but varies meaningfully by vertical and volumes	Revenue share can be lower in exchange for the instant onboarding, but negotiable (volumes matter)	Keeps full amount of net revenue but pays a portion (e.g., bps + cents per transaction) to partner and has a degree of ongoing costs	Keeps full amount of net revenue (ex-interchange, network fees, processing, and banks sponsor fees); also has ongoing operating costs (staff, compliance, etc.)
Onboarding & Experience	Standard onboard with a separate MID for each merchant; acquirer handles KYC, AML, etc.; less control over experience	Depends on vertical, but potential for instant onboard for majority of sub-merchants; acquirer handles KYC, AML, etc.; increased control over experience (but can still have limitations around onboarding process/design/capture)	Instant onboarding and near-complete control over experience	Instant onboard with full control over experience; single touchpoint for sub-merchant
Ongoing support	Payments co. handles; i.e., sub-merchant has two touchpoints (although GPN serves as 1st point of contact)	Stays with payments partner (acquirer); i.e., sub-merchant has two touchpoints	Software company takes on	Payment Facilitator takes on
Risk	Stays with payments partner (acquirer)	Stays with payments partner (acquirer), generally, but varies	Software company takes on (as the "equity" tranche), but could revert to the payments partner ultimately	Payment Facilitator takes on
Portability (merchants, tokens)	No	Generally no (but can be negotiated)	May have contractual portability, but not practical portability	Yes
One-liner (ISV's perspective)	Can be profitable (i.e., no payments-related costs or responsibilities) if revenue share negotiated well	Close to full benefits of being a PayFac (although generally lacks portability), with minimal effort/costs	Must share revenue with the partner, but still takes on risk & support, and lacks practical customer/token portability	Highest revenue, best onboarding & experience, but comes with cost base justifiable only by larger ISVs (~$50mm TPV)
Selection of sample partners	Global Payments (OpenEdge), Worldpay (Mercury), First Data (CardConnect, BluePay), Stripe Connect, Braintree, BlueSnap, Paysafe, Chase, and others	Clearent, First Data (CardConnect, BluePay), Stripe Connect, Adyen for Platforms, Braintree Marketplace, Chase, and others	WePay (owned by Chase), ProPay, Pivotal Payments, Paysafe, Payment Data Systems, Stripe Connect (custom), Payrix, and others	Requires acquiring bank sponsor; Numerous aspects (e.g., tokenization, vaulting, fraud detection, onboarding, chargebacks, risk mgmt.) can be outsourced (e.g., Finix Payments, Payrix, Infinicept, Amaryllis, etc.)

Less control & merchant contract portability ⟵⟶ **More control & merchant contract portability**

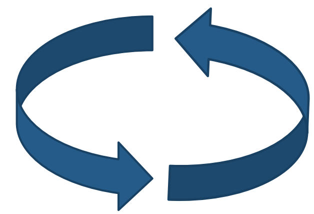
Source: Finix Payments, Infinicept, Credit Suisse research

9. Rationale for software-enabled payments

Convergence of software + payments attractive from both starting points

- Results in a highly recurring revenue stream, with reduced attrition, and the potential for higher margins (i.e., distribution leverage – "acquire the merchant once, sell the merchant many times", including additional ancillary products and services such as working capital loans, payroll processing, invoicing, cards, etc.)
- Makes sense for payments and software to work together given payments data are valuable for decision making and planning (customer preferences, inventory planning, cash flow management)
- Both payments and software companies are attempting to work with the same underlying merchants, which are often SMB and mid-market merchants (also an attractive area of payments, which higher net revenue yields vs. working with larger merchants)
- Payments companies can get exposure via owned software (e.g., Global Payments, Square) or partnered (integrating payments into ISVs, referral relationships)

Software & services platforms adding payments
Shopify
Lightspeed
MindBody
Coupa
TouchBistro
RealPage



Payments platforms adding software & services
Square
Global Payments
Clover (Fiserv/First Data)
Stripe
Shift4
iZettle

Example Platform	SaaS & other revenue ~%	Payments revenue ~%	Comment
Shopify	49%	51%	Vast majority of Merchant Solutions revenue (~60% of total) is Payments
Intuit	85%	15%	2017A result (last payments disclosure), as a % of Small Business & Self-employed revenue
MindBody	61%	39%	2017A result, prior to being acquired by Vista Equity Partners
RealPage	79%	22%	Payments resides in the "Resident Services" category, which was ~43% of revenue in 1H 2019 (we assume ~1/2 payments for illustrative purposes)

Source: Company reports, Infinicept, Credit Suisse estimates

9. Rationale for software-enabled payments

Software is one of the fastest growing swim lanes in payments

Channel/Type of Entity	Description	Increasing or decreasing in importance?	Growth	Sample payments providers employing model
Direct self-serve	In-house sales force, generally focused on larger, high-value merchants within their employer/merchant acquirer's target market	↑	~20%+	Global Payments, FIS (Worldpay), Repay, First Data
Direct sales force	Mainly focus on micro and SMB merchants, where it can be less economical to deploy live sales resources; Square is the best example of self-serve digital onboard (for the majority of Square sellers), while Clover (and others) is also employing this approach	↑	~Mid-high singles	Square, Fiserv (First Data/Clover), Adyen
Bank branch	Bank-owned acquiring (e.g., Chase, US Bank) or referral partner relationships (e.g., First Data JV with Wells Fargo), leveraging the business customer base of the bank, effectively cross-selling payments acceptance in addition to loans, business checking accounts, etc.	–	~Mid-singles	First Data (via JVs with Bank of America, Wells Fargo, Citi, and PNC), FIS (Worldpay), Global Payments (although mostly outside the US)
Independent Software Vendor (ISVs)	Vertical-specific SaaS offerings (e.g., software to help manage a restaurant, dental practice, fitness center, etc.) which have a payments aspect to their software and/or workflow; Range of options spanning ISV-payments partnerships with revenue share, owned-approach (payments company owns software), and PayFac approach (software company takes payments "in-house")	↑	~Mid-teens	Global Payments, FIS (Worldpay), Repay
Modern Independent Sales Organization (ISO) - wholesale	In the US, technically, the large acquirers (Global Payments, Worldpay, First Data, etc. all operate as ISOs). This category employs the other categories as distribution methods. Third-party payment processing companies authorized by one or more underlying acquiring banks to sell/service payments acceptance and merchant accounts for businesses. There are also "Super ISOs" that operate as partners of the larger ISOs. Also, when PayFacs work with larger merchants, they must operate under the ISO (wholesale) model - e.g., PayPal, Stripe, Square must do this when working with merchants that exceed certain volume thresholds set by Visa & Mastercard); modern platforms add layers of technology and services to their product and distribution; Category includes many of the payments platforms that are "an authorized ISO of" an underlying acquiring bank.	–	~Slightly above market rates	Majority of large payments platforms in the US (Global Payments, First Data, Worldpay, etc.) are technically ISOs in the US market
Traditional wholesale ISO	Traditional "feet on street" salesforce extensions; Wholesale ISOs take on the risk of merchant failure, and thus, are more well compensated than retail ISOs.		~Low-mid-singles	Numerous smaller organizations
Independent Sales Organization (ISO) - retail	Retail ISOs do not take on the risk of merchant failure, and thus, are less well compensated than wholesale ISOs.	↓	~Low-mid-singles	Numerous smaller organizations
Total			~7%	

Source: Credit Suisse research; Note: There is overlap above (i.e., a modern ISO will use many or all of these distribution methods, but included for definitional purposes

9. Rationale for software-enabled payments
Front-end differentiation extends to SMB too, not just consumers

Square

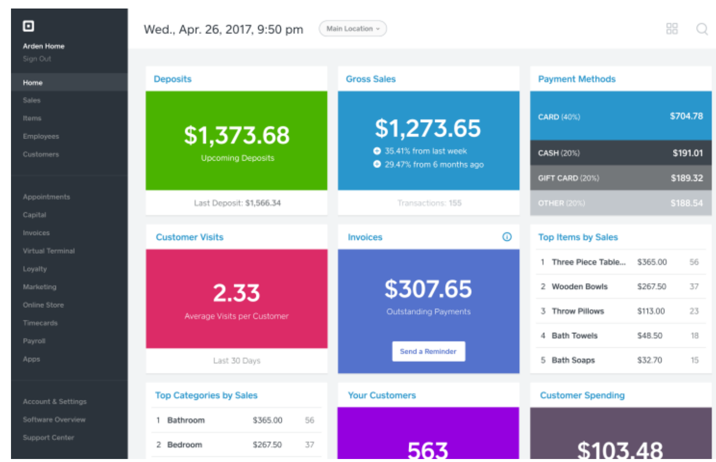
- 42% of revenue derived from software today vs. 18% in 2016
- Frictionless onboarding: merchants can sign up for Square in ~5 minutes vs. potentially weeks with banks/ISOs
  - ~+90% of Square's sellers self-onboard without any human intervention
- Cross-sell enabled by integrated software and self-serve nature of products
  - Facilities ease of use vs. integrating various
  - Square can proactively offer additional products (Square Capital Loans)
- Staged sign-up flow – removes friction by enabling users to sign up with minimal information and requests information as needed for additional services
- Minimal employee training required reflects intuitive software – Square POS app runs on Apple and Andriod operating systems, which users are already know how to use

"…We know we have very compelling and differentiated hardware products. We know we have very compelling and differentiated hardware products. We build our hardware in-house, and that means we have greater reliability, speed of data and elegant design and interoperability with our software products.…"

– Amrita Ahuja, CFO, Square (November 2019)

Square's user interface has a more natural feel for digitally native consumers compared to legacy solutions

Square's entire ecosystem of "self-serve" products in one place simplifies the operations of their sellers



Source: Statista, comScore, Credit Suisse estimates

9. Rationale for software-enabled payments
Square as an example of additional software services for merchants

Service	Description	Pricing
Square POS	General purpose POS software, pre-installed on Square Register. Automatically tracks sales, inventories, customer data, digital receipts, and more	Free
Square for Retail	Designed for retail industry. Includes barcode scanning and advanced inventory management	From $60/month
Square for Restaurants	POS for full-service restaurants. Provides front of the house (tables, orders, courses) and back of the house (revenue and cost reporting) business management solutions	From $60/month
Order Manager	Integrates >20 delievery platforms with Square for Restaurants, allowing sellers to manage all orders from the POS. Top partners include DoorDash, Postmates, and Chowly.	~1% take rate
Payroll	Comprehensive payroll offering enabling sellers to pay wages and taxes, hire new employees, and offer employee benefits. Available in all 50 US states as of 2018	$29 monthly subscription + $5/month per employee
Appointments	Provides sellers with an integrated appointment scheduling solution. Focused on the services industry	From $0/month
Employee Management	Enables services including manage employee timecards, view employee sales analytics, and secure employee permissions	$5/month per employee
Customer Relationship Management	Provides sellers with an integrated customer loyalty program and targerted marketing campaigns by linking customer data with transaction data. The company enables sellers to easily assess the ROI of their marketing spend	From $15/month
Gift Cards	Enables sellers to offer custom gift cards	From $0.80/card
Invoices	Enables sellers to create and send custom digital invoices to customers (recorded in transaction revenue)	2.9% + $0.30
Developer Platform	Set of APIs and SDKs that enable third-party developers to integrate Square Payments into their Apps. Expands Square's addressable market to businesses with industry specific needs	N/A

Source: Company reports, Credit Suisse estimates

9. Rationale for software-enabled payments

Industry thoughts on software-led payments

"…So if you think about the thousands of ISVs that still have not monetized payments…. the ISV business, which is still early, early innings…"

– Frank Bisignano, Chairman and CEO, First Data (December 2018)

"…We've configured the pricing model for Lightspeed Payments such that we receive an average of ~2.6% of the gross noncash transaction volume and a normalized rate of ~65bps net of direct processing costs. When you consider that Lightspeed has only been earning around 25bps under our previous referral-stage program…you can start to see why we're so excited…"

– Brandon Blair Nussey, CFO, Lightspeed POS (May 2019)

"… I think the challenge is, the most rapidly - our most valued relationship, not the most valued relationship, but the ISV that has referred us the most merchant accounts in the US is one that was previously working with one of our competitors. And they called us, actually, we didn't call them. And they said, "Hey, listen, the processor that we were working with just bought one of our competitors. And I can't work with someone that owns software that competes in my space. So what is your view on owning software?" And we said, well, we're going to be in Switzerland. That's not the business that we're in. We're not going to own point-of-sale software. And he said, great, I'm going to integrate to your Snap platform, and I'm going to send you tens of thousands of accounts. It's a laundromat software. But I think if I were First Data and I was 50% of the U.S. market, would I feel differently? Potentially. And -- but I think for the rest of us, it's a really challenging proposition to preclude yourself from working with all the other ISVs that service any one market segment by choosing one to own. And the software development business is tricky. You have to constantly be investing and innovating. We happen to have a lot of exposure to the restaurant world, as I alluded to at the beginning. And 3 years ago, no one had heard of Toast. And today, Toast is the preeminent ISV in the sector. And I don't know that I would want to be super long Toast 3 years from now because someone else is going to come up with a new solution. So I think our skill set is moving money around super quickly, super securely. I think in the integrated payments world, what's incumbent on us is to have APIs that allow software companies to integrate to us in a very compressed time frame and get access to our global solutions in a very seamless way, to have very strong reporting tools, to have transparent contracts, referral agreements, pricing, rev splits, all that kind of good stuff. But I see point-of-sale software as being a very, very different business. And I think I'd rather have an addressable market of all the ISVs in the market rather than just picking a horse, buying it and praying that it remains the market leader.…"

– Brendan Tansill, President, North America, EVO Payments (November 13, 2019)

"…So in terms of thinking about where are we now in the US, I'd say we're probably in middle innings. So as you go out and you spend money at all your SMB retail restaurant, spa, health care, B2B, et cetera, a lot of those guys have converted off the old on-prem or they've moved away from terminals into this software, and payments is enabled. So we continue to take a ton of share there. It's growing mid-teens for us. But with respect to the U.S., over the next 5 years, we think it's middle innings. If I fast-forward, I think the U.K. and Europe, this trend is just starting. So you're just starting to see in the U.K. and Europe them begin to -- the integrated point-of-sale situation is happening there, and payments has not yet been enabled in a massive way there. So we think there's a big opportunity over the next 3 years to enable payments in those integrated point-of-sale solutions across U.K. and Europe.…"

– Stephanie Ferris, CFO, Worldpay (March 2019)

Source: Statista, comScore

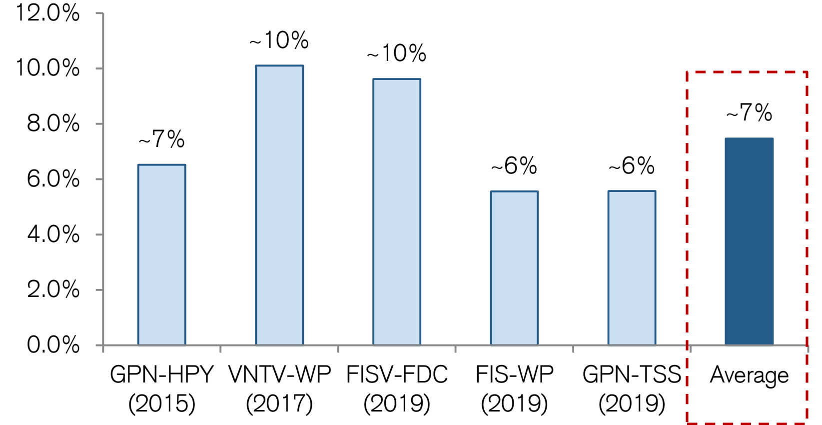
NextGen FinTech Ecosystems

10. Continued consolidation and scaling of platforms

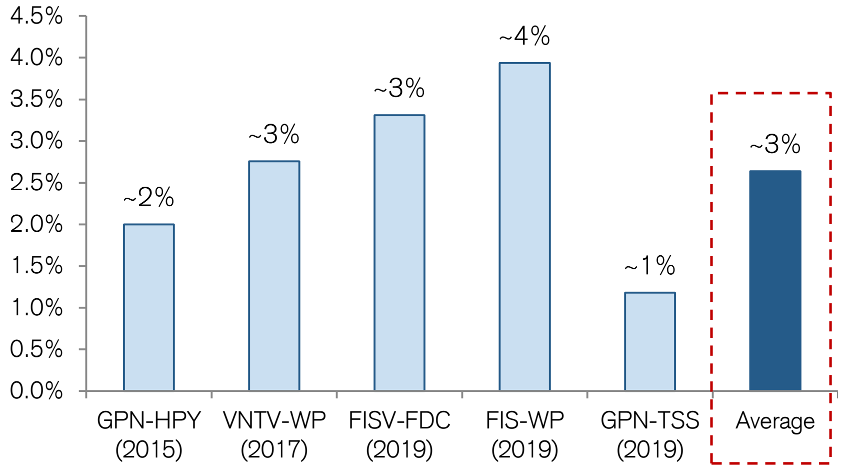
Driving distribution and expense synergies

- M&A is a core competency of incumbent payments players…
  - Historically, more "scale-driven" M&A in merchant acquiring vs. more bolt-on, product capability focused for bank technology providers (FIS/FISV/JKHY) to leverage existing distribution channel
- …while "Next-Gen" players have digital distribution advantages
  - Square ~+90% of merchants self-onboard given seamless onboarding and strong brand in the US
  - Stripe and Braintree are predominately eCommerce with distribution advantages over incumbents skewed toward in-store payments
- Distribution scale drives top line and lowers hurdles for future M&A
  - Cross-selling (key driver of the three large 2019 deals)
  - Geographic expansion given heavy reliance on issuer relationships and regulatory barriers from country-specific license requirements (i.e., called out by FIS – WP for WP acquiring)
  - We expect the next phase of bolt-on M&A outside of traditional acquiring scale to feature purchases of next-gen FinTech ecosystem account connectivity assets and adjacent capabilities around authentication, risk, and personalization/data monetization (e.g., Honey)
- Operating expense scale, driving bottom-line growth and creating cash flow to re-invest
  - High fixed cost structures of payments companies create large cost synergy opportunities:
  - Duplicative corporate overhead
  - Technology and infrastructure costs (data center)

Announced cost synergy target as a percentage of combined cost base, average of ~7% across recent deals



Announced revenue synergy target as a percentage of combined revenue, average of ~3% across recent deals



Source: Company reports, Factset, the BLOOMBERG PROFESSIONAL™ service, Credit Suisse research

10. Continued consolidation and scaling of platforms

Recent acquisitions of greater than $500mm

Target Company	Date	Description	Rationale	Purchase Price	LTM EV/EBITDA	Acquiring Company
Total System Services	Sep-19	Merchant acquiring and issuer processing	Enhanced scale and product capabilities in merchant acquiring businesses, and diversification benefits by adding consumer and issuer processing business lines	$26b	20x	Global Payments
First Data	Jul-19	World's largest merchant acquirer and issuer processor	Highly complementary combination with at least $500mm of revenue synergies from cross-selling and geographic expansion (Fiserv was 95% US) and $900mm of anticipated cost synergies	~$39b	13x	Fiserv
Worldpay	Jul-19	Merchant acquiring and issuer processing	FIS's banking customer base provides a meaningful cross-sell opportunity for Worldpay's merchant acquiring business in high-growth international markets	$35b	23x	FIS
Elan Financial Services (Debit Processing Unit)	Oct-18	Electronic payments network (bills and invoices)	Sits within the Payments segment and expands reach/capabilities in debit card processing and ATM managed services.	~$690mm	NA	Fiserv
AdvancedMD	Sep-18	Software-led	Added software and payments for SMB ambulatory physician practices	~$700mm	NA	Global Payments
Worldpay	Jul-18	UK-based global merchant acquirer	Expanded presence both internationally (Vantiv was a 100% North American-based business) and in eCommerce	~$12b	19x	Worldpay (legacy Vantiv)
Cayan Holdings	Jan-18	Merchant acquiring	Accelerated technology-led payments business and added ~70k merchants and more than 100 integrated partners in the US; strengths in omnichannel	~$1.05b	23x	Total System Services
BluePay	Dec-17	Integrated payments ISO	Strengthened the company's position in the card-not-present integrated software vendor (ISV) channel	~$760mm	NA	First Data

Source: Company filings, Credit Suisse research

10. Continued consolidation and scaling of platforms

Recent acquisitions of greater than $500mm (cont.)

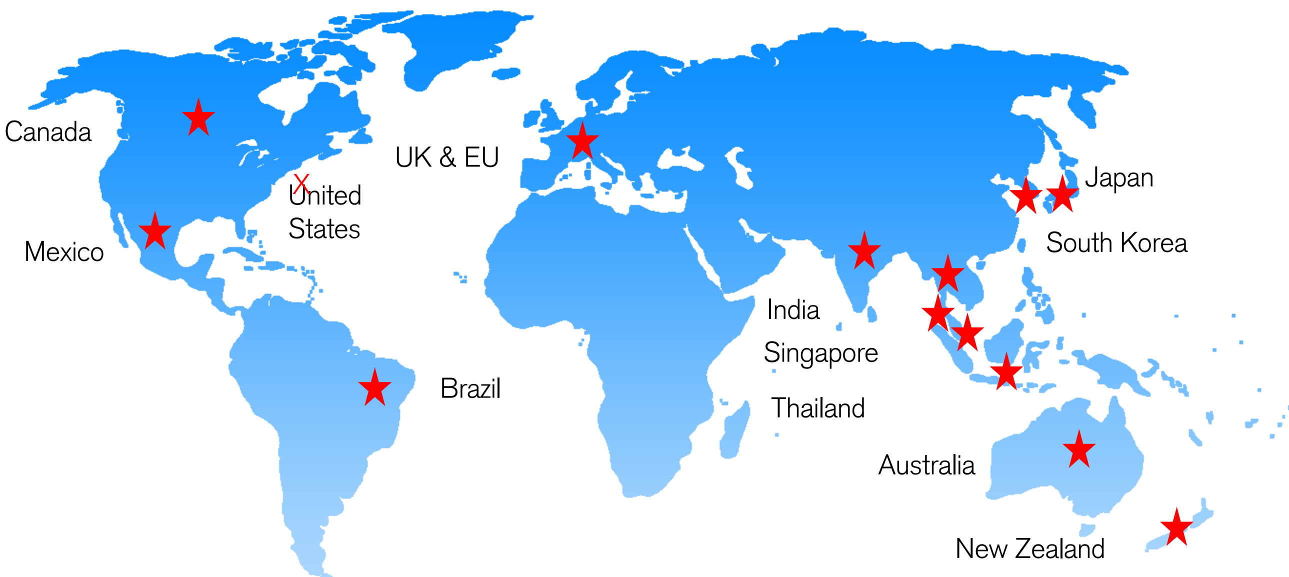
Target Company	Date	Description	Rationale	Purchase Price	LTM EV/EBITDA	Acquiring Company
ACTIVE Network	Sep-17	Software-led	Added event organization software and booking technology platform, focused on the health and fitness market	~$1.2b	12x	Global Payments
CardConnect	Jul-17	Integrated payments ISO	Strengthened the company's position in the card-present ISV channel	~$750mm	20x	First Data
Heartland Payments	Aug-16	Merchant acquiring	Added software and payments business, with an SMB emphasis	~$4.3b	20x	Global Payments
TransFirst	Apr-16	Merchant acquiring	Added ~1.3k integrated technology and referral partners in important areas such as ISVs, healthcare, not-for-profit, referral banks, and eCommerce	~$2.4b	16x	Total System Services
SunGard	Nov-15	Financial software & technology	Allowed FIS to expand its capabilities and client roster, gaining scale and technologies	~$5.1b	NA	FIS
Mercury Payments Systems	Jun-14	Merchant acquiring	Integrated payments leader and part of the foundation of the integrated business today	~$1.65b	18x	Worldpay (legacy Vantiv)
NetSpend	Jul-13	Prepaid cards	Expanded business capability to include prepaid debit card issuance	~$1.4b	14x	Total System Services

11. Open Banking (APIs) and Account Connectivity

Open Banking = Open (consented) access to customer financial data

- Started in Europe with PSD2 – Policy objectives to facilitate innovation and competition in retail financial services; now governments across the world are pursuing open-banking agendas for similar reasons (see map below)
- Characterized as regulations requiring banks to make consumer financial data available to licensed third parties (FinTechs/Techs) via APIs
- Bringing about the "platform-ification" of banking as distribution of financial services becomes increasingly digital and decouples financial products from banks, allowing consumers and Neo banks to cherry pick the best services

Open Banking initiatives around the world, noting that there is no formal program in the US (rather, open banking is being introduced by market forces)



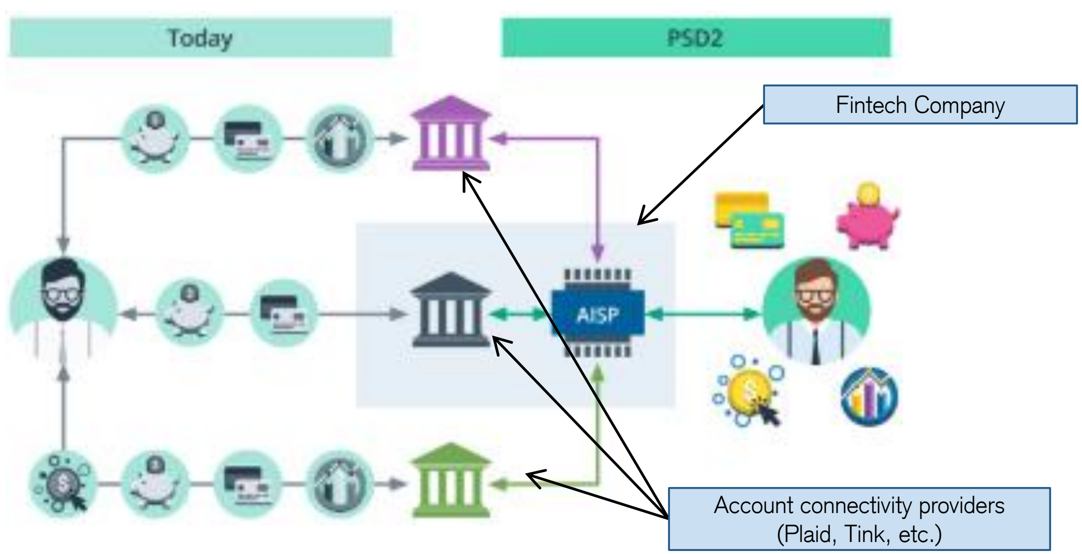
Source: Earnst & Young, Credit Suisse research

11. Open Banking (APIs) and Account Connectivity

Driving force of innovation by enabling FinTech

- Build the infrastructure to power Fintech apps by connecting them to banks via an API
- APIs facilitate the sharing of data between (financial service) providers in a controlled, yet seamless fashion
- Essentially developer platforms, allowing for faster product creation (hours from months), enabling developers to:
  - Initiate payments from a bank account or transfer funds (Venmo)
  - Aggregate all of a customer's account data (Mint)
  - Innovate with the data (credit assessment, automating loan applications, budgeting, etc.)

APIs enable the platform model into financial services



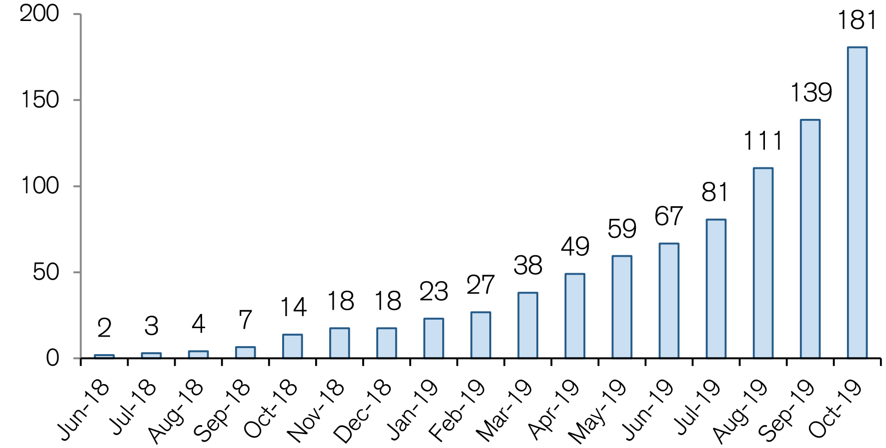
Source: Open Banking UK, Earnst & Young, Credit Suisse research

11. Open Banking (APIs) and Account Connectivity

European enablers: Tink, TrueLayer, Token, and Yapily

- Tink (founded in 2013), TrueLayer (founded in 2016), Token (founded in 2015), and Yapiliy (founded in 2017) are European provider examples/leaders
  - TrueLayer powers both Revolut and Monzo
  - Tink powers both N26 and PayPal (in Europe, while PayPal/Venmo work with Plaid in the US)
  - PayPal has a minority investment in Tink
- Tink and Plaid founders both believe that no single company will do everything and that there will be an ecosystem of specialized applications
- Regulations require banks to make customer account data available electronically:
  - PSD2 in Europe requires banks to have open APIs
- US market challenging because:
  - US banks are required to make data available electronically from Dodd-Frank, but no API requirements
  - More challenging in the US given >10k banks

Monthly open banking API calls in the UK – Illustrates continued increasing levels of adoption



European example N26 – Brings the platform model into financial services via APIs connecting to point-solutions

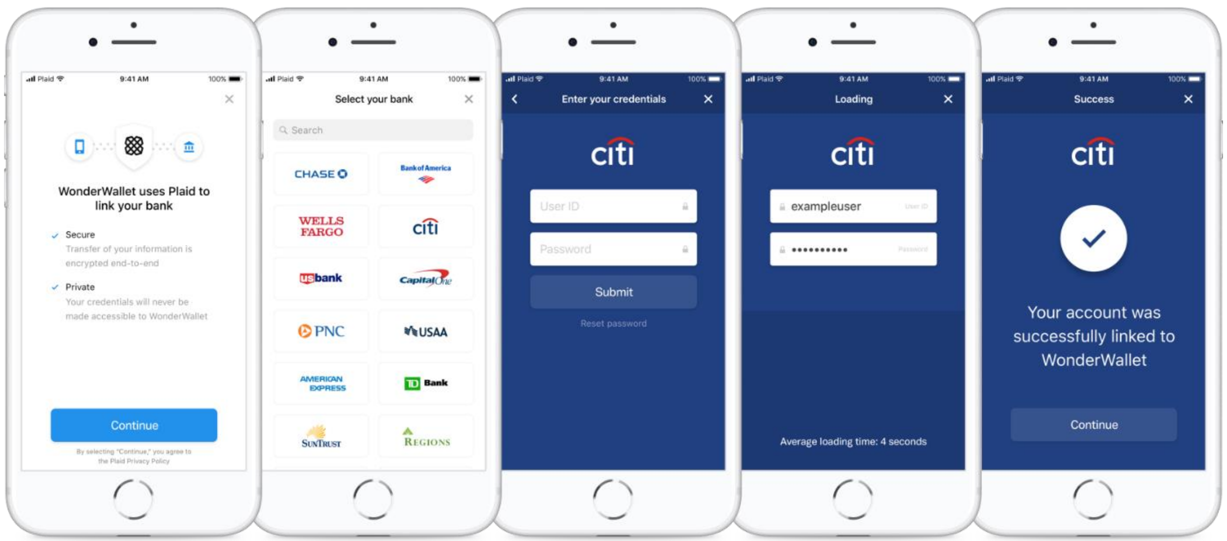
1	Barzahlen: cash withdrawal & deposit at retailer partners
2	Transferwise: international foreign currency transfer
3	Vaamo: Robo-investing
4	Raisin: marketplace for highest rate savings accounts
5	Clark: InsureTech
6	Auxmoney: loans

11. Open Banking (APIs) and Account Connectivity

US enablers: Plaid and Yodlee

- Plaid is the infrastructure (data plumbing) layer, allowing FinTechs to access customer account data via APIs to "*build any financial application from payments to lending to wealth management*"
  - In the US, Plaid powers over 4k apps, connecting >200mm consumer accounts to over 11k banks
  - Sample FinTechs working with Plaid: Venmo, Robinhood, Cash App, Acorns, Expensify, Marcus, Betterment, and more
  - Visa announced it signed an agreement to acquired Plaid for \$5.3b on January 13th, 2020 (expected to close in 3-6 months)
  - Plaid was previously valued at \$2.65b valuation (Series C) – Visa, Mastercard, Goldman Sachs, and Andreessen Horowitz
  - Yodlee (founded in 1999) is the pioneer of account data aggregation, but it has been utilized less by FinTechs

Plaid example, with an illustrative wallet ("WonderWallet") using Plaid to link to a selection of banks, with the user giving access via their familiar online banking logon credentials



Plaid's mission statement summarizes the spirit of open banking well:

"Transform financial services by lowering the barriers to entry for developers, spurring technical interest in the sector and democratizing access to critical services."

Source: Plaid, Credit Suisse research

11. Open Banking (APIs) and Account Connectivity

Plaid, the leading enabler of North American FinTechs

- Now focused on Phase 1, solving the financial data engineering challenge: (1) providing connectivity to all banks via one API, with high up-time access; (2) categorizing and cleansing data to enable FinTechs to offer services (e.g., budgeting); and (3) building out a merchant database across the US (to enable transaction categorization and budgeting tools for consumers)
- Phase 2 will be focused on value-added services through analytics, with examples including loan and mortgage application automation (both of which require ~60 pieces of information to process)
  - "*Products that need to interact with your financial data*" – Plaid CEO, Zach Peret
- Acquired Quovo in January 2019 for $200 million: (1) bolsters ability to incorporate investment and brokerage data; and (2) supports expansion into Europe with Quovo's PISP license with the UK regulator (FCA)
- We believe Plaid will help US FinTechs compete in Europe and be the go-to for European Challenger banks in the US

>11k financial institutions

JP Morgan Chase, Wells Fargo, Citi, Bank of America, American Express, Fidelity, BBVA, PNC, Capital One, Ally, USAA, Charles Schwab, Regions, Simple, US Bank, SunTrust (now Truist)

PLAID

- 25% of people in the US have an account linked through Plaid (Summer 2019)
- The average US bank account has >15 connected services
- >200 million accounts are connected to Plaid

Powers >4k applications

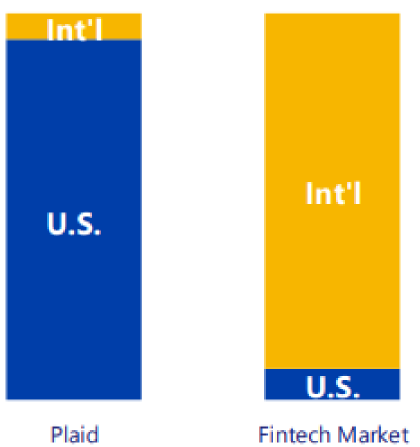
Venmo & PayPal, Square (Cash app), Marcus by Goldman Sachs, Robinhood, Coinbase, Betterment, Affirm, Gusto, Transferwise, Acorns, Intuit, Microsoft, Zillow, LendingClub, Quicken Loans, Blend

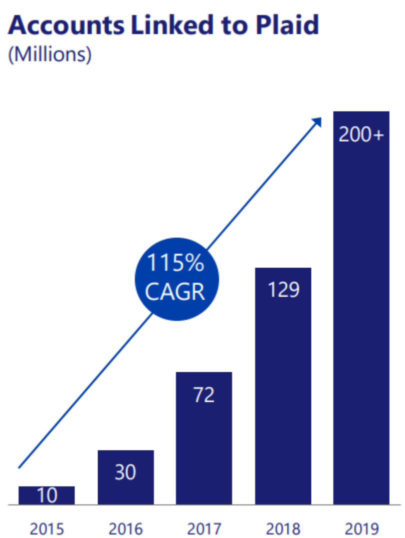
11. Open Banking (APIs) and Account Connectivity

Plaid and the proposed acquisition by Visa, mutually beneficial

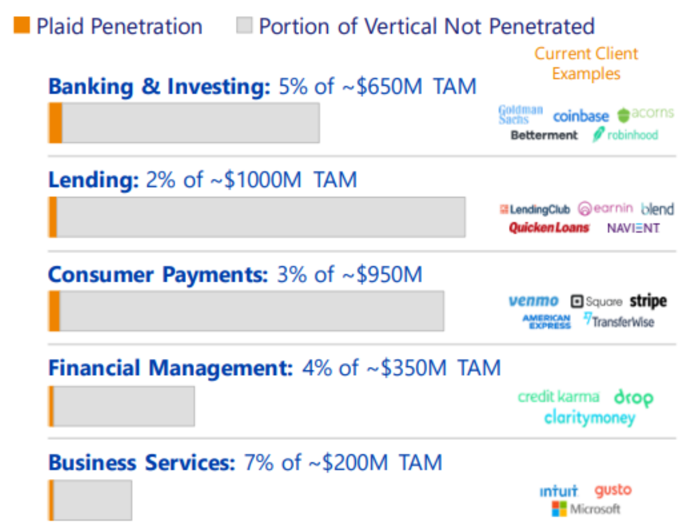
- Plaid accelerates Visa's network of networks money movement strategy and represents a significant opportunity for Visa to partner with FinTechs and >2.6k FinTech developers.
- Demonstrates Visa's deep competitive moats, solidifying Visa's position in next-gen FinTech ecosystem by owning a top open-banking enabler, curbing disruption concerns of the incumbent financial ecosystem.
- Visa's global brand name will give Plaid more credence with traditional financial institutions across the world, as well as help Plaid expand internationally where there are ~15x more FinTech users vs. the US.

Visa's global scale will accelerate Plaid's international expansion..





.. and Plaid expands Visa's TAM with FinTechs



12. BigTech in FinTech, highlighting Apple's FinTech efforts

BigTech focusing on payments to better monetize consumer interactions within their ecosystems and reduce friction

BigTech	Actions taken in FinTech
Amazon (detailed on slides 204-208)	▪ Suite of both consumer & merchant credit offerings, in partnership with both JP Morgan and Synchrony ▪ Amazon Pay for third-party merchants off-Amazon (i.e., PayPal competitor)
Apple (detailed on slides 103-105)	▪ Launched Apple Card with Goldman Sachs (Aug 2019), which GS believes to be "the most successful credit card launch ever" ▪ Apple Pay (launched September 2014), at 12b annual transaction run-rate at a 155% CAGR since Q1 2017, in 49 markets ▪ Apple Cash and Apple Cash Card (launched December 2017)
Google	▪ Received a pan-European e-money license in Dec 2018, enabling Google to issue e-money (e.g., cards) and provide payment services (e.g., execute payment transactions, money transfers) ▪ Announced plans to offer checking accounts in partnership with Citi ▪ Hired Bill Ready to lead Google Commerce in Dec 2019 (ex. PYPL COO), an area of increased focus with visions for a universal shopping cart across Google's properties (search, shopping, YouTube, Gmail), ultimately to support/strengthen its core ad business ▪ Focused on scaling Google Pay in EM initially and then mature markets with strong progress in India, rising to #1 market share of UPI transactions within 2 years of launching at 60% with ~67mm MAUs, although Facebook could be a strong contender with plans to rollout payments to its~400mm WhatsApp users in India ▪ Increased focused on connecting merchants, advertisers and users, in addition to helping SMBs
Facebook	▪ Launched Facebook Pay in Q4 2019 in the US, a mobile wallet powered by PayPal and Stripe for users to make purchases across Facebook's ecosystem (Messenger, Instagram, WhatsApp, and Facebook Marketplaces), P2P, and donations ▪ Potential to build a substantial eCommerce business with substantial reach and a highly engaged user base: 2.4b MAUs and140mm registered businesses on Facebook, 500mm DAUs on Instagram and 75% of US businesses expected to use IG by 2020, and WhatsApp with 1b DAUs across 180 countries ▪ Launched Instagram shopping in March 2019, which we believe has big potential longer-term, noting 90% of users follow a business and the average user spends ~30 minutes per day on the app ▪ Libra, cryptocurrency wallet effort but not essential for FB's other FinTech efforts to be successful, in our view; we see this as a longer-term call option and an ambitious project while noting that FB could achieve similar transaction cost/speed benefits via on-platform transactions ▪ Received a pan-European e-money license in Dec 2016, enabling FB to issue e-money (e.g., cards) and provide payment services (e.g., execute payment transactions, money transfers)

Source: Company reports, bizcommunity.com, qz.com, Credit Suisse research

12. BigTech in FinTech, highlighting Apple's FinTech efforts

BigTech focusing on payments to better monetize consumer interactions within their ecosystems and reduce friction

- Alibaba (Alipay) and Tencent (WeChat) are the pioneers of BigTech in Fintech that US BigTech is attempting to emulate, albeit in a drastically different regulatory environment with world-class established incumbents.
- Alipay and WeChat are expanding into Southeast Asia, where Grab and Go-Jek have dominant positions.

BigTech	Actions taken in FinTech
Alibaba	▪ Ant Financial ecosystem valued at $150b (MYBANK, asset management, insurance) ▪ Flagship Alipay wallet with 53% share of China's mobile payments market ▪ Expanding acceptance into key international tourism locations (including US and Europe) ▪ Owns 40% share in Paytm, $16b valuation and #3 market share of UPI payments in India
Samsung	▪ Samsung Pay ▪ Expected to pilot SoftPOS in Q4 2019, which powers contactless payments on Samsung phones with via an app download
Tencent	▪ WeChat FinTech ecosystem (Tenpay, WeBank, asset management, insurance) ▪ Leading lifestyle super app with >1.15b MAUs ▪ WeChat's mobile payment wallet has 43% share of China's mobile payments market
Uber	▪ Uber Money bank-like services (for drivers), following Instant Transfer capabilities ▪ Uber credit card (for consumers)

Source: Company reports, iResearch, statista, Credit Suisse research

12. BigTech in FinTech, highlighting Apple's FinTech efforts

Began with Apple Pay, now expanding its financial services ecosystem

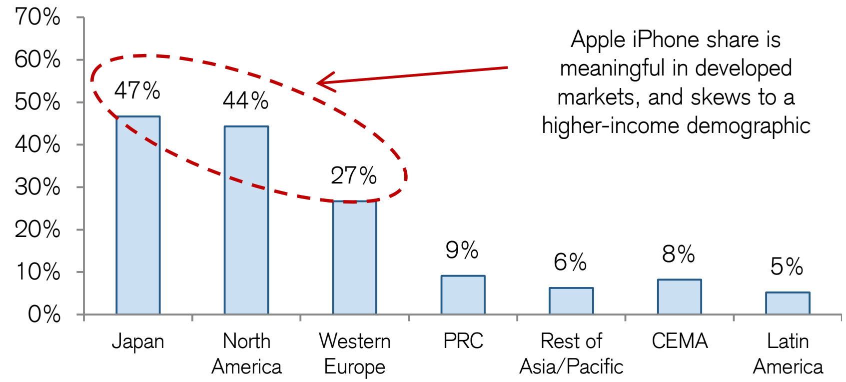
- From its first financial services product, Apple Pay (launched in September 2014), to the more recent Apple Card, the company has built the beginnings of a digital financial services ecosystem, leveraging partnerships with both Green Dot and Goldman Sachs.

- The audience for these products is generally confined to iOS device users – although iPhone share is meaningful in developed markets and skews to the higher-income demographic – i.e., Apple's importance in payments outweighs is unit share.

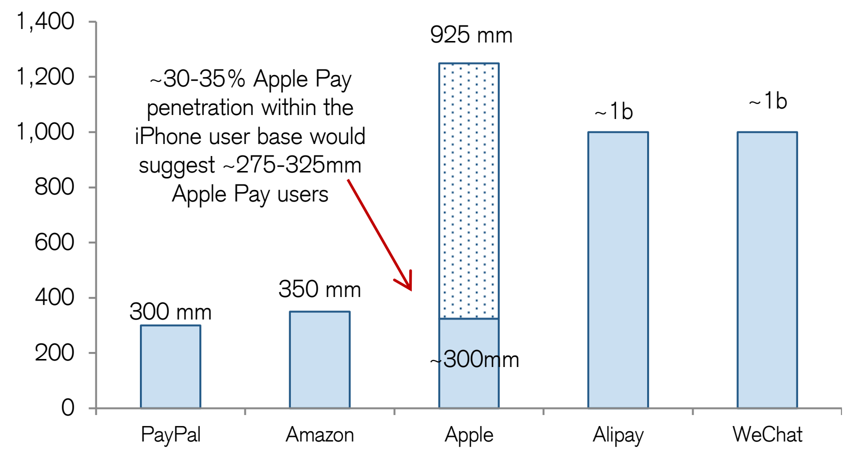
- Payments & FinTech offerings are additive to the ecosystem (i.e., direct monetization is not the sole focus) and reduce friction and customer stickiness – acting as "the glue".

- Apple products in payments and financial services
  - Apple Pay (launched September 2014)
  - Apple Cash and Apple Cash Card (launched December 2017)
  - Apple Card (announced March 2019)

Apple's financial services are limited to the iOS audience, although iPhone share is meaningful in developed markets



Apple's iPhone install base is ~925mm globally, which compares favorably to PayPal active users and Amazon customers

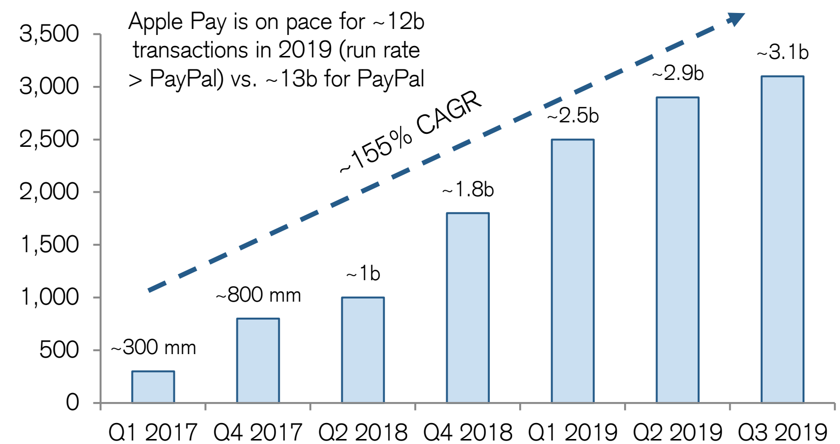


12. BigTech in FinTech, highlighting Apple's FinTech efforts

Apple Pay, Apple Cash, and Apple Cash Card overview

- **Apple Pay** acts as a "glove" that goes around card credentials.
  - We believe Apple can earn ~15bps of the purchase price on credit and $0.005 per transaction on debit, paid by the issuers (depending on issuer arrangement).
  - The value proposition to issuers is reduced fraud (tokenization, biometrics) and increased eCommerce volumes.
  - There are no separate merchant fees and no contracts with Apple (standard card processing fees from the acquirer or PSP are paid by the merchant).
  - Any offline merchant that has a modern payments terminal (NFC contactless enabled) can accept Apple Pay.
  - For online merchants, Apple provides developer tools to add the Apple Pay market to websites and apps (Apple Pay will be shown to the customer only when an enabled Apple device is detected).
  - 70% of US retailers "accept" Apple Pay; available in 40 markets globally
- **Apple Cash** is an iMessage-enabled P2P payments service that works in conjunction with the **Apple Pay Cash Card**.
  - Funds are received into a virtual Apple Pay Cash card (powered by Green Dot), which is stored in the Apple Wallet.
  - Funds can be spent via Apple Pay (using the Cash card at any merchant that accepts both Apple Pay and Discover) or transferred to a bank.

Apple Pay transactions more than doubled YoY in Q4 2018; Apple is on track to surpass 10b transactions in 2019



Apple Cash and the Apple Pay Cash Card, a virtual prepaid debit card that allows P2P received funds to be spent in-store & online

Green Dot powered virtual prepaid debit card that sits within the Apple Wallet

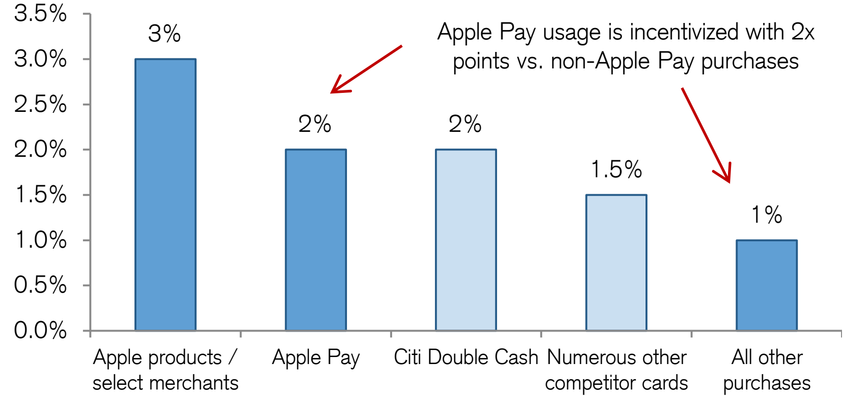
Discover is the card network partner (i.e., Apple Pay Cash card is accepted anywhere Discover is accepted)

12. BigTech in FinTech, highlighting Apple's FinTech efforts

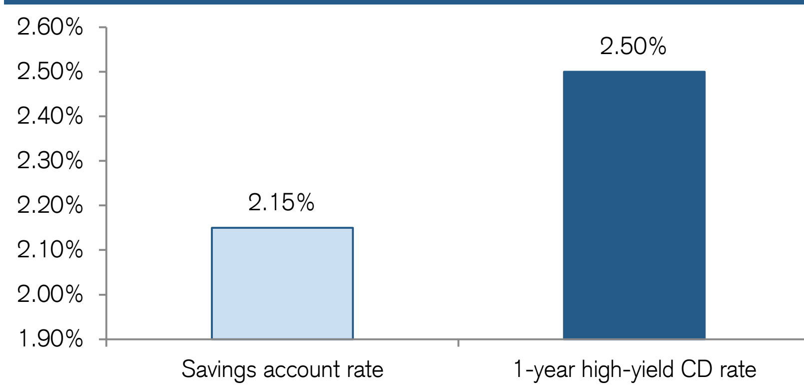
Apple Card, in conjunction with Goldman Sachs, and what's next?

- **Apple Card** is a physical and virtual credit card that we expect to appeal to Apple enthusiasts and help to increase engagement with Apple's other financial services (Apple Pay, Apple Cash).
  - Goldman Sachs is the card issuer, Mastercard is the network
  - Apple sharing in card economics (interchange and interest income)
  - Cardholders earn more when using Apple Pay, and rewards are delivered through Apple Cash same day ("Daily Cash"); 3% on Apple products, 2% when using Apple Pay, and 1% on all other purchases
  - Spending tools within the Apple Wallet will be color-coded by category and contain various analytics (weekly and month summary data, interest expense estimates based on various payment amounts, etc. – though we note Apple maintains the highest data privacy standards, enabled by owning the hardware that runs the software / applications)
- What could be next for Apple in payments & FinTech? Expanding the product suite into a more full-service digital bank offering (competing with traditional & Neo banks).
  - Additional Goldman Sachs partnering (i.e., Marcus savings accounts, CDs, loans)
  - Physical Apple Cash debit card (monetize via debit interchange)
  - Wealth Management and/or Investing/Trading functionality
  - Enable iPhone to accept contactless card payments with no additional hardware – Samsung is already doing this

Apple Card rewards attractive when used within the Apple ecosystem, but less attractive on non-Apple Pay purchases



Goldman Sachs Marcus offers highly competitive interest rates for savings accounts and CDs



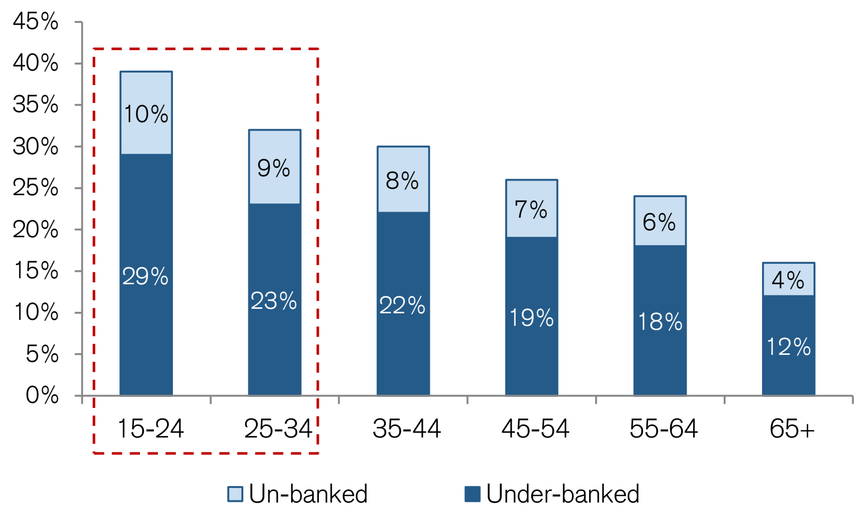
Source: Company reports, NerdWallet, Credit Suisse research *Apple is covered by CS analyst Stephen Ju

13. Unbanked and Underbanked opportunity for US FinTechs

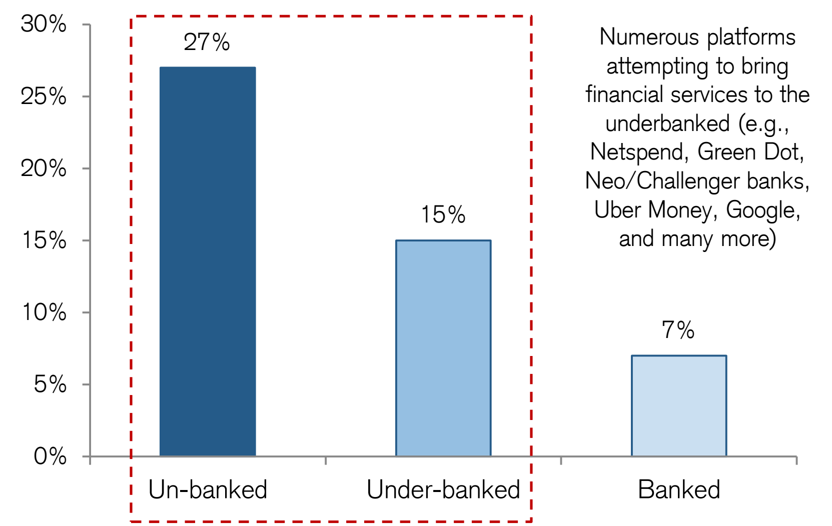
Providing access to modern / affordable financial services

- FinTech companies are targeting the ~60-80mm underserved US consumers
  - 14mm unbanked adults in the US (no accounts) + 49mm underbanked adults in the US (have a checking or savings account, but also utilize services from alternative providers, e.g., money orders, check cashing, international remittances, payday loans, etc.), per FDIC
  - Square estimates 70-80mm underserved US consumers
- Value proposition to the consumer:
  - Low fees and low/no account minimums
  - Digital-only bank hallmarks of smooth UI/UX & fast onboarding
  - Checking account functionality (e.g., prepaid debit card, ATM access, direct deposit)
  - "Hook" features (e.g., Bitcoin trading & Boost rewards via Cash App, free FX conversion via Revolut)

There are ~63mm underbanked and unbanked in the US, demonstrating a high overlap with Millennials and Gen Z consumers



Prepaid card usage data by market segment suggest a heavy skew toward underserved consumers



Source: 2017 FDIC Survey of Unbanked and Underbanked Households, Credit Suisse research

14. P2P as a customer acquisition and engagement tool
Why does P2P matter if it does not make any money?

- Strong network effects lower customer acquisition costs, a key advantage for FinTechs vs. traditional banks (i.e., users sign up new users, "*Download Venmo, so I can pay you back*.")
- Costs of P2P are offset by cross-selling other services to large P2P user base
  - Transaction costs for getting funds on and off of the platform – debit and ACH fees (loss making at first)
  - Technology costs to build and maintain the platform
  - Cards attached to wallets to monetize via interchange (e.g., Venmo Card & Cash Card)
  - Instant transfer fees (consumer fees of ~1-1.5% for faster funds access)

P2P was the foundation for many of the largest FinTech companies

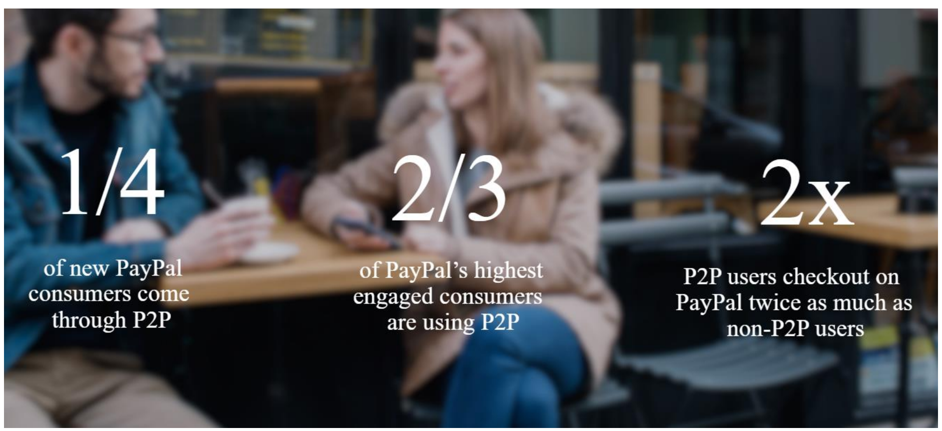
PayPal	WeChat Pay	venmo	Cash App
Market leader globally ex China	Market leader in China	Largest FinTech app in the US	2nd largest FinTech app in the US behind Venmo (owned by Square)
- Started in 1998 as a P2P company	- Started in 2014 via P2P (tradition of giving money in red envelopes)	- Started in 2009 as a P2P app	- Started in 2013 as a P2P app
~300mm users (including Venmo)	~900mm users	~41mm users (as of Q1 2019)	~15mm users (as of Q4 2018)

Source: Company reports, Credit Suisse research

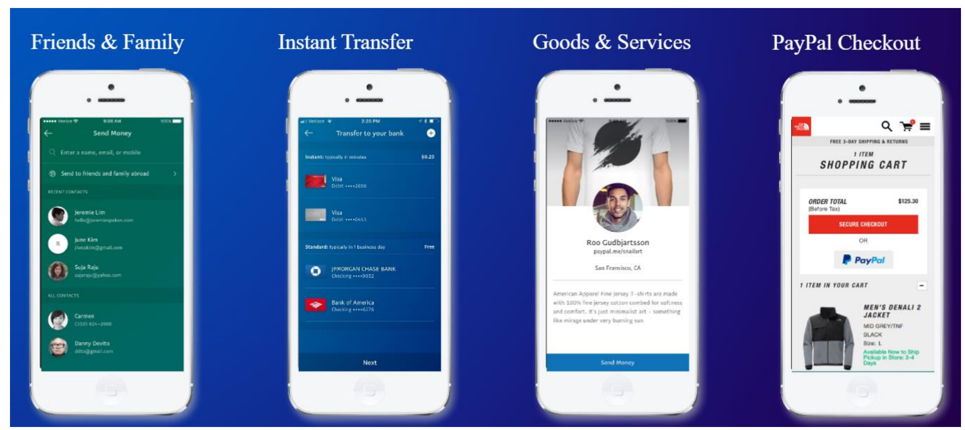
14. P2P as a customer acquisition and engagement tool
Direct and indirect benefits for the platforms providing P2P

- Strategic value for the FinTech platform is two-fold:
  - Direct monetization opportunity from banking services (e.g., prepaid card interchange, instant transfer fees, increased use of checkout button in PayPal's case), and
  - Network effect benefits (e.g., driving activations, user growth, and engagement).
- PayPal receives ~25% of new users via P2P, with these users making up ~2/3rds of the highest engaged accounts on the platform.
- Square notes that the Cash App's P2P business provides efficient customer acquisition through network effects and that the business is evaluated by management on the basis of its network, engagement, and monetization.

PayPal disclosed that P2P users checkout on PayPal (monetized transactions) twice as much as non-P2P users



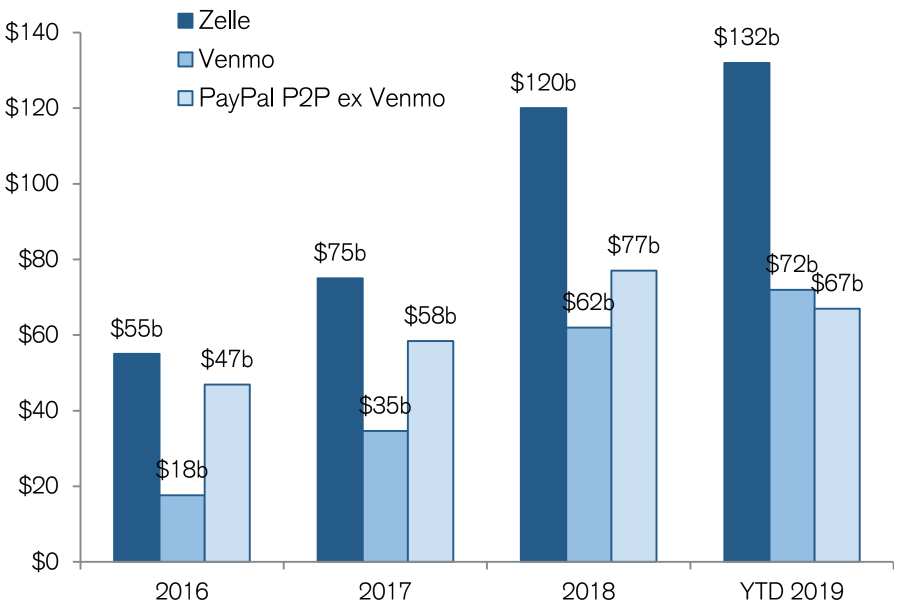
PayPal P2P contributes to activations, user growth, and engagement with the platform (benefiting network effect)



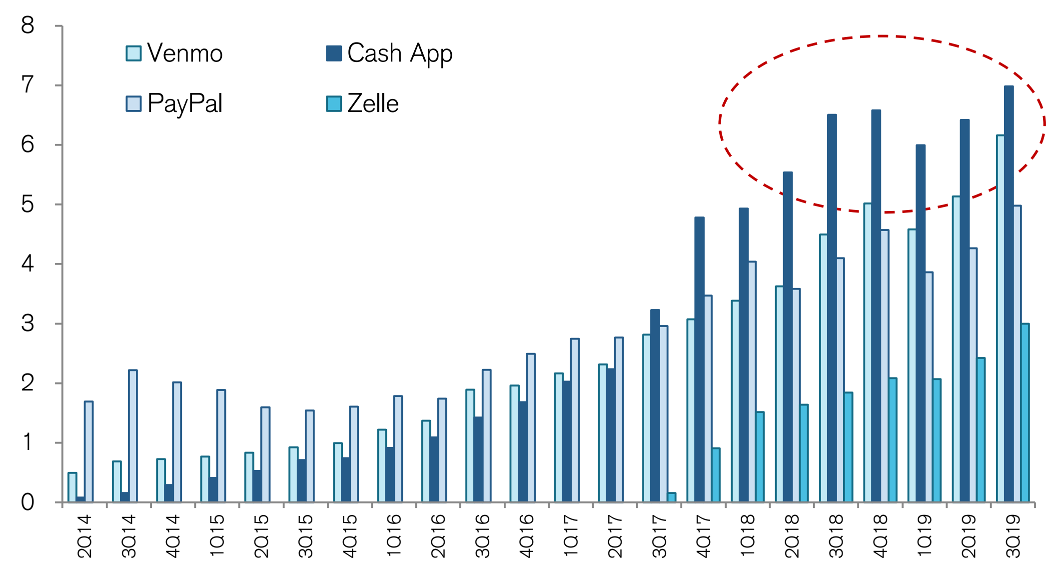
14. P2P as a customer acquisition and engagement tool
How we think about Zelle vs. FinTechs

- US banks are addressing P2P FinTech competition by introducing Zelle.
  - Checking accounts are a key part of a bank's relationship with customers (daily engagement).
  - Consumers are using P2P apps like a checking account (e.g., paying rent with Venmo or direct depositing paychecks into Cash App).
- In our view, assessing P2P volume trends is a good proxy for engagement & user base growth but has limited importance beyond that – it's a customer acquisition tool (the important thing is what the platform does with that engagement in terms of cross-selling and/or a consumer network for payments).

Zelle volumes are nearly 2x Venmo's, largely driven by different use cases (i.e., Venmo used more for everyday expense sharing)



US quarterly app download data show the rise of the use of Square's Cash App (surpassing core PayPal in Q2 2017)



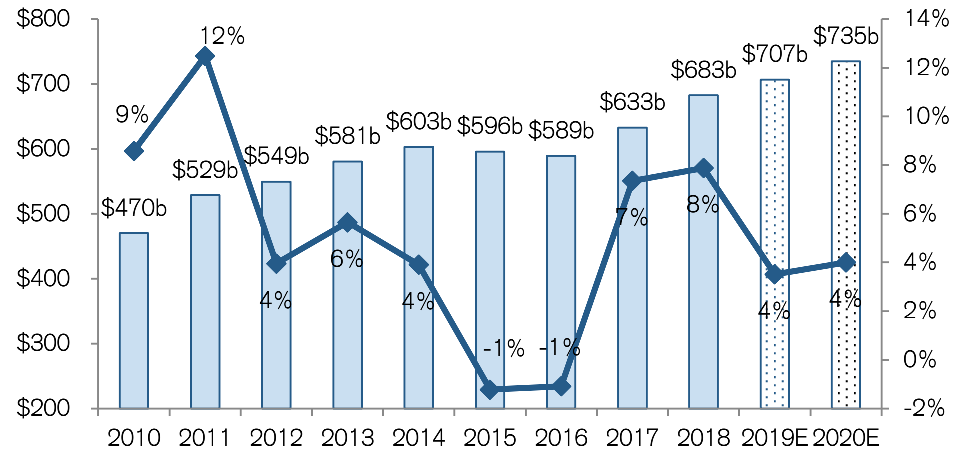
Source: Sensor Tower, Company Data

15. Global remittance market innovation

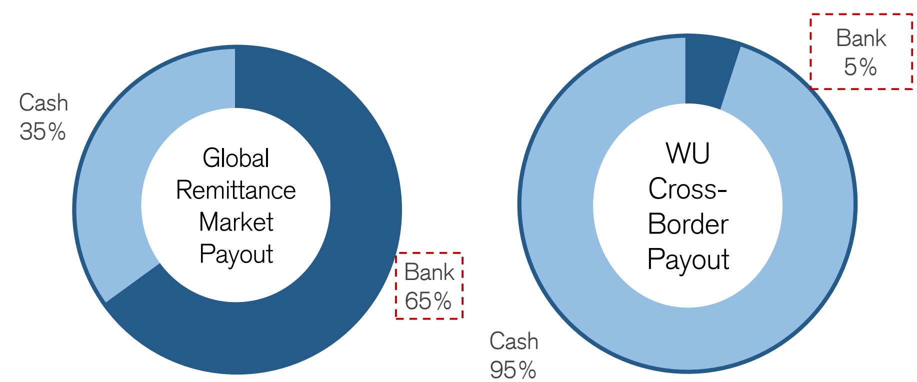
~$700b industry TAM, typically growing ~low- to mid-singles

- Global money transfer market growth has stabilized since down years in 2015, 2016.
- Cross-border remittances are still dominated by traditional bank wires, despite higher and uncertain sending costs vs. money remittance providers and FinTech entrants.
- An opportunity exists for incumbent players (already in progress at Western Union) to convert bank wires (65% of global volumes) into payments over their own remittance network via white-label partnerships with traditional banks.
  - Bank wires are a trusted form of money remittance but often come with uncertain timing and uncertain fees.
  - The correspondent banking system causes this uncertainty, involving a variety of local and international branches in each country before the money arrives.
- FinTech entrants could play a role in expanding the TAM of the market, adding volumes from individuals who would not have otherwise transferred money cross-border (i.e. easy-to-use mobile phone apps, travelers, international business more willing to move money).
  - A linked bank account is normally required to open an account with a FinTech remittance company; therefore, it is not feasible for a portion of wire senders (unbanked or underbanked).

Global remittance market TAM of ~$700b in volumes, expected to grow ~low- to mid-single digits (although differs meaningfully by corridor)



Global remittance market cash vs. bank split, compared to Western Union (inverse, with only ~5% bank-based for Western Union)

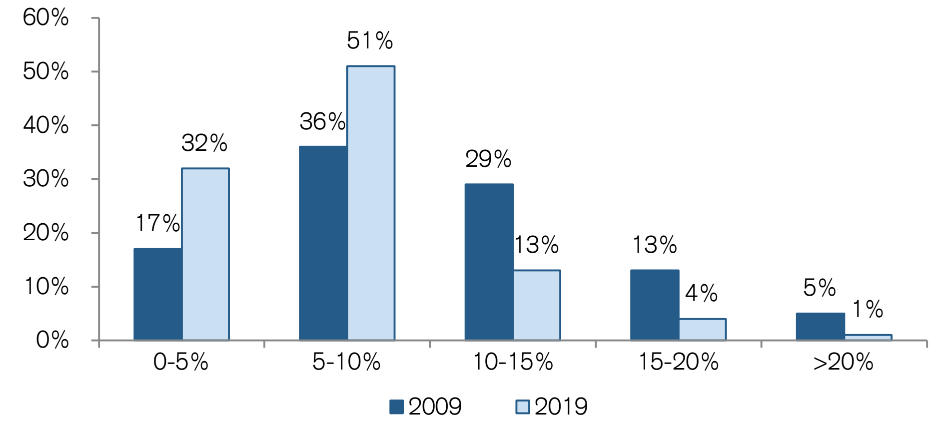


15. Global remittance market innovation

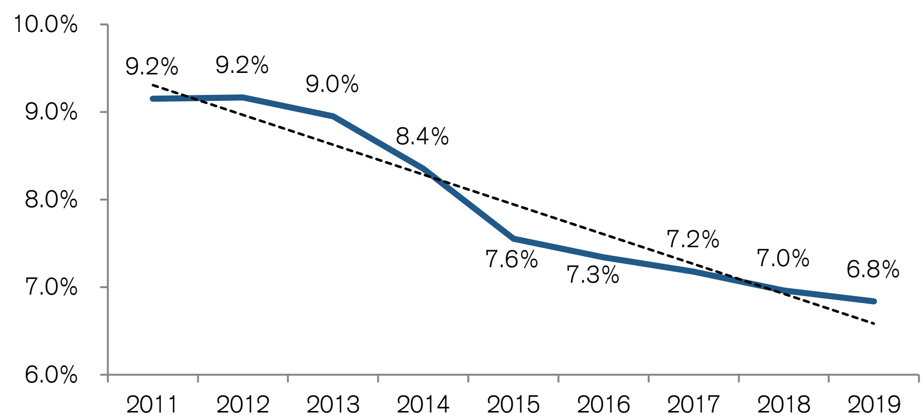
Large market with pocket of pricing pressure

- Global money transfer prices still high at 7% on average (which includes bank wires) despite innovation given high barriers to entry and high-cost structures of incumbent players:
  - Barriers to entry – money transmitter licenses in each country
  - High costs to manage agent networks, receiving fees when money is sent and received
  - Increased regulatory requirements such an know-your-customer (KYC) and anti-money laundering (AML)
  - A local presence, including bank accounts and capital held in that country's foreign currency (FX markets are a last resort to complete a transfer)
- Costs vary widely between specific corridors, generally inversely correlated with volumes
- Costs are gradually coming from increased competition taking a digital approach such as Transferwise, Remitly, WorldRemit, and others

Pricing varies widely by corridor – now 83% of corridors cost <10%, up 30% from 2009



Sustained broader industry level pricing pressure (global average cost for sending $200 shown below), although impacted by bank channel and other mix-related dynamics



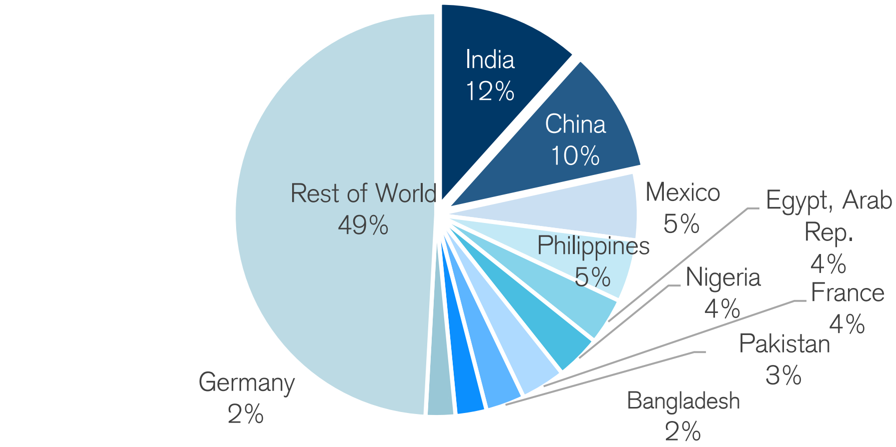
Source: World Bank, Credit Suisse research

15. Global remittance market innovation

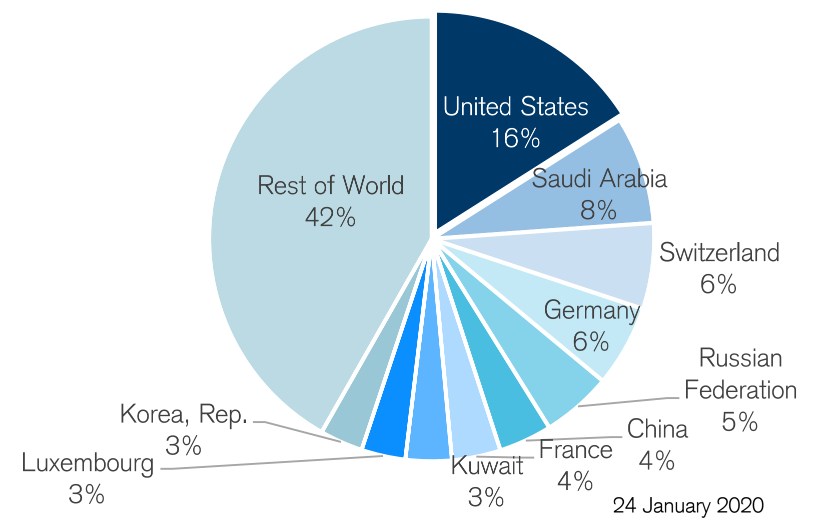
US dominates the world remittance landscape

- Generally speaking, flows are most frequently moved from developed countries to developing countries (typically job-seeking activity).
- Inbound remittance market:
  - India and China are leading receive markets but are driven by a more fragmented distribution of immigrants around the world.
  - No one corridor is overly material to migrant flows, with all < 25% of the country's inflows.
  - Flows to Mexico, the 3rd biggest country in the world by inflows, are highly concentrated, with 90%+ volumes of coming from the US.
- Outbound remittance market:
  - The largest outbound remittance market is the United States, by a margin of ~2x the number two market (Saudi Arabia).
  - The US Census Bureau estimated in 2017 that ~14% of the American population was foreign born (~44mm people, 3x more immigrants than the next closest country).
  - 6 of the top 10 money remittance corridors originate in the United States, with US into Mexico representing the single largest remittance market in the world (~5% of the entire industry).

2019E Global inbound remittances (% of total volume), with India and China the two largest inbound markets, followed by Mexico



2018 Global outbound remittances (% of total volume), with the US and Saudi Arabia the two largest outbound markets, followed by Switzerland



CREDIT SUISSE

Source: World Bank, Credit Suisse research, US Census Bureau

15. Global remittance market innovation
Start-ups see elevated remittance prices as an opportunity

Metric	Transferwise	Remitly	WorldRemit
Recent valuation	\$3.5b (May 2019)	~\$1b (July 2019)	~\$900mm (June 2019)
Geographic reach	59 countries	50 send and 150 receive countries	50 send and 150 receive countries
Approach	• Started off as P2P focused on GBP to EUR, now can transact in 49 currencies across 1.6k routes • Now white-labeling banking "network" for others to build on • Expanding into B2B with business accounts (borderless accounts) • Revenue +53% at £179mm, 3rd year in a row of posting a profit	• Launched in 2011 • Initially had send capabilities from the US and Canada to 10 high-traffic countries (e.g., Mexico, India, the Philippines and Guatemala) • Expansion to ~600 send-to-receive corridors (as of December 2018)	• Launched in London in 2010, focused on consumer cross-border payments • Expanded into B2B payments with business accounts for SMBs • 90+ currencies, 150 countries
User base	~6mm	">1mm" as of December 2018	~4mm
Other notes	• £4b monthly transfers (or £48b annualized vs. Western Union at \$90b in C2C volumes 2019E), as of September 2019 • In the summer of 2018, was ~3m users transferring £2b monthly (both doubled) • Multi-currency debit card w/ \$250/month free ATM withdrawal • Business accounts: international invoices, payouts, APIs (Xero)	• Visa Direct partnership to send funds internationally from US Visa cards • Perfect Delivery Promise: guarantee of exact date and time of delivery • Funding via bank account or card, and recipient can receive directly in a bank account or do cash pickup • Added delivery options (e.g., M-Pesa, home delivery)	• Bank transfers, cash pickups, mobile money accounts, WorldRemit Wallet, and airtime top ups • Business accounts • 90%+ transactions are authorized within minutes, and 70% of mobile-to-mobile transfers take less than 3 minutes

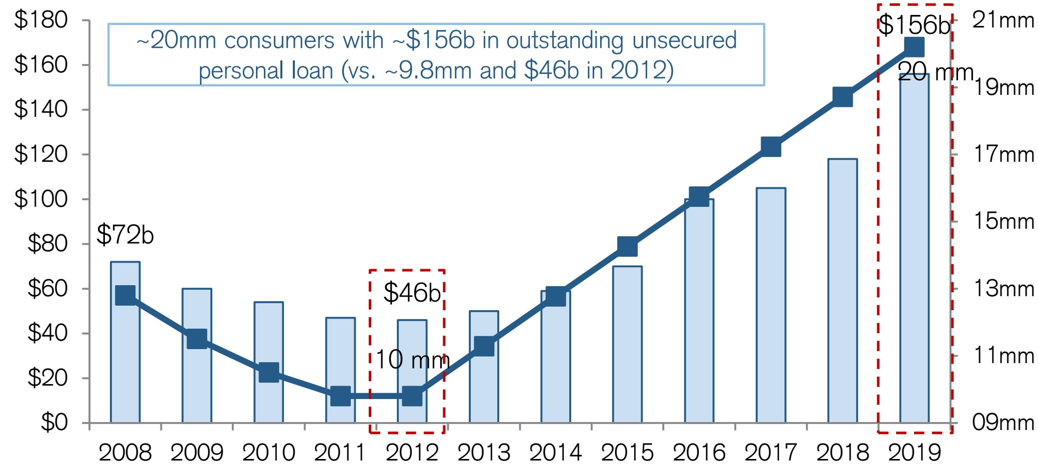
Source: Company reports, World Bank, Crunchbase, PYMNTS.com Credit Suisse research

16. FinTech-driven credit (consumer offerings)

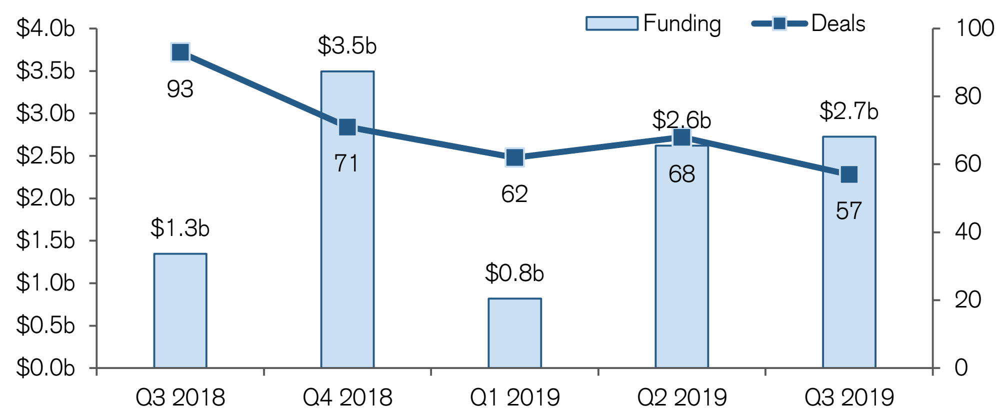
Expanding the addressable market of consumer credit

- The current market size for the personal loan industry is ~$150b, and it is considered to be the fastest growing sub-segment of consumer credit, with FinTech lenders driving personal loan growth since 2012
- TAM expansion via FinTech platforms that often leverage traditional data points (e.g., FICO scores) in conjunction with potentially thousands of other alternative data sources (e.g., employment, education, income potential, spending habits, etc.)
  - Reduced costs vs. traditional banks (lack of brick-and-mortar branches, modern tech platforms reducing back-office expense)
- Personal lending platforms generally prefer customers who would like to consolidate debt, although offerings span a wide range of loan products (e.g., student loan refinancing, private student loans, personal loans, purchase-specific financing)
  - We believe a subset of FinTechs are considering moves further upscale, given varied degrees of success with riskier borrowers (which comes with larger loan sizes).
- FinTech led sub-segments of the personal loan market are:
  - **Marketplace lending** – Generally unsecured installment loans done through an online P2P lending platform (e.g., Lending Club, Prosper, SoFi, Avant, and Marlette)
  - **Dedicated POS financing** – Financing options that are offered when consumers are checking out, either online or in-store (e.g., Affirm, AfterPay, GreenSky, PayPal Credit, Klarna, Square Installments, Vyze, etc.). Varying degrees of maintaining risk and/or selling off to investors (there are FinTech personal lending platforms that keep lending on balance sheet, e.g., Marcus).

The US market for unsecured personal loans stands at ~19.6mm consumers, with ~$156b in outstanding loan balance (vs. ~9.8mm and $46b in 2012)



Alternative lenders have received more than $11b in funding since Q3 2018, most recently highlighted by a $500mm Series G by SoFi to expand its financial services offerings (which most recently is cryptocurrency trading)

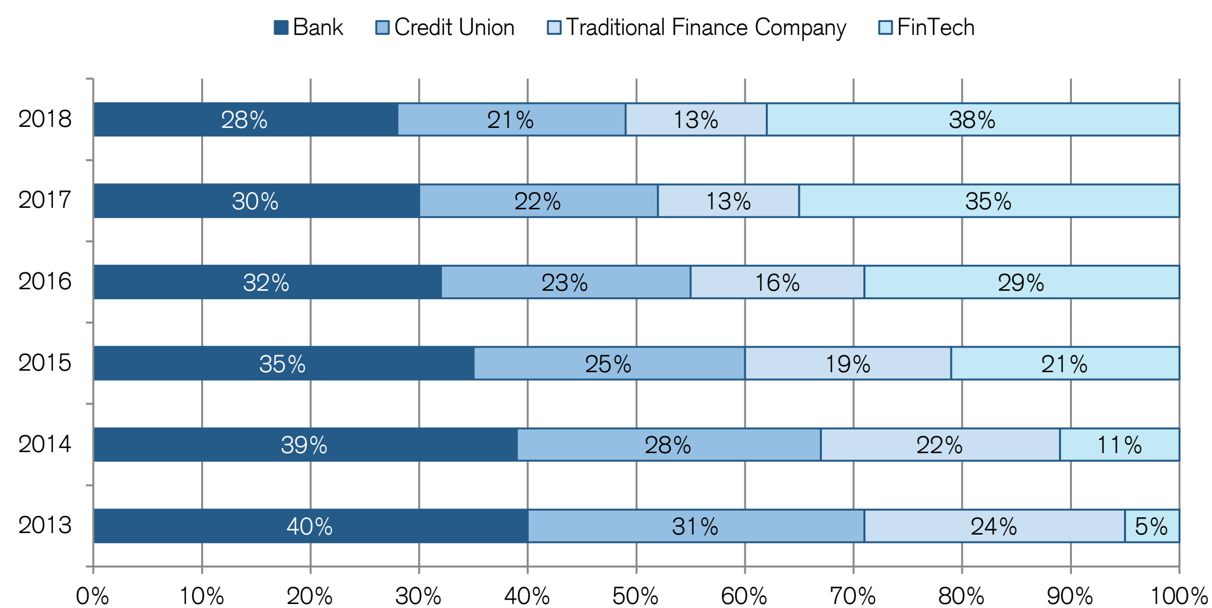


16. FinTech-driven credit (consumer offerings)

FinTech loans gains share within the personal loan market

- FinTech platform loans made up 38% of personal loans in 2018, having first gained a market share leadership position in 2018 (relative to banks, credit unions, and traditional finance companies – when combined, banks and credit unions still make up about half of all personal loans).
- In 2013, FinTechs accounted for just 5% of such balances (and combined bank and credit union share has decreased from 71% to 49% during the same time period).

FinTech share of the personal loan market has grown from ~5% in 2013 to ~38% in 2018



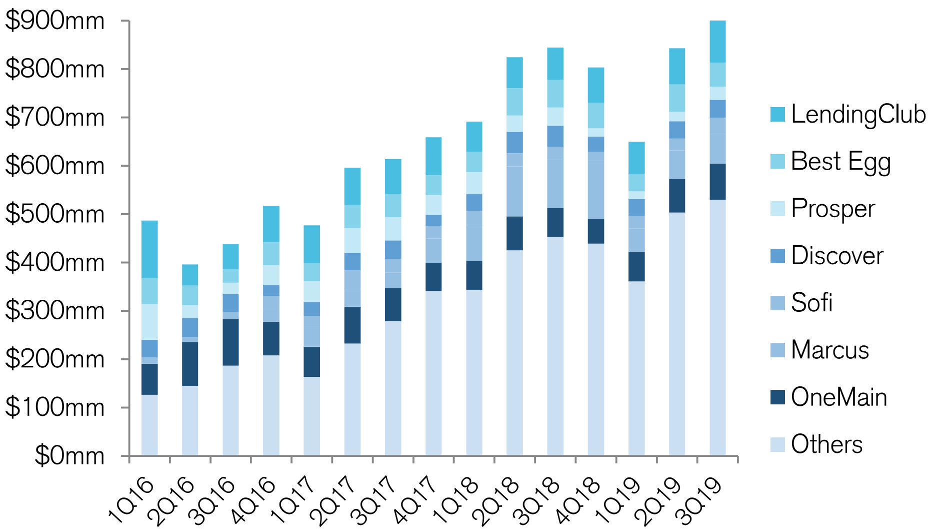
Source: Company reports, TransUnion consumer credit database (TransUnion does not break out POS personal loans separately, per The Financial Brand), Credit Suisse research

16. FinTech-driven credit (consumer offerings)

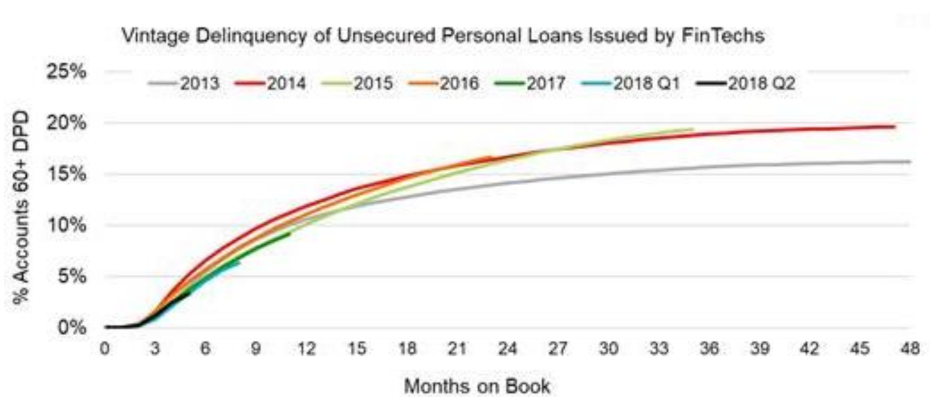
Marketplace (peer-to-peer) lenders

- Examples of large marketplace (P2P) lenders are Lending Club (LC), Prosper, SoFi, Avant, and Marlette (Best Egg)
- Marketplace lenders generally offer unsecured installment loans done through an online investment platform (i.e., P2P lending platform)
- Serve as an intermediary in matching borrowers (attracted by speed and convenience) and investors (prospects for higher returns), although a "true" marketplace model is no longer viable (hybrid model has emerged, some funding is necessary)
- Key question is whether risk separation of credit grades will be maintained; the test will be in a weaker economy
- Additional notes: (1) Risks tend to increase significantly as growth scales up; and (2) These lenders are not just consolidating other debts (although debt consolidation and/or credit card debt repayment are key uses cases)

Top personal lending brands by mail volume (i.e., the number of mail offers personal lenders mail out to solicit personal loan applications)



FinTech vintages are showing steady improvement when viewed by the percentage of accounts that are 60 days+ past due



16. FinTech-driven credit (consumer offerings)

Dedicated POS financing (purchase-specific credit offerings)

- Examples of large, FinTech-dedicated POS financing platforms are Affirm, AfterPay, PayPal Credit, GreenSky, and Klarna, along with Synchrony Financial, ECN Service Finance, and private-label issuers (Wells Fargo, Citi, etc.) and, increasingly, traditional banks (e.g., Chase offering “My Chase Plan”, Synchrony offering “SetPay”)
- FinTechs offer financing at the POS (online & in-store), with merchants benefiting from conversion rates and higher average basket size
- Accounts for only ~20% of approved loans (suggesting a different purpose than personal lending and, thus, less competitive), partially due to many of the providers being newer products/concepts
- Key questions: (1) What will happen to the industry if more credit card issuers allow borrowers to turn credit card balance into monthly installment loans with comparable terms (already beginning with Chase, Citi)?; (2) What happens if banks more prominently offer dedicated POS financing by themselves without relying on third-party platforms? (announcements in 2019 from both Visa [installment APIs] and Mastercard [Vyze] to enable banks at the POS)

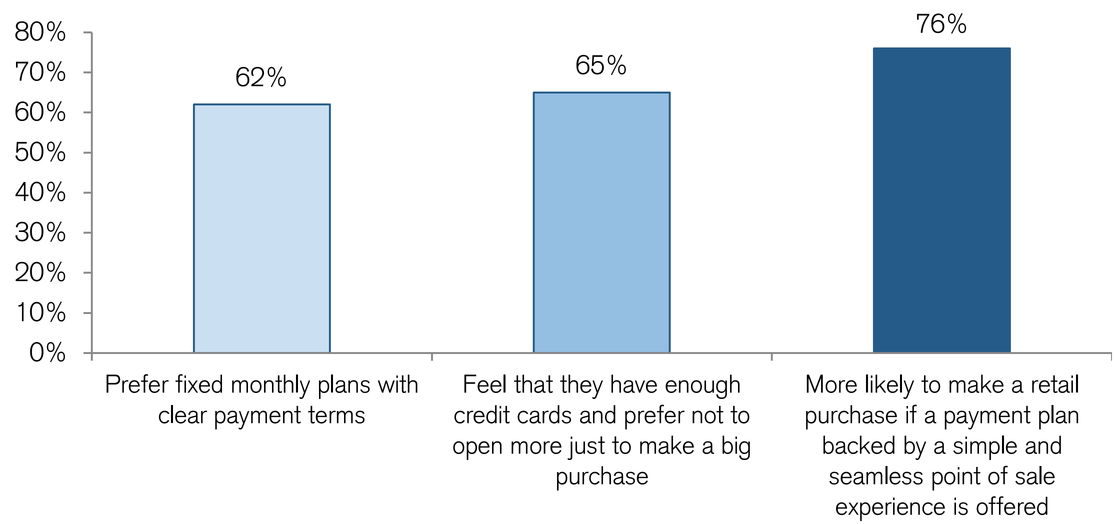
Affirm data suggest meaningfully higher basket size, conversion, and revenue per visitor

75% Higher basket size vs. non-Affirm users

20% Increase in online conversion

10% Increase in revenue per site visitor

Survey suggests that having clear and easy access to financing at the POS meaningfully increases conversion (n=520, June 2018)



Source: Company reports, PYMNTS.com, Citizens Financial Group, Inc., Credit Suisse research

16. FinTech-driven credit (consumer offerings)
Selection of Personal lending FinTech platforms

Marketplace lenders	Comment
SoFi	• $4.3b valuation ($500mm+ financing, May 2019) • $40b in funded loans across 700k+ members • Offerings in student loan refi, private student loans, personal loans, home loans, SoFi Invest, and SoFi Money • Expanding into cryptocurrency trading (partnering with Coinbase) • Anthony Noto became CEO in early 2018 (former COO of Twitter, CFO of NFL, Goldman Sachs analyst & banker) • Had applied for a US banking license but withdrew application in October 2017
Lending Club	• 3mm+ consumer borrowers and 200k+ self-directed individual investors, along with banks, institutions, and managed accounts serving as investors (banks are largest source of funds) • ~13% average APR on loans up to $40k (average loan $16k) • Publicly traded in the US (LC)
Avante	• $4b+ borrowed across 600k+ consumers; • Loan amounts of $2k to $35k, with APR range of ~10-36%, terms of 24-60 months • Also charges an administrative fee of 4.75%; Primarily a lower FICO score lender (and lending-as-a-service)
Prosper	• $15b+ borrowed across 950k+ consumers; loan amounts up to $40k, with terms of ~3-5 years
Marlette (Best Egg)	• $8b+ borrowed across 600k+ loans; loan amounts of $2k to $35k, with APR range of ~6% to 30%
Upstart	• Loans from $1k to $50k; 3- and 5-year terms
Upgrade	• Loans from $1k to $50k; 36- to 60-month payback periods
Other personal lending FinTechs	**Comment**
Earnest	• Range of student loan refi, private student loans, and personal loans (up to $75k) • Acquired in July 2018 by Navient Corp., for $155mm
Marcus (Goldman Sachs)	• Loans up to $40k, with APR starting at 5.99% (range ~6-29%), terms of 36-72 months • Combines with online savings accounts (Marcus-branded) and Apple Card (credit card) to form basis of a nascent consumer business
Elevate	• Online credit products for non-prime consumers; $7.4b in volume, 2.3mm customers (July 2019)

Source: Company reports, Credit Suisse research

16. FinTech-driven credit (consumer offerings)

Selection of dedicated financing platforms innovating at the POS

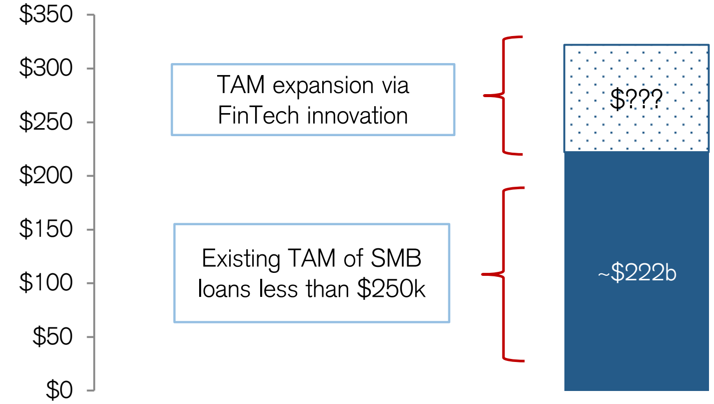
POS financing platform	Valuation	Comment
Affirm	~$2.9b ($300mm financing, April 2019)	• Checkout button credit offering; simple interest range 0% to 30% (avg.~17%); no late fees • Partially merchant funded at ~2-3% • Average order ~$800 paid back over ~10-11 months • ~3k+ merchants offering (Walmart, Peloton, Wayfair) • October 2019 launch of Anywhere (Visa virtual card) expanding network to all Visa accepting merchants vs. ~3k Affirm acceptance points (i.e., even non-Affirm merchants)
AfterPay (AfterPay Touch Group)	~$5b (publicly traded in Australia, APT)	• Checkout button credit (installments) • Merchant funded at ~4-6% plus $0.30 (free to consumers) • Afterpay and Touchcorp merged June 2017 • 25k+ merchants (Urban Outfitters, Forever 21, GOAT)
GreenSky	~$1.3b (publicly traded in the US, GSKY)	• Emphasis on home improvement & elective healthcare • Partners with banks (Regions, Fifth Third, Synovous) • ~$20b+ cumulative volumes (as of Q3 2019) • ~17k+ merchants (Home Depot, Renewal by Andersen)
Klarna (Visa strategic investor)	~$5.5b ($460mm financing, August 2019)	• Range of repayment options (e.g., after delivery, over time, 30 days, 36 months, etc.), with shorter payment terms (e.g., 14-30 days) interest free • 90k+ merchants • Merchant funded (3-4% fee)
PayPal Credit (formerly Bill Me Later)	Part of PayPal (PYPL)	• Consumer offering in the US done via Synchrony Financial (SYF), but kept on balance sheet ex-US • ~$1b in consumer receivables (largely international) as of Q2 2019 • ~2% of PayPal total payments volumes is funded via PayPal Credit
Square Installments (Square Capital)	Part of Square (SQ)	• Launched October 2018 • Range of $250–10,000, fixed monthly payments (3, 6, or 12 months) at a range of 0-24% • Consumer funded, although merchant pays an installment-specific MDR on sale (e.g., 3.5% for in-store)
Vyze (Mastercard acquired)	Part of Mastercard (MA)	• A platform for lenders at the POS (allows merchants to offer credit from multiple lenders) • No credit risk to Mastercard (platform only) • Large-ticket item currently but expanding to smaller-ticket size

Source: Company reports, Digiday, Credit Suisse research

17. FinTech-driven credit for merchants (micro & SMB lending)
Expanding the addressable market for merchant credit

- FinTech platforms are in the process of expanding the addressable market for small business lending – similar to what Square has done for micro merchant payments; these platforms are able to offer loans that traditional banks previously avoided.
  - Cost prohibitive for many traditional banks to go after small loan sizes (e.g., Square ~$6-7k average loan size) in terms of customer acquisition, costs to review application, etc.
  - FinTech often already have acquired a heavily engaged customer, and the loan offering can be done via cross-sell through a dashboard with which the merchant interacts on a daily basis.
  - FinTechs often utilize additional and/or more real-time data that banks do not have, including sales trends through their payments or eCommerce platform (e.g., Square Capital, Shopify Capital, Amazon Lending) to reduce risk.
  - Alternative data sources used by FinTechs include accounting software linkages (inventory levels, receivables and payables data, hiring trends), social media accounts, linkage to all bank accounts (cash balance trends, outflows and inflows), website traffic, user reviews & ratings, and more.
  - FinTech platforms are often "paid first" via a percentage of payments volumes, further reducing risk.
- Numerous types of credit offerings (working capital loans, merchant cash advance, equipment financing, invoice factoring, other business loans, etc.); merchant cash advance offerings through payments platforms are not new, but expansion into smaller merchant is (e.g., Square Capital, PayPal Credit, Shopify Capital).

Business loan balances < 250k in the US stood at ~$222b as of year-end 2018, but FinTech's are expanding the reach (new TAM)



FinTech SMB loan experience vs. traditional bank – easier application, faster approvals, and based on more than traditional credit metrics

Lower customer acquisition & processing costs, existing merchants	vs.	Often not economical (CAC, risk, etc.) to pursue smaller loans
Online application (including pushed pre-approvals in dashboard) and fast	vs.	Can be offline (brank branch) and time consuming (more requirements)
Automated review & approval (often times instantly or within minutes)	vs.	Reviewed by a person (weeks or more of application processing)
Funding available same-day or next day (perhaps directly via debit card)	vs.	Funding can take multiple days in some cases
Decisions enhanced with payments, accounting, social, & other data	vs.	Decision based on traditional credit analysis

Source: Company reports, OnDeck, Credit Suisse research

17. FinTech-driven credit for merchants (micro & SMB lending)

Examples of Payments & eCommerce platforms offering merchant credit

Merchant credit offerings	Comment
Square Capital	• Cumulative ~$6b loan volumes across ~850k loans since launch May 2014 • Repayment as a percentage card volume done through Square's platform • Loss rates consistently at less than 4%, despite smaller merchant size
PayPal Credit	• Merchant credit business remains on balance sheet for PayPal (US consumer sold to Synchrony Financial) • PayPal Business Loans ($5k to $500k range) & PayPal Working Capital ($1k to $125k range) • Total receivable ~$2.6b as of Q3 2019 (+63% YoY due to PPBL growth) • US & UK offerings (~95% of receivables)
Shopify Capital	• Cumulative ~$770mm total merchant cash advances as of Q3 2019 • July 2019 expanded to non-Shopify Payment merchants in the US (expands TAM ~10%) • Supported by data within Shopify Payments and Shopify Fulfillment Network
Amazon Lending	• Invitation-only program that offers $1k-75k loans for sellers to purchase inventory for use on Amazon • Utilizes real-time sales data (and growth), customer reviews, profitability metrics, etc. • Terms on the loans tend to be 12 months or less (i.e., short term) • "Amazon Lending surpassed $3 billion lent to small businesses on Amazon since the program started in 2011" (January 2018)
Amazon.com Revolving Corporate Credit Line & Amazon.com Corporate Pay-In-Full Credit Line	• Credit line can only be used at Amazon.com • More flexible payment terms (i.e., pay-in-full or make minimum monthly payments only) • The Pay-in-Full Corporate credit line offers 55-day payment terms (no interest, no fees) and is marketed more toward larger businesses (e.g., libraries, schools, government organizations)
Global Payments (Evolocity Financial partnership)	• Up to $200k per loan • Repayment as a percentage of card volume • Cash advance and SMB loans • Additional TSYS offerings (cash advance up to $150k)
Clover Capital (Fiserv)	• Repayment as a percentage of card volume (but tends to be in the 10-20% range) • Available to any First Data directly or through any ISO, partner, etc.
Worldpay Business Finance (Liberis partnership)	• Partnership with Liberis Ltd (Worldpay will receive a commission) • UK-based offering for businesses doing £1,000+ trailing-four-month volumes

Source: Company reports, Credit Suisse research

17. FinTech-driven credit for merchants (micro & SMB lending)

Additional FinTech platforms innovating in merchant credit

FinTech Platform	Comment
Behalf (Visa strategic investor)	• Allows vendors to extend no-fee terms and 30-180 financing (30-180 days) to SMBs (line of credit) • Behalf customers can make business purchases (access credit line) via Visa virtual cards
BlueVine	• Invoice factoring, term loans, and lines of credit • Invoice factoring up to $5mm • $2b+ cumulative funds delivered to 15k+ SMBs
FundBox	• Revolving lines of credit for SMBs • Connects to accounting software, business accounts, etc. • $50k annual sales ideally (average customer is > $250k)
Kabbage	• $6.5b in volume to 170k+ SMB since founding (2009) • Working capital lines of credit up to $250k, repaid in 6-, 12-, or 18-month terms • Pulls from multiple sources (bank accounts, sales channels, social media, accounting software, etc.) • $50k annual sales, or $4.2k per month average past three months • Launched SMB payments capabilities in Oct 2019 for instant A/R payments
LoanBuilder (Swift Financial, acquired by PayPal)	• Business loans between $5k and $500k • $42k annual sales and a 550 FICO score required • The lender for LoanBuilder is WebBank (Utah based ILC)
Funding circle	• Peer-to-peer lending platform (investors lend to SMBs) • Business loans between $25k and $500k • UK, US, Germany, and the Netherlands
On Deck Capital	• $12b+ total originations across 100k+ SMBs • Term loans (~80% of business), line of credit, and equipment finance offerings • Publicly traded in the US (ONDK)
Payability	• Gives Amazon merchants access to ~80% of sales on a next-day basis (vs. up to 14 days) • Requires 90 days of sales history

Source: Company reports, TechCrunch, PitchBook, Credit Suisse research

18. Digitally native expectations

FinTechs are on one end of the "barbell", big banks are on the other

- Digitally native consumer expectations for mobile apps are set by the mainstream apps (Instagram, Amazon, YouTube, Uber, etc.) where Millennial & Gen Z consumers spend most of their time.

- High expectations for mobile apps favor banks that can keep up (investment, innovation) and/or lean on the more modern offerings from bank technology providers.

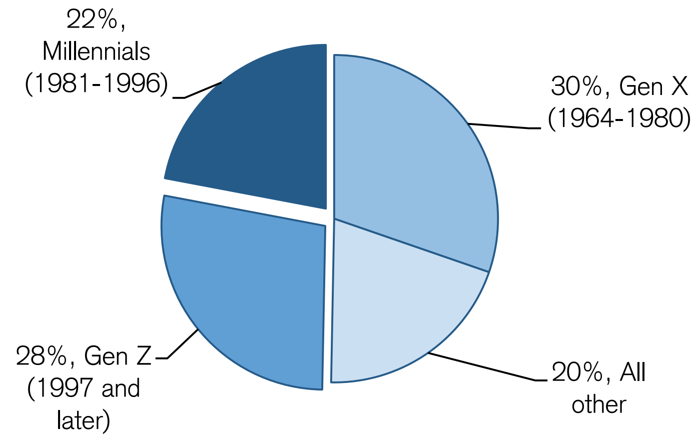
- Millennials & Gen Z are already ~50% of the US population (2017). We expect their preferences to influence winners and losers in consumer financial services.

  - Big banks – The top four banks in the US have the scale to compete with nearly 50% of industry assets, supporting annual technology budgets of over $40b in aggregate.

  - Sub-scale regional & community banks – These banks will continue to face pressure from both sides of the "barbell" with legacy systems that are expensive to maintain and built on programming languages that communicate less fluidly with modern tech.

  - Neo banks & Fintech platforms – Modern technology stacks (i.e., no legacy assets) allow for faster product development centered around feedback from their increasingly large users bases (lack of branch costs, e.g., personnel, real estate).

Millennials & Gen Z are already ~50% of the US population (2017) – we expect their preferences to dictate winners & losers



The "barbell" of financial services favors large banks (able to invest, scale offerings) and Neo banks (nimble, modern, lower cost base)

Drivers of Cash-to-Card Conversion

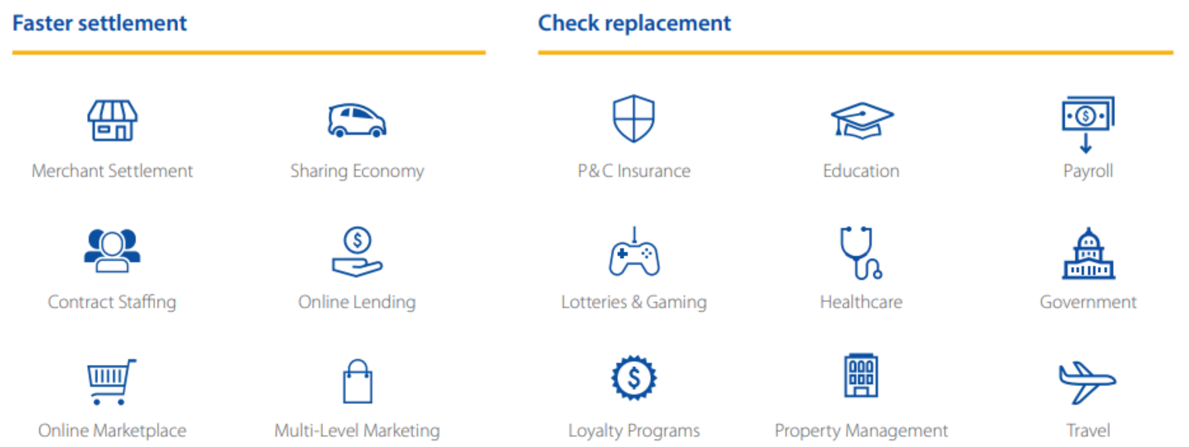
Credit Suisse

19. "Push-to-card" payments unlocking new payment flows

Visa Direct & Mastercard Send strategy and ecosystem benefits

- Both offense (priced to expand card-able TAM into larger, interchange-sensitive payments) & defense (race to scale before modern/fast ACH rails gain ubiquity), resulting in increased carded velocity of those same PCE dollars and further into B2B
  - Expands card-able TAMs into new payment flows (i.e., beyond PCE, into online & on-demand marketplace merchant payouts, insurance claim payouts, etc.)
  - Sends to card-based accounts, then re-spent on cards (increased consumer and business debit card usage as an indirect benefit)
- Revenue generation for both card networks (network fees) and issuing banks (interchange-like revenue stream for receiving banks)
- Slows modern/faster ACH rails from gaining ubiquitous adoption – Visa and Mastercard gaining scale – i.e., partners embedding these offerings – ahead of various emerging faster payments offerings (e.g., NPP in Australia, FPS in the UK, RTR in Canada, RTP provided by The Clearing House in the US, Zelle by Early Warning in the US)
- Beyond Visa and Mastercard, push transactions available via STAR (Expedited Transfer), NYCE (Money Transfer), & PULSE (A2A Transfer)

"Push-to-card" payments (e.g., Visa Direct, Mastercard Send) expand card payments into new market opportunities, beyond C2B and into B2B, C2B, and P2P



"Push-to-card" disbursements provide advantages to business and governments (senders)

82% More likely to work with a business that offers fast disbursements

72% Consider a debit card number to be more convenient than a bank account + routing number

88% Organizations that have cited efficiency as the primary reason to switch to electronic payments

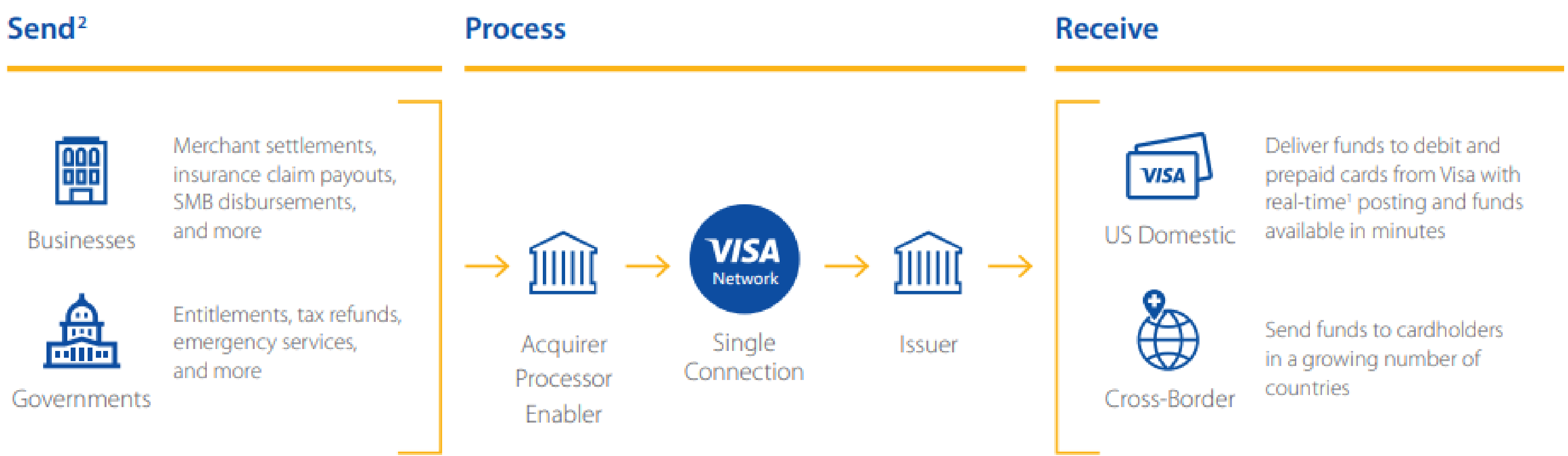
Source: Company reports, Visa, Credit Suisse research; Note: Digital Disbursements Consumer Preferences Survey was commissioned by Visa and conducted by SevenDesign via Ask Your Target Market, among 2,000 active U.S. debit card users (2017); [3] "2015 Payments Cost Benchmarking Survey," The Association for Financial Professionals (2015)

19. “Push-to-card” payments unlocking new payment flows

Visa Direct & Mastercard Send – Push payments using card rails

- Leverage existing card rails (debit card linkage to bank accounts) for all general purpose and prepaid cards, essentially reversing the payment flow within the payments network (i.e., born out of the returns/refunds process)
- Domestic and cross-border capable
- Visa Direct can send funds to Mastercard cards (and vice-versa)
- Can be “instant” or standard t+2 (instant requires “fast funds” posting requirement on the receiving bank – funds available within 30 minutes)

“Push-to-card” payments still require a facilitator function (e.g., merchant acquirer, payments service provider, processor, or other facilitator) to connect to the network



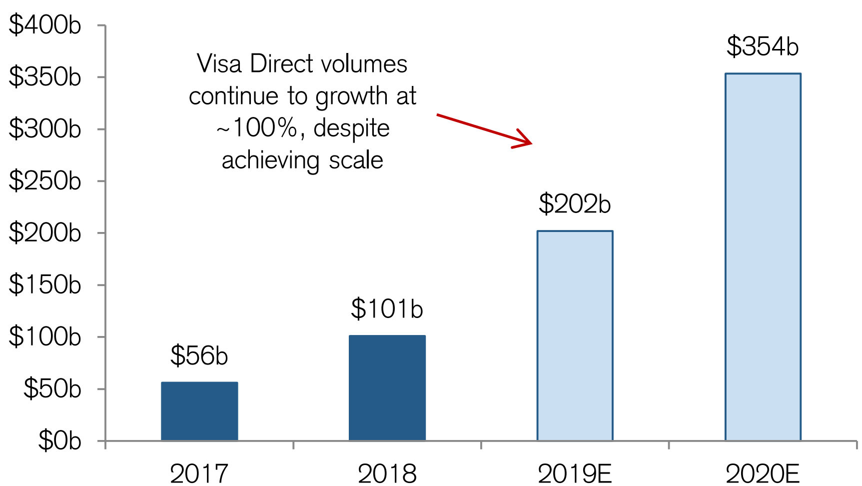
Source: Visa, Glenbrook Partners, Credit Suisse research; Note 2: Use cases are for illustrative purposes only; Program providers are responsible for their programs and compliance with any applicable laws and regulations

19. "Push-to-card" payments unlocking new payment flows

Visa Direct & Mastercard Send growth and pricing

- Network pricing (yields) vary by use case but are (on average) below traditional pull debit at the POS
  - Use case based network fees, priced to value, but on average tend to be lower than traditional debit (in part due to larger average dollar amounts per transaction, i.e., cents per transactions spread across a $1,200 insurance claim payout vs. $50 shirt)
  - Generally more fraud prevention and risk associated with a traditional C2B card transaction vs. a B2C/G2C disbursement
  - Visa generally refers to transaction growth vs. volumes (although recent disclosures allowed for backing into a volume measure)
- Interchange-like fees (not officially considered interchange and thus not a part of Visa's publicly available pricing schedule paid by sender to the receiver's bank); potential for this portion of the economics to be reduced or removed over the longer term (ACH push payments do not provide revenue for receiving banks)

Visa Direct continues to grow ~100%, and these volumes now make up ~2% of Visa's total payments volume; of the ~$100b in 2018, ~$42b was US (vs. ~$14b in 2017)



Visa Direct and Mastercard Send provide an "interchange" to the receiving bank, likely put in place to incentivize uptake

"Interchange" paid to receiving bank	~$0.10 per domestic transaction for Visa Direct
Network fees	Largely priced on a "cents per transaction" basis, and thus, appear mainly in "Data Processing Fees"; Use case based and still early days in the price discovery process (e.g., different prices for B2C vs. P2P, perhaps negotiable for large payers such as insurance companies with larger average send amounts); Generally amounts to a net yield for Visa that is below traditional debit
Other	Visa OCT is the transaction, while Visa Direct is the service; Mastercard Money Send is the transaction, while Mastercard Send is the service

Source: Company reports, Glenbrook Partners, Credit Suisse research

19. “Push-to-card” payments unlocking new payment flows
Visa Direct & Mastercard Send vs. ACH-based alternatives

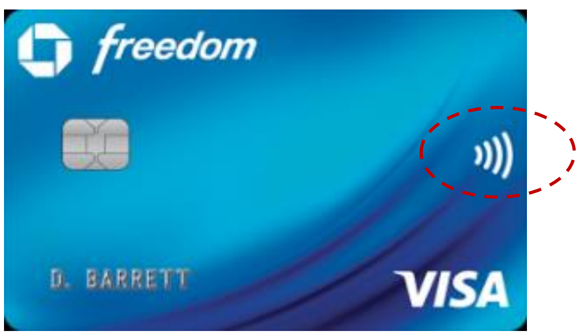
Aspect	Visa Direct & Mastercard Send	ACH-based (including faster payments, ACH-like alternatives)
Domestic vs. Global	Cross-border: Global by definition, with cross-border capabilities and access to ~3.5b cards and ~25k banks connected to Visa and Mastercard	Local (but evolving): ACH-based systems are (today) by definition local, and often country-specific; Examples include NPP in Australia, FPS in the UK, RTR in Canada, RTP provided by The Clearing House in the US, Zelle by Early Warning in the US, and the pending FedNow system (potential launch in 2023/2024) in the US; That said, it is possible that over time modern ACH systems could become linked/interoperable for use in cross-border payments (i.e., many are using ISO 20022 standards, making connecting various systems more feasible over time)
Account-access	Traditional bank accounts & prepaid cards: Broader access to the underbanked via prepaid cards; Can also access credit cards	Traditional bank accounts only: Generally does not have access to prepaid cards and credit cards, although there are country-specific examples that can access 16 digit debit and prepaid cards via ACH rails (e.g., FedGlobal via FedACH to SPEI).
Costs to sender	Higher, but priced to value: Use case specific pricing and still in the early stages of an evolving pricing strategy (emphasis on transactions at the moment)	Lower: Appropriate for many uses cases, but without the full scope of services provided by card network-enabled push payments
Costs to receiver (bank)	Banks earn money: Banks are compensated for receiving funds, earning "reverse interchange-like" revenue; Receiving banks earn $0.10 each time they accept Visa Direct	Banks have costs: Banks (sending and receiving) have costs associated with accepting ACH-based payments, typically paying the operator (e.g., NACHA, EPN) and a third-party service provider (e.g., Popmoney by Fiserv)
Risks	Chargebacks & dispute process: Card network rails come with processes around chargebacks & disputes; Originating bank bears the risk when accounts are taken over; These processes generally add costs to the ecosystem	No chargebacks & disputes: ACH-based payments cannot be reversed due to issues with a product or service delivery (merchant failure); The originating bank does assume risk when accounts are taken over (per Reg E)
Speed & availability	24/7 real-time (card rails are always on); Visa requires fast-funds enabled issuers to make funds within 30 minutes	Modern systems are 24/7, traditional are not: Modern faster payments systems (e.g., RTP in the US) are 24/7; Legacy ACH systems are not, and often operate under bank branch-like hours (batch processing)
Other	Long-standing real-time capabilities, consolidated into two known brands (Visa, Mastercard)	Numerous, more recent developed options

Source: Visa, Glenbrook Partners, Credit Suisse research

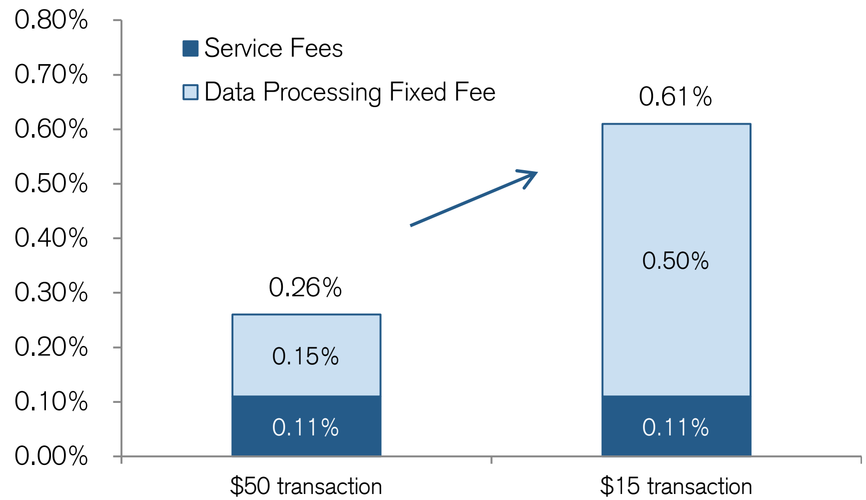
20. Contactless payments
Driving penetration of small-ticket habitual purchases

- Contactless payments is a driver of transaction growth in mature markets with high card penetration, with key benefits such as:
  - Replacing cash, particularly in small-ticket items that are disproportionately still done in cash today (we note that this turns out to be yield accretive for the card networks given fixed data processing fees are spread over lower ticket sizes)
  - Increasing spend per active card by ~14-16%
  - Decreasing checkout time and improving customer experience
- Enablers of Contactless – Critical mass of acceptance and cards before taking off (chicken and egg)
  - Merchants need to have EMV-enabled terminals
  - Banks need to issue contactless-enabled cards (cost issuers at ~$5 per card vs. ~$2-3 per card without contactless capabilities)
  - Drive consumer adoption by habituating the use of contactless payments through daily use cases (e.g., transit)

Contactless logo on the front of the card signifies a contactless-enabled card, which should begin appearing more often in the hands of US cardholders in 2020 & 2021



Illustrative example: Visa's net revenue yield potentially could be more than ~2x higher on a small-ticket transactions (ex enhanced rebates & incentives)



Source: Visa, Credit Suisse estimates

20. Contactless payments
US rolling out as we speak, experience elsewhere

- Consumer adoption in international markets bodes well for adoption in new geographies (particularly the US).
  - Visa has 50 countries where at least 33% of face-to-face transactions are contactless.
  - Acceptance in the US is improving. Currently 60% of Visa and Mastercard US payments volume is occurring at contactless-enabled merchants.
- Visa noted that as of end Q3 2019, eight of the top ten issuers are participating in contactless and that more than 100mm Visa contactless cards had already been issued (vs. expectation of 300mm by end 2020).
  - We expect an outsized benefit for V vs. MA in the US given mix (45% of volume vs. 35% for MA, skew to large issuers).
- Mastercard noted (also at end Q3 2019) that issuers making up ~70% of US Mastercard cards had committed to re-issuing contactless cards over a 12- to 24-month period, with many already doing this (e.g., Citi, Capital One, HSBC, Key Bank, etc.).

Contactless % share of face-to-face transactions; rapid consumer adoption indicates strong customer experience

	Australia	Singapore	Canada	UK
2014	52%	22%	14%	4%
2017	84%	52%	42%	44%

"… So where we've seen contactless come in, it has taken off like a rocket ship, and we've given you some of the statistics. It takes 2 or 3 years to build. And then within a couple of years, 90% of transactions are contactless. And what it does is 2 things. One, it allows you to go deeper and deeper into smaller and smaller transactions and so digitizes more cash. And secondly, it becomes so easy that people displace other modes they were using to pay like tapping phones…"

– Vasant Prabhu, CFO, Visa (December 2019)

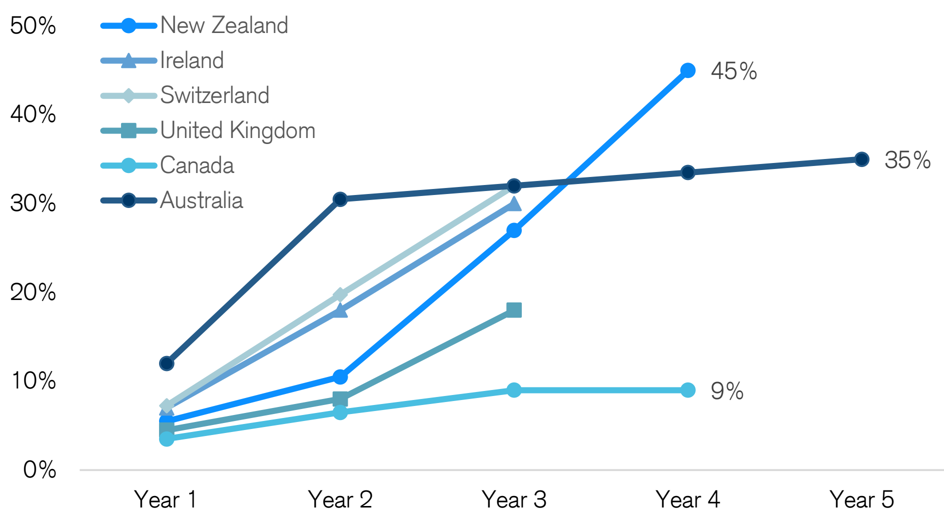
Source: Company reports, Visa Investor Day, Credit Suisse research

20. Contactless payments

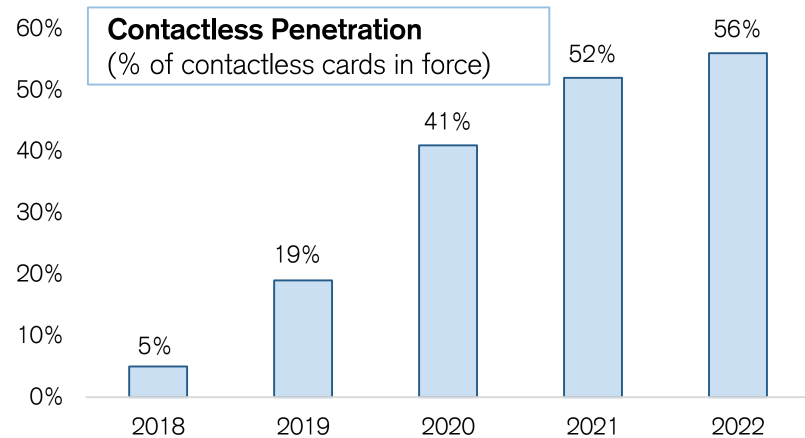
US contactless rollout phasing and impacts

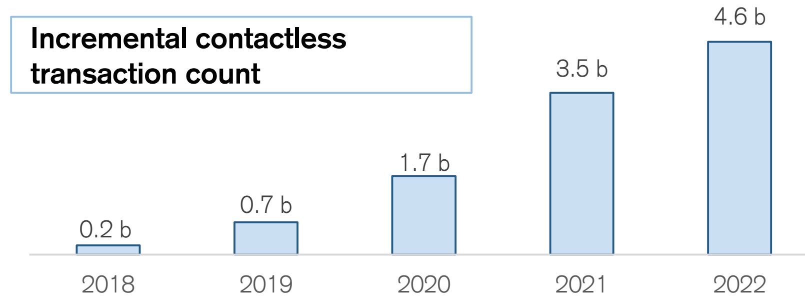
- Contactless payment methods are largely a new development (~5% penetration as of 2018) and should increase rapidly as issuers continue converting to contactless capabilities.
- Previously un-carded transactions should contribute incremental volume as contactless issuance ramps, further incentivizing issuers and merchant acquirers to put more resources into selling contactless terminals into merchants.

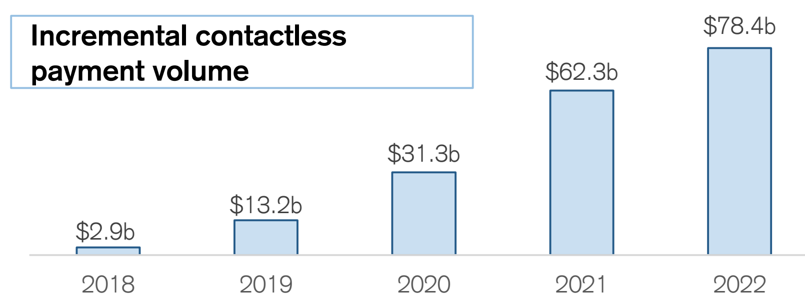
Contactless-enabled cards have shown transaction per card increases of 35-45% in card markets similar to the US (years 1-5 post rollout)



The US market for contactless cards is expected to ramp quickly, with incremental transactions reaching ~4.6b by 2022E







Source: Credit Suisse estimates, A.T. Kearney via Consulting.us

20. Contactless payments

Top 15 economies' experience with contactless rollouts

Contactless cards began rollout in the early 2000s in select markets, with more recent rollouts in countries with payments markets (high card penetration) more similar to the US, experiencing meaningful adoption within 3-4 years

Country	Year of contactless cards deployment Year first card was issued, year of contactless acceleration	Drivers of contactless adoption (2016)		Contactless penetration (2016)	
		% point-of-sale transactions conducted using cards	% cards in force that are contactless	% total point-of-sale transactions that are contactless	% card point-of-sale transactions that are contactless
Australia	2009, 2012	45.00%	67.45%	12.44%	27.64%
United Kingdom	2007, 2015	54.00%	63.87%	12.56%	23.27%
Canada	2007, 2013	61.00%	66.40%	13.93%	22.84%
South Korea	2004, 2012	58.00%	95.91%	12.07%	20.82%
Spain	2012, N/A	13.00%	53.09%	2.48%	19.11%
China	2006, N/A	6.00%	59.25%	0.96%	15.94%
France	2007, N/A	37.00%	42.85%	2.47%	6.67%
Italy	2010, N/A	14.00%	38.24%	0.89%	6.39%
Russia	2013, N/A	18.64%	21.88%	1.13%	6.06%
Germany	2012, N/A	16.60%	58.73%	0.88%	5.33%
India	2015, N/A	7.00%	3.14%	0.04%	0.52%
United States	2003, N/A	56.00%	3.47%	0.18%	0.32%
Mexico	2012, N/A	15.64%	0.37%	0.01%	0.07%
Brazil	2013, N/A	40.00%	0.69%	0.03%	0.06%
Japan	2001, N/A	16.20%	0.03%	0.00%	0.02%

Low card penetration | High card penetration | High contactless penetration | Low contactless penetration

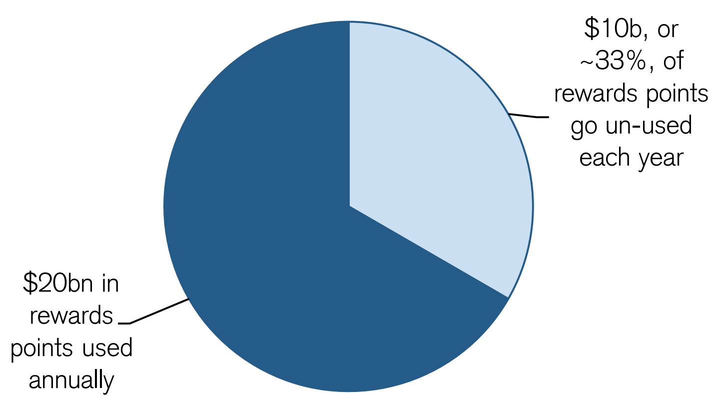
Source: A.T. Kearney, Credit Suisse research

21. Loyalty and rewards becoming easier to spend

FinTechs entering the rewards and improving liquidity

- Opportunity for payments ecosystem to take friction out of using rewards points (provide an easy-to-spend, at the POS, instant access to rewards points vs. formally spending via a rewards program website), with various ways to provide this value (e.g., FIS, Square, PayPal programs)
- PayPal estimates 1/3rd, or roughly $10b worth, of reward points in the US go unused each year at the top 6 banks alone, while FIS suggests that there are more than 200b unused rewards points that are up for grabs
- Merchants that work with FinTechs to accept loyalty rewards benefit from providing an option that consumers find attractive (per survey results below, potentially leading to increased foot traffic), an additional payment method choice online (greater choice generally leads to increased conversion), and potentially reduced costs (in the case of FIS Premium Payback, merchants are not charged interchange on the rewards-funded portion of the transaction)

PayPal estimates that ~33% of rewards points go unused in the US each year



FIS Premium Payback-related consumer survey results point to the value proposition for merchants

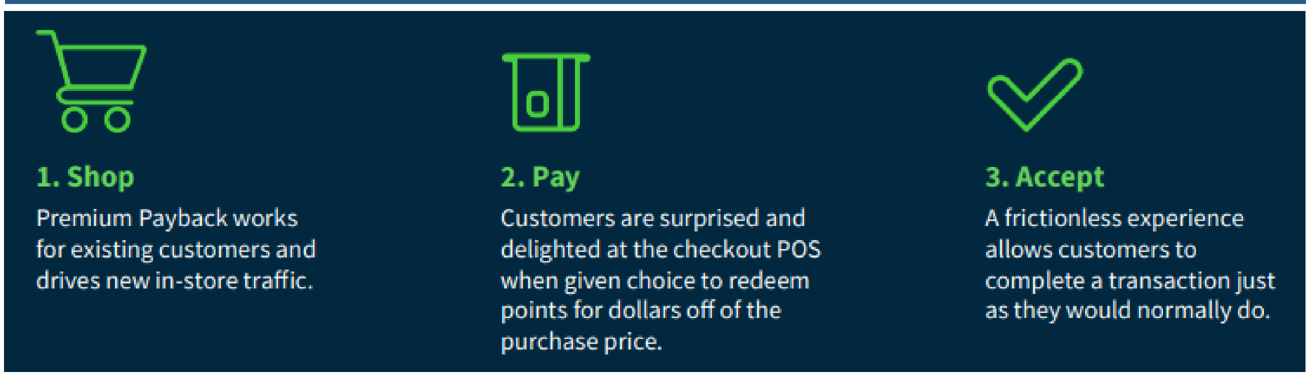
- **56%** Consider Premium Payback a better value than other redemption options
- **88%** Would redeem their points again for purchase rebates
- **88%** Rated their experience (with FIS Premium Payback) as a four or a five

21. Loyalty and rewards becoming easier to spend

FIS Loyalty-as-a-Currency set to expand with WP merchants

- Premium Payback program enables ~23mm consumers to redeem rewards on the POS, originally launched in 2016
- Gas stations were the initial vertical (~24k US gas stations); the success of program had led to new vertical expansion
  - No action required by consumer (will be prompted at the POS with the option to use rewards points)
  - Merchant benefits from reduced interchange for the rewards points-funded portion of the transaction
  - Issuer is able to remove liability from balance sheet and convert the points at a slight discount
- FIS-WP benefits from creating a value-added service for both issuer and merchant partners, allowing for a degree of increased stickiness, price compression protection, and potential share gains via new client additions
- FIS expects the first joint (FIS-WP) loyalty-as-a-currency customer will go live in 1H 2020, with the integration work done for this first client paving the way for a more streamlined onboarding process for future new clients
- FIS-WP will extend this offering into eCommerce sites of Worldpay merchants (large and multinational retailers)

FIS Premium Payback is seamlessly enabled into the existing POS payment process



Early consumer adoption stats suggest the offer resonates at the POS

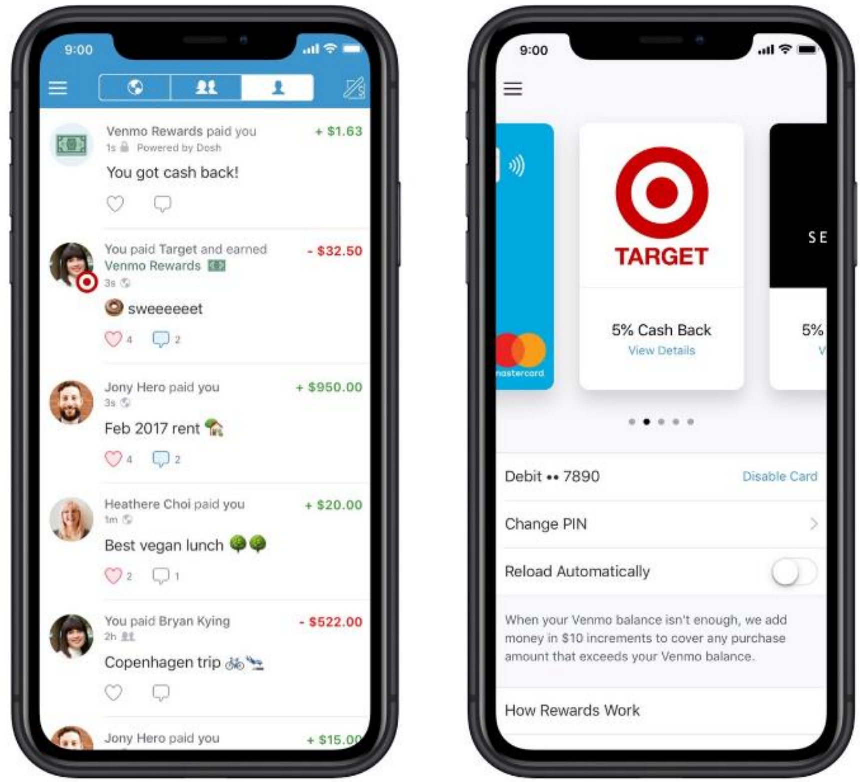
37%	Portion of consumers that accept the offer when prompted at POS (offer to redeem points as part of their current purchase)
10%	Increase (YoY) in take rate experienced during the early innings of this new service

Source: FIS, Credit Suisse research

21. Loyalty and rewards becoming easier to spend
PayPal and Venmo leveraging their 2-sided networks

- PayPal provides instant rewards programs in two forms: PayPal Pay with Rewards and Venmo Rewards (cash back)
- PayPal Pay with Rewards
  - Enables consumers to consolidate points across accounts to use at PayPal's >24mm merchants globally
  - PayPal benefits from reduced funding costs (rewards a low-cost funding method, supportive of transaction margins)
  - Deepens bank relationships, with large US Issuers partnering (Chase, Amex, Citi, Discover, etc.) with PayPal
  - Banks improve their consumer value proposition and reduce reward points liability on balance sheet
  - Merchant benefit via increased conversion
- Venmo Rewards (cash back program)
  - Venmo is offering immediate Cash back on purchase at select merchants (when Venmo Card is used); funds entire Venmo account balance
  - We expect rewards to be used as an engagement lever for Pay-with-Venmo (PWV)
  - Unique (but similar to Boost from Square's Cash Card) in that attractive awards can be earned on a debit card (vs. credit card), given debit rewards have been meaningfully reduced since debit interchange became regulated for large banks after 2010

PayPal leverages its 2-sided network to drive value for the entire ecosystem (consumers, merchant, banks, and PayPal) via PayPal Pay with Rewards and the Venmo Rewards cash back program



Source: PayPal, Credit Suisse research

21. Loyalty and rewards becoming easier to spend
Square's Cash App Boost

- Square's Cash Card (card attached to Cash App account for consumers) provides consumers with instant cash-back rewards without an expensive annual credit card fee
- Unique (but similar to Venmo Rewards) in that attractive rewards can be earned on a debit card (vs. credit card, given debit rewards have been meaningfully reduced following the Durbin amendment)
- Delivers rewards immediately (i.e., instant gratification to users, funds delivered to Cash app balance); examples are 15% of Shake Shack, $1 off any coffee, 10% off Nike, 10% off DoorDash, etc.
- Drives incremental revenue for merchants (Square and non-Square sellers) via foot traffic, frequency of visits, higher ticket size, etc.
- Cash Boost (rewards) potential to turn from a cost center (currently a contra revenue item, serving as a marketing cost as Square funds the rewards) to a revenue generator (potential for merchant funding of rewards, paying for positioning within Cash App, etc.)
  - The targeting value within the Cash App is something we believe investors underappreciate (Location-based Boosts), given the ability to target by customer (known user), merchant (company-specific offers), or location (geo-location data) and on a real-time basis – attractive to digital advertisers with large budgets
  - The first step toward improving monetization of Boost has begun, with Square beginning to reduce some of the contra revenue costs by asking partners to contribute to funding of the offers – next step could be to ask for full merchant funding, followed by competition (bidding) for positioning within Cash App

Square's Cash App Boost has the potential to turn from a cost center (contra revenue item, with Square funding the rewards) to a revenue generating, hyper-targeted advertising platform

21. Loyalty and rewards becoming easier to spend

PayPal's Honey acquisition – Doing things other payments methods don't do

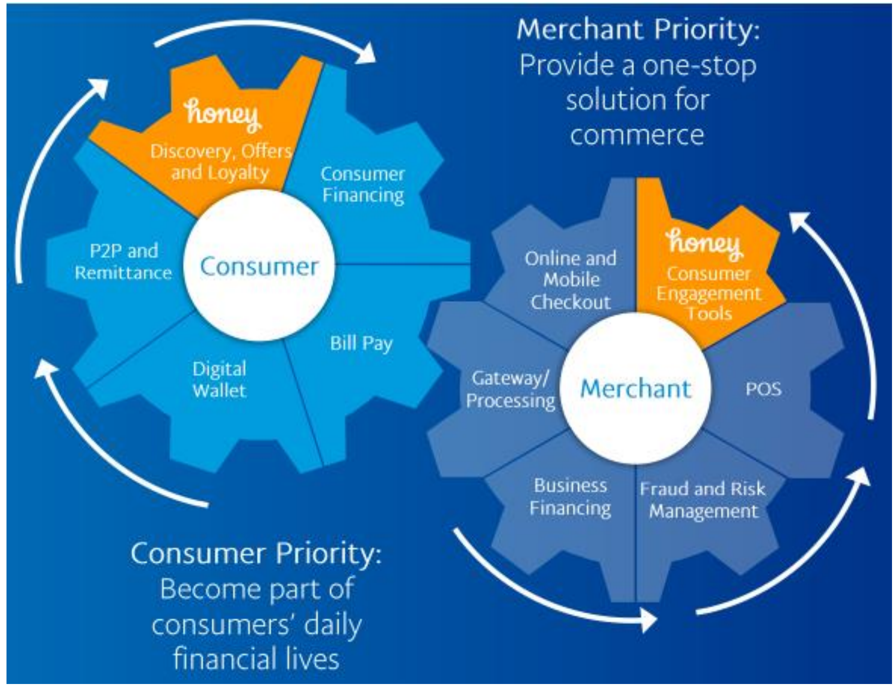
- In Nov. 2019, PayPal announced the $4b acquisition of Honey, an online shopping and rewards platform that works across more than 30k online merchants and ~17mm monthly active users, which PayPal can scale across its ~300mm users.
- ~40% of all eCommerce begins through a "trigger event", such as a personalized offer.
- It supports PayPal's pricing (i.e., transaction take rates) and will help to differentiate PayPal vs. alternative checkout methods (timely given the network SRC button launched in Q4 2019); simply stated, doing things other payments methods don't do.
- Honey will be embedded in the Venmo app and will be a significant driver of Pay with Venmo adoption, in our view.
- Honey enhances Venmo's push into online shopping through rewards, in a similar vein to earlier brand initiatives.
- We note the vast majority of rewards are merchant funded, an emerging tool for marketers to directly engage with consumers.

"…There are a lot of these direct-to-consumer brands that have launched, and one of the big ones that people know about is Allbirds…They came out and basically spent their entire marketing budget on Facebook ads and Instagram ads, and they're paying basically for eyeballs or clicks. What we just had the conversation with them about is it would be actually a lot more effective for them if they could just give 10% discount to a user who bought with Venmo as long as they shared their purchase.…"

– Amitabh Jhawar, GM Venmo, PayPal (November 2019)

Honey is a highly-strategic acquisition enabling PayPal to become involved with consumers at the beginning of the shopping experience (i.e., drives traffic to merchants, moving PayPal to top of funnel, a notable differentiator)

For consumers	For merchants
Helps save money by streamlining discounts and rewards, in addition to price-tracking tools and alerts	Expands PayPal's value proposition by enabling it to target specific consumer demographics with customized (personalized) offers, increasing conversion and sales

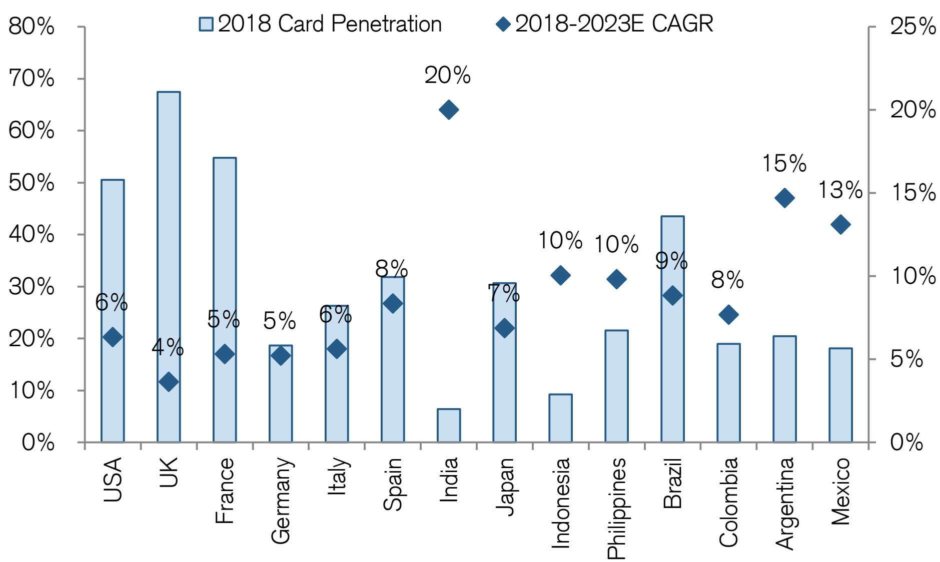


22. Long runway for card penetration in both EM & DM markets

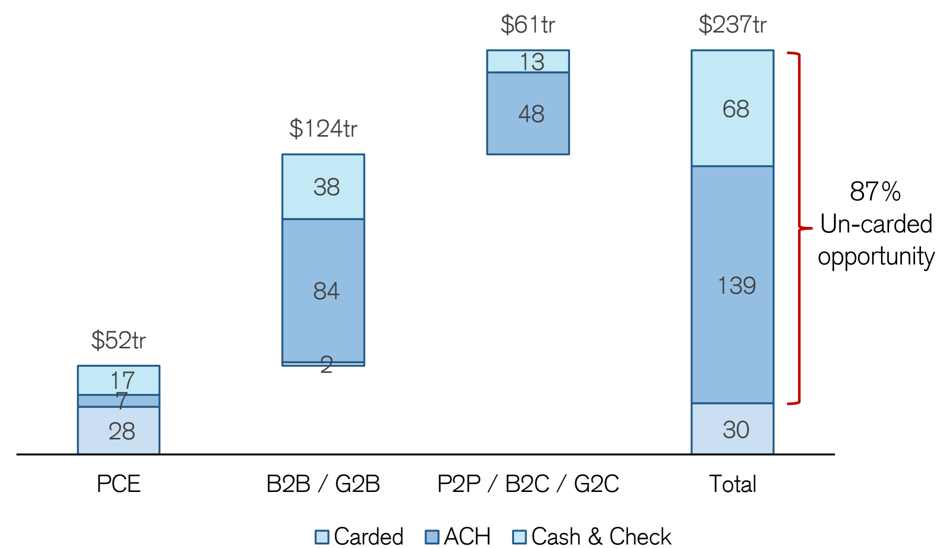
Emerging markets will be a key source of growth payments companies

- Emerging markets will be a key source of growth for global payments companies, with card payments growth in developed markets now below 10% (e.g., ~6-8% in the US) given now higher levels of PCE penetration.
- The Asia-Pacific region is the least penetrated, with a TAM of $6tr and meaningful opportunities for continued cash & check conversion in India, Japan, Indonesia, and the Philippines.
- Europe represents the next largest opportunity, with a TAM of $3.5tr in cash & check transactions yet to be converted, with still sizable opportunities in Germany, Italy, Spain, and France (for the card networks specifically).

Global card penetration of consumer spend remains low in numerous countries, with the US and the UK representing two of the more mature payments markets (both north of 50% penetrated)



Globally, Mastercard estimates there is still ~$7tr of cash & check within the Personal Consumption Expenditures (PCE), and ~$68tr in total globally



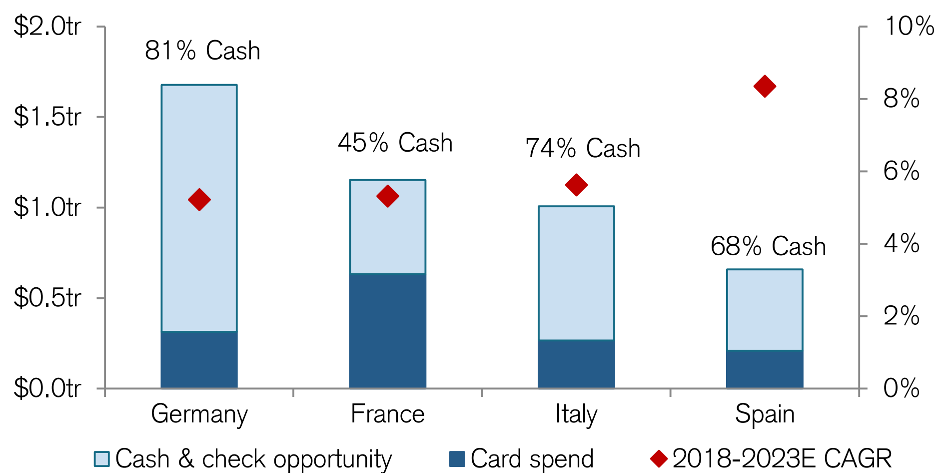
22. Long runway for card penetration in both EM & DM markets

Europe a ~$3-4tr cash opportunity, drivers, country highlights

- Government influence has been a driver of the European payments landscape, highlighted by interchange caps and PSD/PSD2
  - Interchange Caps in December 2015 reduced acceptance cost and stimulates electronic payments penetration with SMBs
  - PSD/PSD2 aimed at fostering innovation and competition
- Debit-centric market – cultural preferences to not use credit
  - Low-interchange also limits card reward programs, with interchange generally viewed as funding those costs
- Network mandate for all POS terminals to be contactless-enabled
- Germany, # 4 GDP country in the world
  - Cash >55% of in-person payments, debit card 25%
  - Girocard, national card scheme, >70% card share
- France, #6 GDP country in the world
  - Cash >45% of in-person payments, debit card 30%
  - Cartes Bancaires, national card scheme, >90% card share
- Italy, #8 GDP country in the world
  - Cash >60% of in-person payments, debit cards >20%
  - Bancomat, national card scheme, >40% card share

~$3-4tr cash & check opportunity remains in Europe

The key growth countries in Europe are still relatively cash heavy



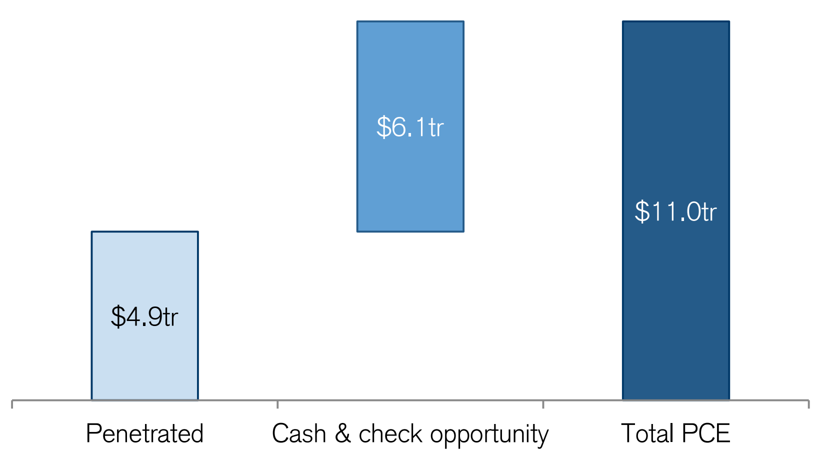
 Source: Visa, Euromonitor, Credit Suisse estimates

22. Long runway for card penetration in both EM & DM markets

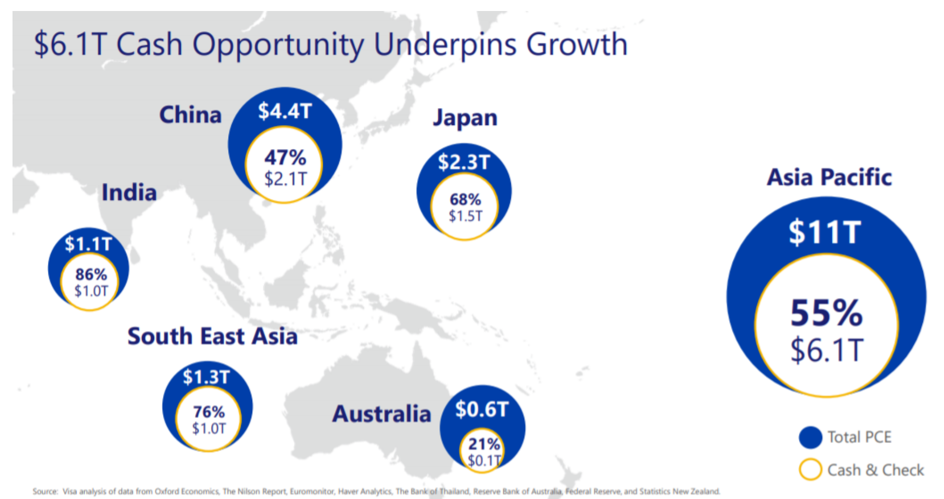
Asia-Pacific still ~50% cash & check, a favorable backdrop

- Government initiatives to reduce cash (India demonization, Japan Cashless initiative)
- High smart phone penetration (e.g., China at 76% in 2017, South Korea at 82%, and Malaysia at 73%)
- Prevalence of super apps with large user bases (meets ubiquity requirements for consumer adoption of new payment behaviors)
- Near greenfield opportunity to fill in financial services gaps from large underbanked populations (insert data point)
- QR codes lowers barriers for electronics payments – cheaper, lower infrastructure requirements

>$6tr cash & check opportunity to be brought onto electronic means of payments within emerging markets…



…with the opportunity in Asia-Pacific extending beyond emerging markets (e.g., Japan ~65% cash & check)

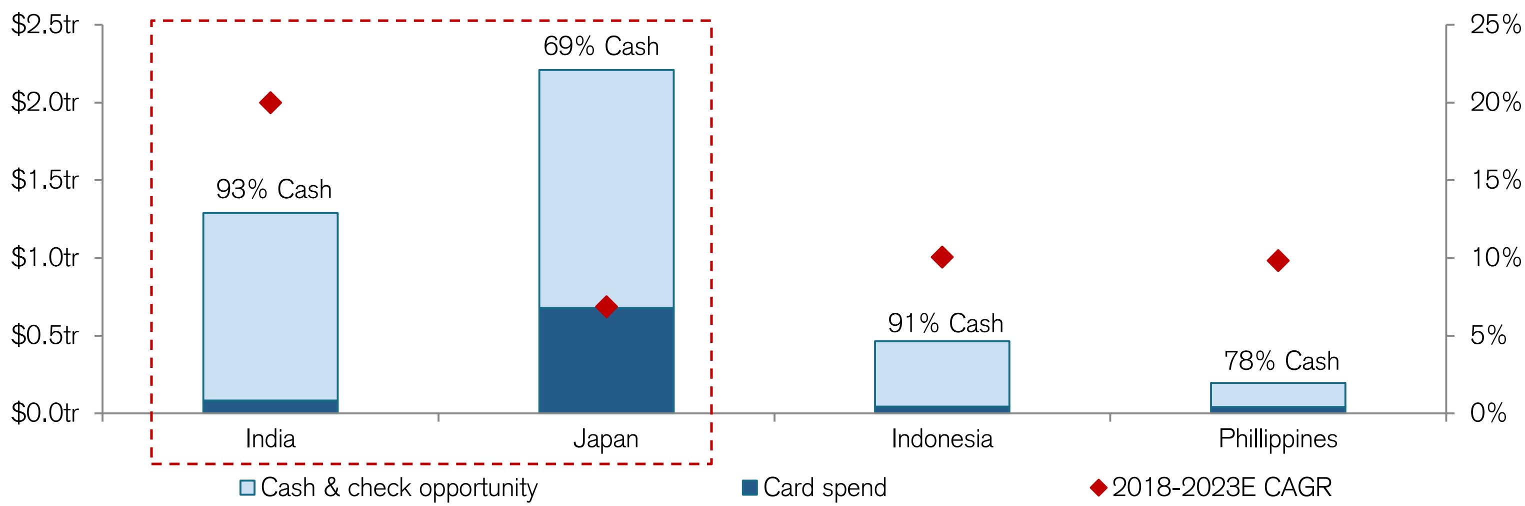


22. Long runway for card penetration in both EM & DM markets

Asia-Pacific opportunities in India, Super-Apps in the region

- India (#7 GDP globally, 2nd by population) along with Japan (#4 by GDP) represent the two largest addressable opportunities in Asia ex-China
- India – Government highly supportive of electronic payments and, in 2016, introduced demonetization efforts to reduce cash
  - Launched Unified Payment Interface (UPI) in 2016, utilized by Paytm, Google Pay, etc.; V/MA have ~70% share, along with Rupay (domestic network)
  - Paytm: largest payments wallet with >200mm users, ~60% owned by Alibaba (Alipay), payments bank license in 2018 to offer debit cards and investment products (Ant Financial started with similar products)
- Indonesia & Philippines – super-app-dominated countries (unlocks large underbanked populations for payments ecosystem)
  - Go-Jek: super-app >25mm MAUs, leader in Indonesia, Visa invested in 2019 to promote 4-party payments model (Visa-credentials)
  - Grab: >130mm registered users, leader across Southeast Asia, first partnered with Mastercard in 2018 to issue pre-paid debit cards

Both India and Japan represent the largest addressable opportunities, sitting at ~70-90% cash dominant



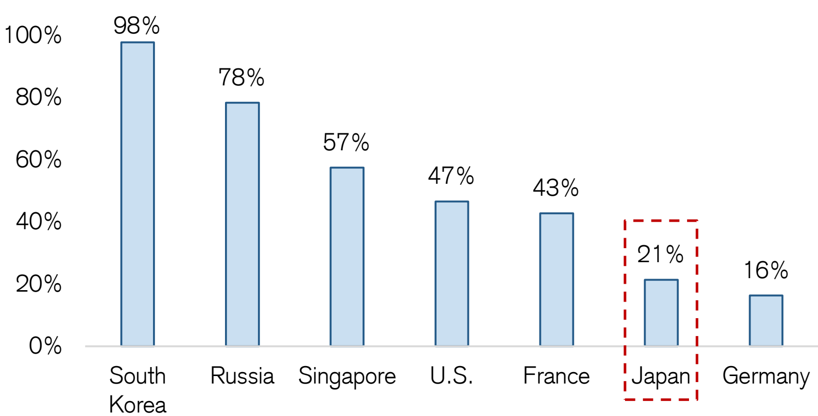
Source: Visa, Euromonitor, Credit Suisse research

22. Long runway for card penetration in both EM & DM markets

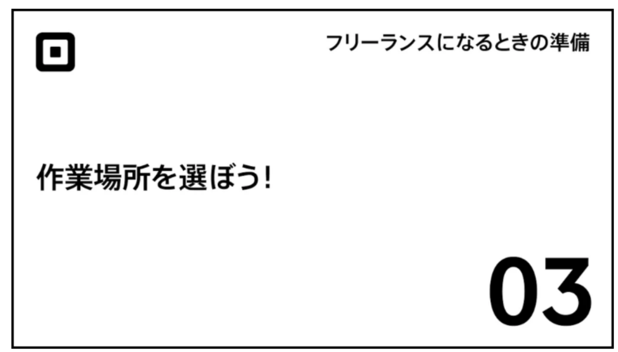
Japan Cashless initiatives aim to 2x penetration by 2025

- Japanese government's Cashless Initiative is expected to take electronic payments from ~21-22% today to ~40% by 2024, with improvements ahead of 2020 Olympics in Tokyo
- Cash usage in Japan remains high, in part due to cultural reasons (including low crime rates/safety in carrying cash)
  - Incentives are provided to merchants for both acceptance and hardware costs, along with ~5% rewards (rebates) for consumers using cashless payments means at registered businesses (which are mostly SMB, given larger retailer are more likely to accept already)
  - As of November 2019, ~770kn SMB had installed cashless payment terminals with the support of government subsidies (~39% of the 2mm eligible businesses)
  - In 2012, only ~33% of Japanese households were using cashless payments methods – that number has risen to ~50% today
- Program could be extended (encouraged by The International Monetary Fund)

Japan's cashless payment ratio is among the lowest of development nations, sitting at ~20% (with government initiatives in place with an aim toward ~40% by 2024)



Square launched in Japan in 2013 and, more recently, began accepting JCB (local scheme); Management has highlighted the tailwinds related to government cashless initiatives

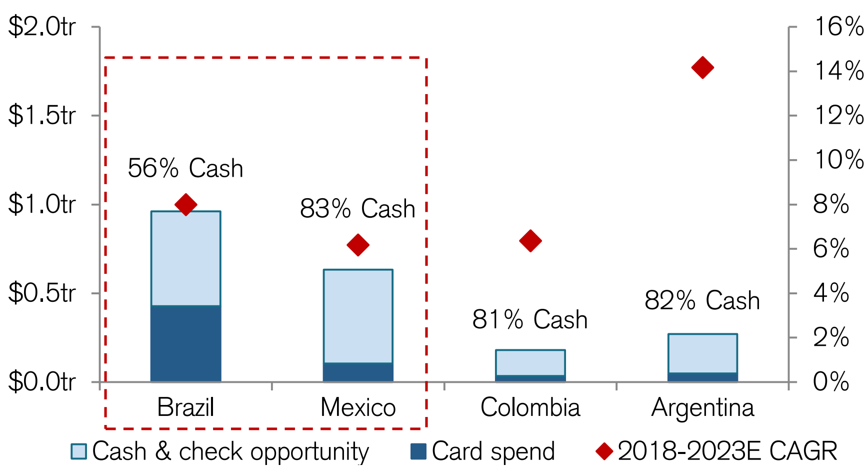


22. Long runway for card penetration in both EM & DM markets

Latin American opportunities greatest in Brazil, Argentina, Mexico

- Brazil (#9 GDP country in the world), Mexico (#15 GDP country), and Argentina (#28 GDP), along with acquiring markets opening, have made Latin America an attractive area of investment and growth (we focus below on First Data's entry and success)
- Brazil – until 2010, banks in Brazil were restricted to using only two incumbent acquirers:
  - (1) Cielo (previously VisaNet until 2010) had exclusivity on Visa acquiring; and (2) Rede, which had exclusivity on acquiring Mastercard transactions
  - Following the opening up of the Brazilian acquiring market, First Data seized the opportunity by building a greenfield merchant acquiring business in Brazil from scratch in 2014 that has grown rapidly, gaining share from legacy acquirers with antiquated technology platforms
- Argentina – similarly, regulators are ending card scheme exclusivity, but in a phased approach
  - Visa and 14 Argentinian banks owned the Prisma network, which will retain exclusivity to processing their existing Visa portfolios through 2022
  - First Data had 44% POS market share but only 15% acquiring share (2017) due to its inability to acquire Visa Cards (~80% of the market)
  - Next catalyst will occur in 2022 when the Prisma exclusivity agreement ends

Both Brazil and Mexico are healthy growing electronic payments markets, currently at ~45-80% cash dominant



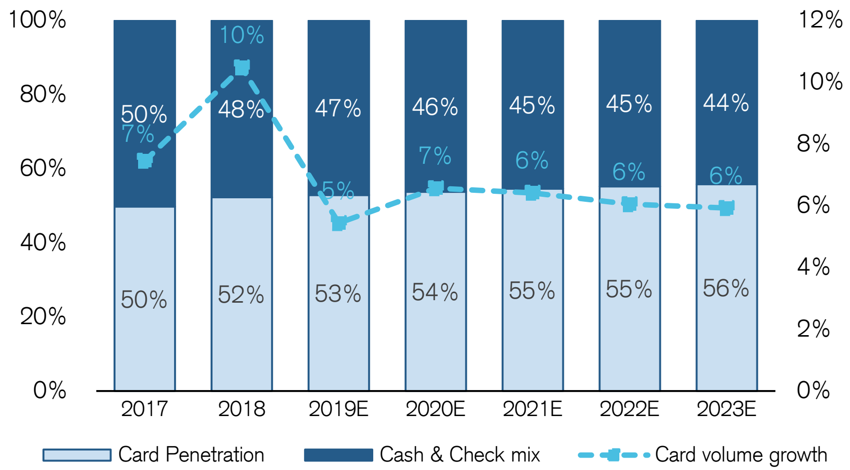
First Data highlights the various acquiring markets that have opened up Latin America (Brazil in 2010, Argentina 2H 2018, Uruguay 2019, Chile)

 Source: First Data, Euromonitor, Credit Suisse estimates

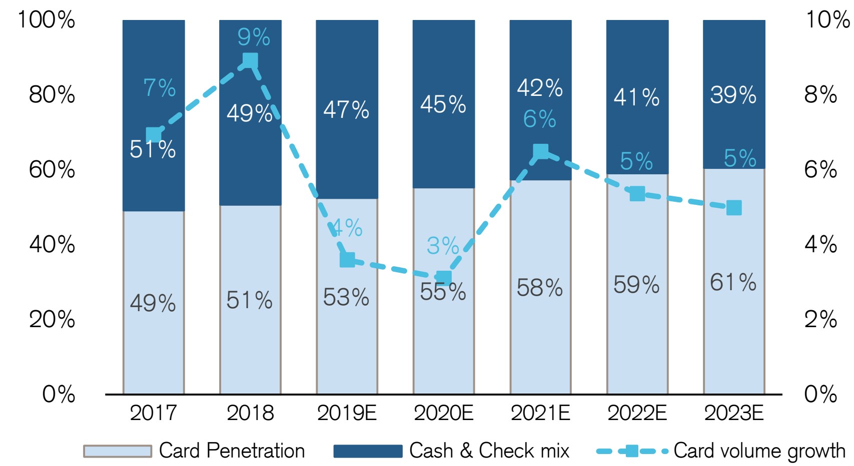
22. Long runway for card penetration in both EM & DM markets

Summary data for the US, Europe, AsiaPac, and LatAm

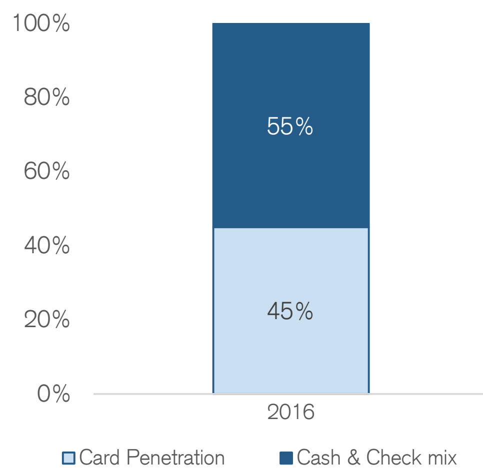
US



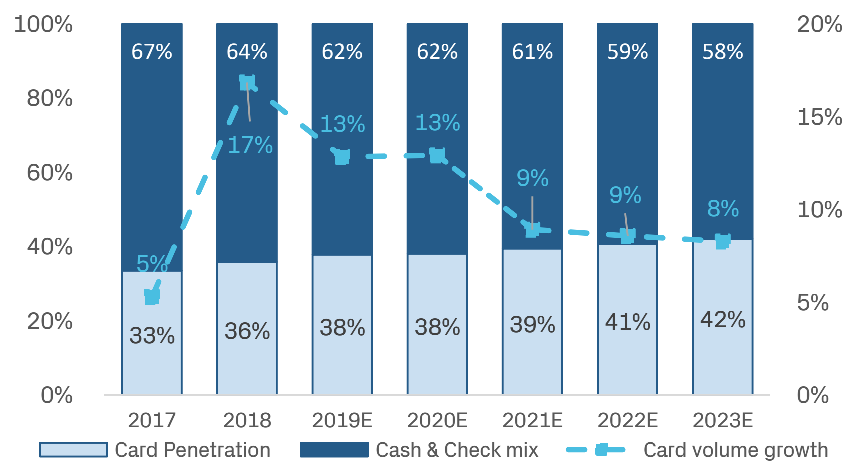
Europe



AsiaPac



LatAm

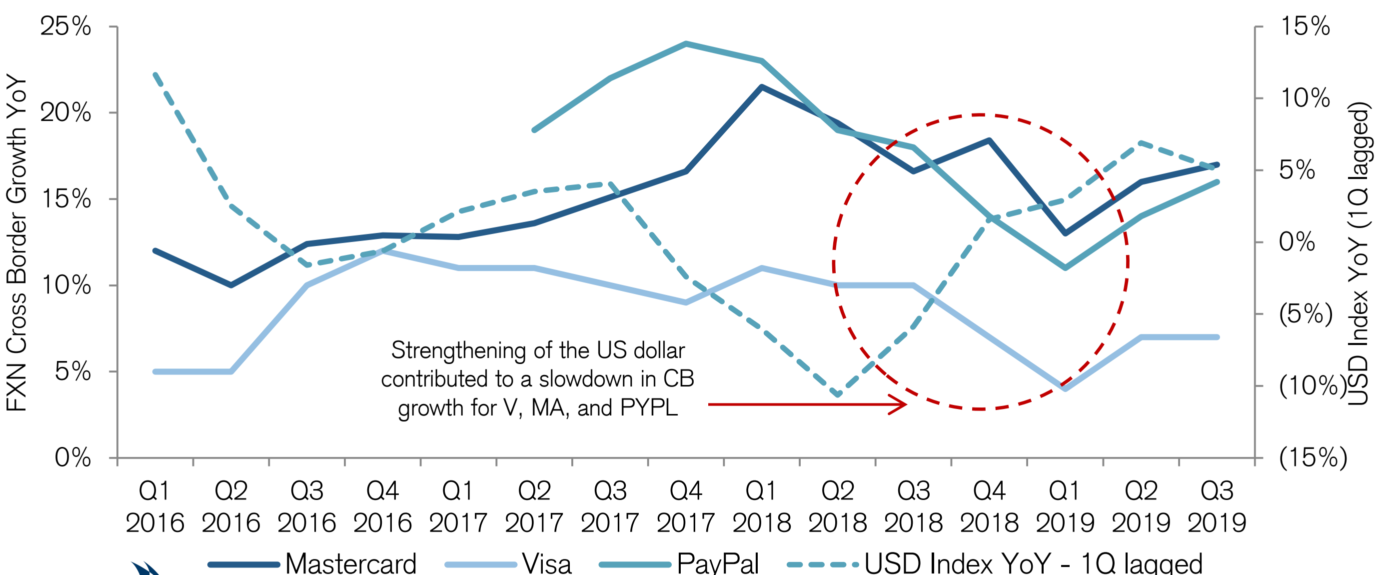


Source: Euromonitor, FactSet, Visa (for AsiaPac) Credit Suisse estimates

23. Cross-border payments volumes
Travel and eCommerce key drivers

- Cross-border payments volumes for the card networks comprise ~50-60% tourism spend (both consumer and corporate travel), growing roughly mid-single digits, and ~40-50% eCommerce (this would have been closer to ~70% travel just ~5 years ago, and ~90%+ travel 20 years ago), growing in the ~20-30% range.
  - Tourism spend is inherently discretionary and cyclical as well as more sensitive to geopolitical factors and exchange rates, particularly a strengthening USD given (1) the US is the largest inbound tourism market in the world, much larger than US outbound, providing only a partial offset from increased US outbound cross-border; and (2) 33 countries use US currency or are pegged to the US dollar.
  - eCommerce spend is more stable, which helps to reduce cross-border volume volatility for the card networks as it increases as a portion of the mix (this has been happening for years, a trend we expect to continue).

Cross-Border Volume growth on a currency-neutral basis vs. the USD Index (1Q lagged); Strengthening of the USD generally leads to slower growth in cross-border volumes



"…Start with the thinking of cross-border as both determined by the level of travel and tourism on the one hand at a consumer level, combined with corporate travel and commercial travel at a commercial level, combined with cross-border e-commerce. When you look at all 3 together, you get what the market is growing at in a secular way…"

– Ajay Banga, CEO, Mastercard (February 2019, Q4 2018 earnings call)

Source: Company filings, FactSet, IMF, researchandmarkets.com, Credit Suisse research

23. Cross-border payments volumes

Strong US dollar weighs on cross-border revenue in 3 ways

A strong US dollar has three impacts on the financial results of the card networks and a selection of merchant acquirers (e.g., PayPal)

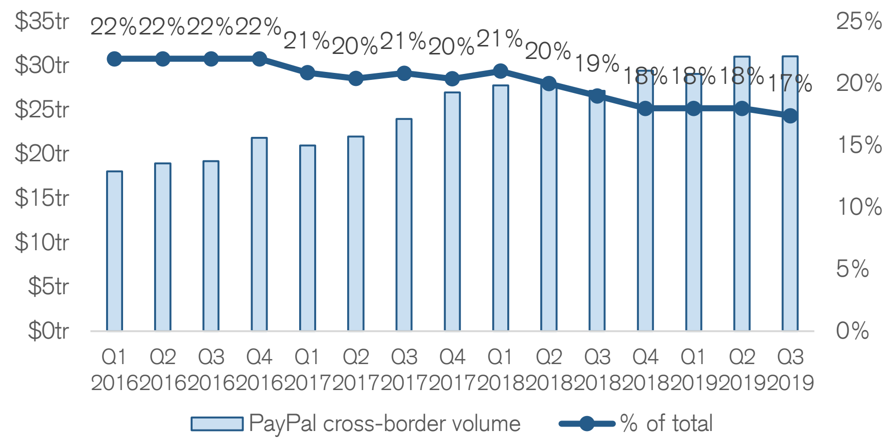
Demand destruction
Example 1: Brazilian consumers spend less on US-sourced eCommerce websites
Example 2: European consumer reduces vacation to the US in terms of total trip time, or in some cases, opts not to take the trip at all

Translational impacts
Example 1: US-based company (V, MA, PYPL) that reports in USD sees reduced reported revenue and earnings as a result of non-USD business being translated back to fewer USD as part of reported results

Amplified revenue & EBIT impacts
Example 1: Generally higher take rates and, thus, higher incremental margins associated with price-based flow through to EBIT and earnings

1. Demand destruction for tourism spend in the US given it becomes relatively more expensive – only partly offset by US outbound increasing given US has significantly more inbound spend (since US consumers travel less)
2. Translational impacts that reduce reported cross-border volume and revenue from when the USD is stronger
3. Amplified revenue impacts due to higher take rate nature of cross-border, meaning there is a disproportionately larger impact on overall revenue and thus margins (given the incremental margins on this higher take rate business are higher)

PayPal's cross-border volumes make up ~17% of total, which has trended down from ~22% in early 2016, in part due to increasing Braintree/Venmo mix (historically a more US-focused platform)



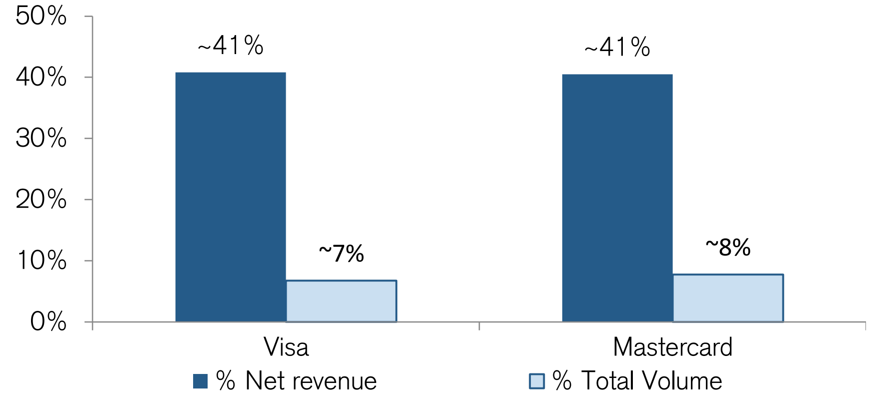
- We believe Visa and Mastercard's cross-border businesses are more balanced vs. PayPal's
- Visa and Mastercard have a greater mix of tourism vs. PayPal, which has a larger mix of retail eCommerce (meaning card networks may see increased cross-border outbound from travel spend when the dollar strengths as an offset to reduced inbound cross-border)
- PayPal has a greater mix of foreign consumers purchasing US goods vs. US consumers purchasing foreign goods (while Visa and Mastercard are more balanced in this sense, creating more of an offset as the USD strengthens and weakens)

Source: Company filings, Credit Suisse research

23. Cross-border payments volumes
Attractive economics for the networks and acquirers

- We believe card network cross-border transactions can earn ~6-8x the yield of traditional domestic transactions. Further, Visa and Mastercard process ~75% and ~56% of their transactions, respectively, although they process ~100% of cross-border transactions (further adding to the revenue gap when comparing cross-border and domestic transactions).
- While there are no clear disclosures that allow for the derivation of these estimates, we use a combination of card network financial results, tourism spend, eCommerce market sizing, and numerous industry discussions to arrive at rough estimates of cross-border volume and revenue contributions (i.e., not precise estimates, but directionally indicative of cross-border's importance to the business – we aim to refine these over time).
- Some of the variances between Visa and Mastercard cross-border net revenues could also relate to issuer mix (larger issuers for Visa, on average), regional processing share on domestic transactions (i.e., Visa has higher share of domestic transaction processing vs. Mastercard, in part due to US and UK mix, where Visa processes the majority of its transactions), and intra-European mix (transactions priced more similarly to domestic transactions, though are cross-border technically). Generally speaking, we would expect Mastercard to have a slightly higher portion of cross-border volume, although a greater portion of that being intra-Europe vs. Visa.
- Select merchant acquirers revenue yield can be ~1.3-1.5x higher on cross-border transactions (based on rack rate pricing, although large merchants that have lower negotiated domestic rates could see differing gaps)
  - Differentiate by helping merchants avoid high cross-border fees from the card networks, enabled by local acquiring licenses in a country
  - Local licenses allow acquirers to classify transactions as domestic (when the merchant maintains a business entity in the country), allowing the transaction to be processed in the local currency (avoids increased network fees, increased interchange, and improves authorization rates)

Revenue stemming from cross-border (yields higher than a traditional domestic transaction) vs. volumes for Visa and Mastercard; we est. ~M-HSD% of volumes &~40% of revenue



Network	Reporting of revenue associated with cross-border transactions
Visa	Cross-border related revenue contained in "Service Fees" and "Data Processing" (including a processing premium), along with the bulk of the premium residing in the "International transaction fees" line item.
Mastercard	Cross-border related revenue contained in "Transaction Processing Fees" (at a premium), and also within "Cross Border Volume Fees"; Mastercard's "Domestic Assessments" revenue line item does not contain brand fees associated with cross-border transactions.

Source: Wells Fargo Merchant Services for US merchants, Credit Suisse estimates

23. Cross-border payments volumes

Enabling global marketplace sellers and freelancers

- Marketplace sellers and freelancers are increasingly engaged on a cross-border basis, creating a need for cross-border currency management platforms such as Payoneer, EBANX, Airwallex, PingPong, and others, along with similar offerings via Transferwise and Revolut
- Platforms can be thought of as global treasury networks offered as-a-service to SMBs
  - Core offering involves multi-currency / “borderless” small business bank accounts, combined with the ability to convert back to the seller/freelancer’s home currency within the provider’s ecosystem (at a reduced rate vs. what might be charged by an eCommerce platform or what might be available via a traditional banking relationship)
  - Ability to pay out to local suppliers in local currency (further reducing FX fees given the currency remains local, often leveraging local payments schemes and/or faster payments rails for last-mile delivery); supplemented by cards attached to the borderless account, providing instant access
  - Additional services might include working capital products (lending), eWallets, VAT services, fraud combatting solutions, etc.

Company	Overview of cross-border platform and how it supports SMB merchants
Airwallex	• Hong Kong-based platform with strength in APAC • Customers include: JD.com, Tencent, and Shopify; investors include: Tencent, Sequoia, DST, and Mastercard • 130+ countries and 50+ currencies
EBANX	• Brazilian-based platform that offers payments for the entire eCommerce transaction • Allows global merchants to more easily reach Brazilian consumers
Payoneer	• International money transfer for marketplace sellers and freelancers, along with working capital offerings, payout capabilities, and fraud combatting solutions for marketplace partners • “Millions” of customers and “billions” of volumes annually, across 200 countries and 150 currencies • KYC, AML investment (automating as much as possible – i.e., in the US, 86% of accounts automatically onboard and get approved) • Provides solutions for marketplaces to combat fraud (~4% of revenues, with ~60-70% of fraud via by repeat users/opening new stores)
PingPong	• Hangzhou, Zhejiang, China-based platform with $10b+ in payments volume • Amazon-focused for sellers in China (also works with sellers on NewEgg, Wish, and others) aiming to reduce cross-border fees for 3P sellers
Transferwise & Revolut	• Offer borderless accounts that compete with other companies on this page (although core business is in P2P money transfer)

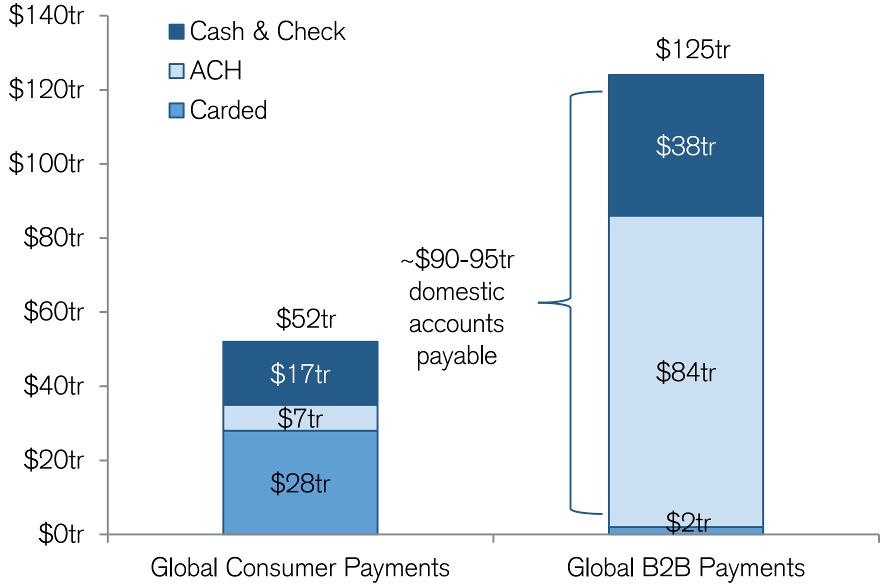
Source: Company filings, Credit Suisse research

B2B/Corporate Payments

24. B2B payments coming of age
Underpenetrated growth market nearing inflection

- $125tr TAM that is so large it almost does not merit discussion; accounts payable (AP) payments between businesses represent ~$110tr (~90%) of the B2B opportunity, of which ~20% is "card-able" and ~$10tr is cross-border
- Card networks are enablers for the rest of the ecosystem by embracing alternative payment types in B2B (e.g., efforts in bill-pay, virtual cards, push payments, account-to-account)
- Public and private technology companies building software and workflows to unlock this opportunity (i.e., issue is less around the payments themselves and more on the processes, reconciliation, data, workflows, etc.)
- B2B pure-players, FleetCor and WEX, differentiated with comprehensive B2B capabilities targeted at SMBs – both can now handle the entire AP file and are building supplier networks to help address the pain points below

Global B2B TAM ~$125tr volume opportunity, although with various means of monetizing volume (*ad valorem* via virtual cards, cents per transaction on ACH, SaaS fees, etc.)



While the actual payments can be less of an issue, antiquated processes, reconciliation, data, and a lack of automation are common pain points

Highly manual (people-intensive) processes are slow and expensive, given a lack of automation, and error prone

Checks have hidden costs (e.g., checks can be in the ~$4-20 range vs. ~$3 per ACH transaction, per AvidXchange) and are not guaranteed good funds

Limited transaction data from payments make reconciliation difficult

Cash flow management difficulty – i.e., paying on the due date with certainty vs. mailing a check a few days ahead of time, lacking certainty

Lack of visibility into supplier payment preferences

Source: Mastercard, Visa, Credit Suisse, Rounding differences for B2B payments figure

24. B2B payments coming of age

Companies under coverage with B2B exposure (V, MA, FLT, WEX)

Company	Overview of B2B assets
Mastercard	• Commercial business: corporate cards, travel and expense cards, fleet cards, and small business cards, representing ~11% of volume • Mastercard Track Business Payments to optimize B2B flows, acting as the switch and directory (~210mm registered entitles as of September 2019) • Leading provider of Fast ACH solutions (Vocalink & Nets), representing 67% of the addressable B2B TAM • Transfast, account-to-account payments platform, allows MA to reach ~90% of the world's bank accounts • Largest Virtual Cards business and push payment capabilities from Mastercard Send • Bill Pay Exchange (launched 4Q 2019), targeting a $4tr TAM in the US, and global capabilities gained from the Nets acquisition
Visa	• Corporate cards, also representing 11% of volume • Visa Direct, the company's rapidly scaling push payments product, growing +100% YoY to reach ~$200b of volume in 2019 (CS estimate), which combines with Earthport's account-to-account payments capabilities providing Visa with access to 99% of bank accounts in the top 50 markets; currently working with all large remittance providers • B2B Connect, distributed ledger-based cross-border platform for higher-value transactions/larger merchants (FIS and Bottomline distribution partners) • Business Payments Network, payments directory that contains payments preferences (which suppliers take what type of payments)
FleetCor (Pure-play B2B)	• >80% of revenue derived from B2B payments: Fuel (45%), Corporate Payments (17%), Tolls (14%), and Lodging (7%) • Full suite of Accounts Payable products with ability to handle the full spectrum of payment methods (Nvoicepay acquisition in 2019), including cross-border (Cambridge acquisition in 2017) • Largest issuer of virtual cards (Comdata acquisition in 2014), and is building a vertical specific supplier network to accept virtual cards (separate integration required), consisting of ~1mm distinct businesses
WEX (Pure-play B2B)	• >85% of revenue derived from B2B payments: Fuel (66%), Travel (12%), and Corporate Payments (8%) • Pioneer of virtual cards first used in the travel industry, with the broadest virtual card issuance (Mastercard, Visa and JCB) • Complete accounts payable file servicing, with the ability to make payment by virtual card, ACH, check, or wire transfer • White-label virtual card management platform for banks, leveraging assets from the AOC acquisition – customers include AXP & PNC • WEX also white-labels its Accounts Payable product to banks (AXP, PNC), leveraging assets from the AOC acquisition in 2017 • Offers invoicing and bill-pay to corporates and consumers via capabilities gained from the Noventis acquisition in 2019

Source: Company reports, Credit Suisse research

24. B2B payments coming of age
Additional B2B assets at various public companies

Company	Overview of B2B assets
FIS	• Legacy Worldpay expanded into B2B with the 2017 acquisition of Paymetric, which manages and automates payment workflows within enterprise systems (Oracle, Hybris, Sales, etc.) • FIS provides traditional B2B solutions to its bank customers, such as cash and treasury management • FIS is planning to create a broader B2B solution by combining its treasury management solutions with Paymetric
FISV	• Management sees the potential for increased B2B money movement by combining FISV cash management, CheckFree RXP (e-Billing solution) with some of First Data's payments capabilities • Leader in bank-based Zelle implementation and considers B2B a potential opportunity for the Zelle platform • Popmoney capabilities in B2B money disbursements
Global Payments	• Called out B2B as an opportunity from the TSYS acquisition with Netspend's payroll card • Global Payments views Netspend as a launch pad into B2B areas including invoicing and accounts payable automation (both in the US and on a global basis)
PayPal	• Bill Pay TAM expansion via the January 2019 partnership with Paymentus and more partnerships expected to be announced • PayPal's network with +23mm merchants positions the company well for further expansion into B2B payments
Square	• Initial step into B2B payments with its Invoices product, enabling sellers to send professional invoices • Launched Square Card in January 2019, a business debit card for Square merchants • Also offers Cash App for business, allowing merchants to accept payments via Cash App • We expect Square to launch additional B2B products, such as a business credit card through Square Capital, Square's lending arm that provides working capital loans to merchants with an average loan size of ~$7k, along with other features enhancing expense management
Repay	• Recent acquisition of APS Payments for entry into B2B vertical • Integrations into Sage, SAP, Adagio, etc. representing an immediate addressable opportunity of ~$80b in volumes vs. RPAY 2019 ~$10b • Will compete with Paymetric (among others) in this vertical
Bill.com	• Provides accounts payable and receivable solutions and accounting software integrations • Partnerships with FleetCor for virtual cards • SMB-focused platform, with likely some overlap with FleetCor in the lower-mid-market
Bottomline Technologies	• Offers Paymode-X B2B payments platform with 400k+ members in network and $200b+ annual volume • Included distribution through key banking partners (e.g., Bank of America)
Western Union	• Payment solutions for SMBs, mostly consisting of cross-border payments, and white-labels the solution to banks • Industry-specific solutions, customizing their offering by vertical

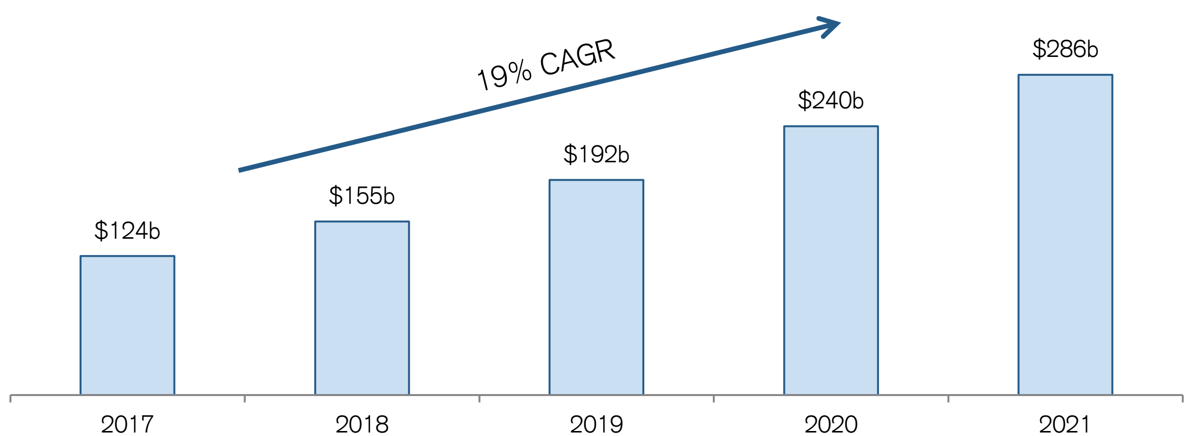
Source: Company reports, Digiday, Credit Suisse research

25. Virtual cards in B2B Payments

A key driver of card penetration in B2B payments

- First introduced in the early 2000s, primarily used in B2B travel and fleet management
- Now a key component in automating Accounts Payable/Accounts Receivable-related payments, replacing inefficient paper-based payments that require manual efforts for both sides
- Roughly ~20%-40%+ of an AP file can be addressed via virtual cards, although it may require individual supplier discussions to educate on the benefits, costs, etc. (companies like FleetCor and WEX do this when given a complete AP file)
- Virtual card numbers function like a token, serving as a substitute for the underlying account number
  - Single-use cards - good for only one transaction, enhanced safety/security
  - Lodge cards - reusable virtual card, typically stored with a trusted vendor

Virtual cards are one of the fastest growing areas in payments, expected to deliver a near ~20% CAGR 2017-2021E (roughly ~2-3x underlying industry growth rates)



Source: WEX, eNett, Mastercard, Credit Suisse research

25. Virtual cards in B2B Payments
Virtual cards leaders FleetCor and WEX

- WEX is the pioneer of virtual card usage, focused on online travel.
- WEX and FLT have large acceptance (supplier) networks (WEX quotes ~2.5mm, while FleetCor quotes ~1mm), with WEX's scale enhanced by white-labeling its corporate payments product through financial institutions (e.g., PNC, American Express).
  - FleetCor offers Comdata Mastercard virtual cards for customers to pay invoices.
  - Both WEX and FleetCor have specific teams designated to signing up suppliers (i.e., gain an AP file, attempt to increase virtual card acceptance penetration within the suppliers that are to be paid).
  - eNett is WEX's primary competitor in travel payments with a strong presence in Southeast Asia (eNett is currently part of Travelport which was taken private in May 2019).

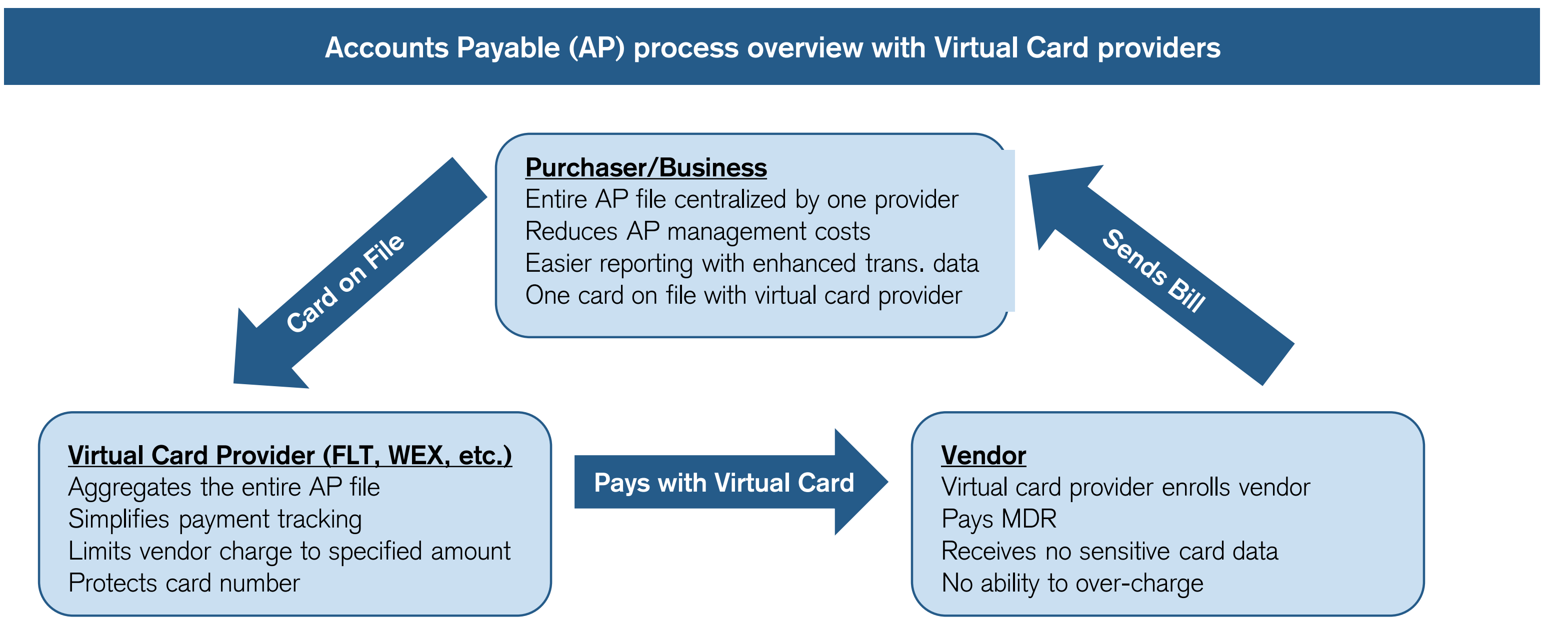
Key benefits of virtual card usage
Improve speed and simplification of AR & AP reconciliation processes
Reduce operating costs – scale from process efficiency, reduces errors, helps to avoid FX markups (up to 3%)
Increase control of corporate spend – limit a purchase to the amount, date, merchant, and MCC code
Revenue opportunity from financial incentives (rebates) on transactions
Reduce fraud – single-use virtual card numbers can only be used once with the controls above
Better reporting with enhanced data from card transactions

Source: WEX, eNett, Mastercard, Credit Suisse

25. Virtual cards in B2B Payments

Virtual Card mechanics within traditional AP/AR

- Virtual cards can help to decrease check processing costs, reduce manual processing errors, and enable direct linking of payments to expenses.
- Beyond cost savings, virtual card usage can lead to rebates – to the point of turning AP functions into revenue generators vs. cost centers, adding to the value proposition around efficiencies, reconciliation, etc.
- Specifically, interchange earned on virtual cards can be (depending on the arrangement) shared back with the underlying payee, helping to reduce the total costs of AP operations.



Source: WEX, Credit Suisse research

25. Virtual cards in B2B Payments
Virtual Card mechanics within the travel segment

- Virtual cards within travel are mainly utilized with hotels booked online via OTAs (key clients include Expedia and Booking.com), specifically when the OTA employs the merchant model (i.e., takes payments for the hotel from the customer, and later sends a virtual card payment to the hotelier upon stay).
- Booking.com was traditionally an agency model OTA but has more recently began utilizing the merchant model for both hotels and alterative accommodations (e.g., vacation rentals).
- WEX plans to focus on non-hotel travel markets (airlines, vacation rentals, tours & activities, and car rental), which make up two-thirds of online travel.

Online travel agency (OTA) virtual card process overview

Travel company makes reservation for consumer and receives payment → Travel company requests Virtual Card Number, WEX provides credit → Supplier charges Virtual Card Number → Transaction reconciles automatically → Travel company settles with WEX

Source: WEX, Credit Suisse research

26. Next leg of B2B payments puts SMB services in focus

Whitespace opportunity created by historical distribution and tech issues

- **Whitespace opportunity created by small banks lacking distribution to profitably reach SMBs, along with underdeveloped product offering (e.g., primarily corporate cards), as the vast majority of these banks outsource their IT**

- We estimate 75% of the US $10tr SMB B2B payments TAM is addressable, with key areas including accounts payable/accounts receivable, corporate cards, and expense management

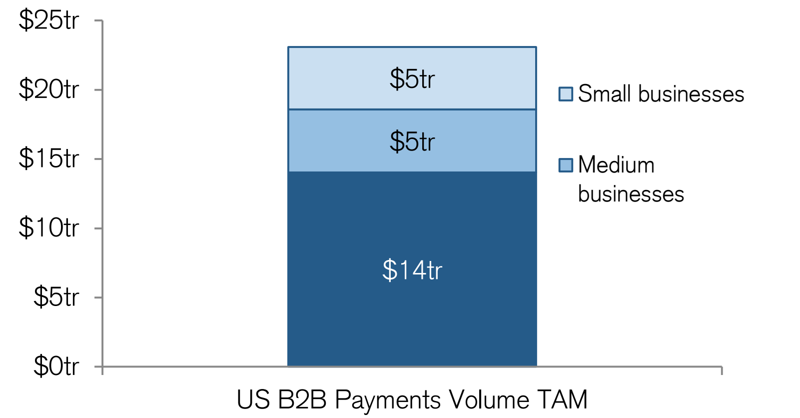
- Incumbents working with FinTechs to overcome hurdles:

  - Distribution - Multi-pronged approach leveraging current clients, a direct salesforce, and partners such as banks (WEX) and FinTechs (FleetCor, WEX, PayPal)

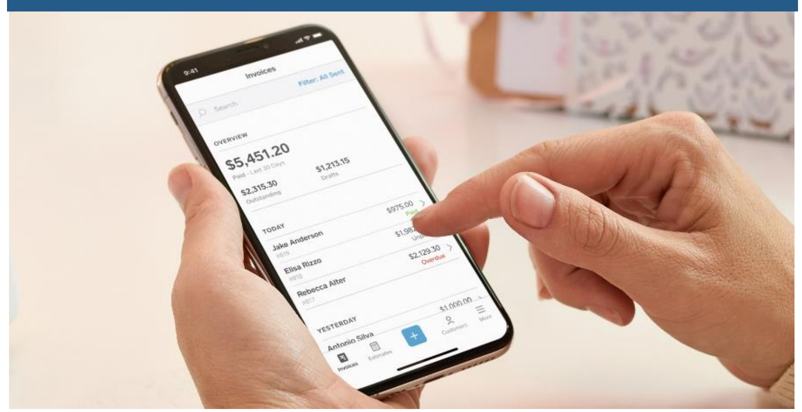
  - Technology and capabilities - Comprehensive product sets, the ability to make their products accessible to Fintech partners (e.g., APIs), and integrations into accounting software (e.g., QuickBooks, Xero)

- Square offers invoicing (Square Invoices), debit products today (Square Card), and Cash App for Business; we expect more B2B products to come, particularly around expense management and/or credit card offerings

SMB represents $10tr of the $24tr US B2B Payments TAM



Square offers Square Invoices, Square Card, and Cash App for Business; we expect more B2B products to come (i.e., expense management and/or credit card offerings)



Source: Company Data, Deloitte, Credit Suisse research

26. Next leg of B2B payments puts SMB services in focus
Numerous fast-growing private companies developing solutions

Overview of a selection (not exhaustive) of private B2B payments companies serving the SMB and middle-market segment	
Bill.com IPO in Q4 2019	• Provides accounts payable and receivable solutions and accounting software integrations • Partnerships with FleetCor for virtual cards • SMB-focused platform, with likely some overlap with FleetCor in the lower-mid-market
BREX	• Provides start-ups of all sizes with a corporate credit card • Helps businesses reach higher credit limits, expense management, automation and accounting integration • Launched BREX Cash, a business checking account in October 2019 that enables no-fee B2B ACH and wire payments
Divvy	• Business expense management and budgeting tools are free to customers, currently monetized via virtual card economics • Partners with WEX for corporate and virtual cards
AvidXchange	• Provides accounts payable and receivable solutions and accounting software integrations • Partnerships with FleetCor for virtual cards • SMB-focused platform, with likely some overlap with FleetCor in the lower-mid-market
Billtrust	• Provides an end-to-end payment cycle management solution, which automates every step of the invoice-to-cash process • Business Payments Network (BPN), a payments directory that contains payments preferences (i.e., details around which suppliers take what type of payments, various terms around timing, discounts, etc.)
MineralTree	• Focused on accounts payable automation • Emphasis on middle-market merchants • Recently hired (October 2019) Comdata (FleetCor) veteran Vijay Ramnathan
Veem	• Focused on accounts payable automation for cross-border payments ("consumerization" of cross-border experience) • Proprietary multi-rail technology, businesses can send or receive money in a click, track their payments end-to-end
Expensify	• Receipt management and expense tools for SMBs, along with Visa card offering attached • Competes with Divvy, Concur, etc.
Tipalti	• Provides accounts payable and receivable solutions and accounting software integrations • Works with both SMB and mid-market business

Source: Company Data, Deloitte, Credit Suisse research

Back-End Banking Innovation

27. “Faster payments” & “RTP” become more real

Real-Time Payments (“Fast ACH”) overview

- “Traditional ACH” systems were designed in the 1970s to replace checks, with no significant updates since
  - ACH systems are how banks send money to other banks domestically and make up the largest part of a country’s payments system (ex-wires)
  - Process transactions 1-2 times a day in batches and can take up to 3 days for funds to be made available (closed on weekends)
- Fast ACH is the first overhaul of domestic payments (connecting banks); main advantages over legacy systems:
  - Speed & availability – Payments are authorized and (often) settled simultaneously, making funds available instantly, operating 24/7
  - Data – Utilizing ISO 20022 messaging standard (adopted in +70 countries)

Key drivers & enablers of “faster payments” and RTP globally
Central bank mandates to update national payments systems to reduce cash (increase taxes), financial inclusion, and innovation
Mastercard, the leading provider of Fast ACH globally with Vocalink and Nets (working with 11 of the top 50 GDP countries already)
Bank technology providers (FIS, FISV, JKHY, Finastra, ACI, etc.) will need to connect their bank customers to any new payments systems
Increasing consumer and business (B2B applications) demand for faster payments

Source: Mastercard, Credit Suisse research

27. "Faster payments" & "RTP" become more real

Real-Time Payments ("Fast ACH") overview

- Adoption of RTP in consumer payments will vary by country (e.g., dominant in Denmark now), although we do not expect any meaningful market share gains at the expense of cards in core markets like the US over the medium term.
- We expect initial use cases will be targeted at traditional ACH/Check flows in B2B/P2P/G2C payments.
- We note that banks do not earn interchange on faster payments/ACH/RTP and, therefore, lack a direct monetary incentive to encourage adoption of RTP for retail payments (although incentives are driven by consumer experience and demands).
- Historically, payment infrastructure innovation has happened only on the card network side, but now, FinTechs can start building services off of these lower-cost rails.
- UK Faster Payments has been live since 2008 and has included P2P, P2B, B2B, B2P, G2B, and G2P transactions through mobile or online means.
- Vocalink (Mastercard) is the underlying system and operator.

UK Faster Payments has been live since 2008

UNITED KINGDOM

Name: UK Faster Payments

Year live: 2008

FPII score + = API: 4

Average daily volumes/value: Avg. volume = 5.914 M, Avg. value = 4.889 B GBP

Speed of posting to accounts: A maximum of 15 seconds

Maximum value: 250,000 £ depending on bank

Individual and/or batch payments: Individual and batch payments with Direct Corporate Access supported by some banks

Speed of settlement: Deferred Net Settlement 3x daily

Operating hours: 24/7

Open Access API interface: No

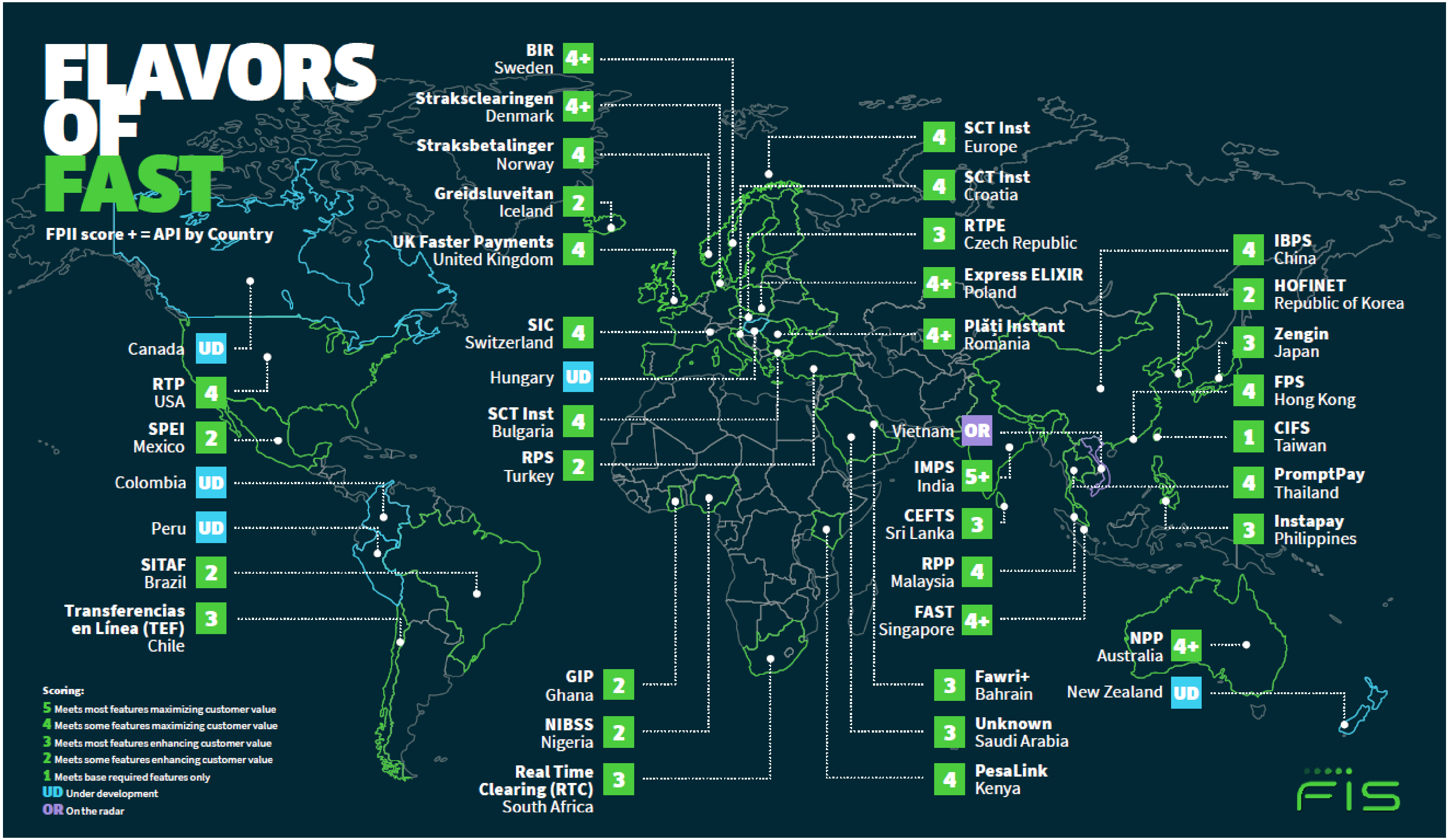
Payment applications and overlay services: P2P, P2B, B2B, B2P, G2B and G2P transactions through mobile or online.

Commentary growth, additions, changes, etc.: U.K. growth is steady at 20 percent and the New Access Model ensures service provider and new entrant participation without significant investment. New Payments Architecture under development will be ISO 20022-based.

Source: Mastercard, FIS, Credit Suisse research

27. "Faster payments" & "RTP" become more real

54 schemes live vs. 14 in 2014 and 40 in 2018



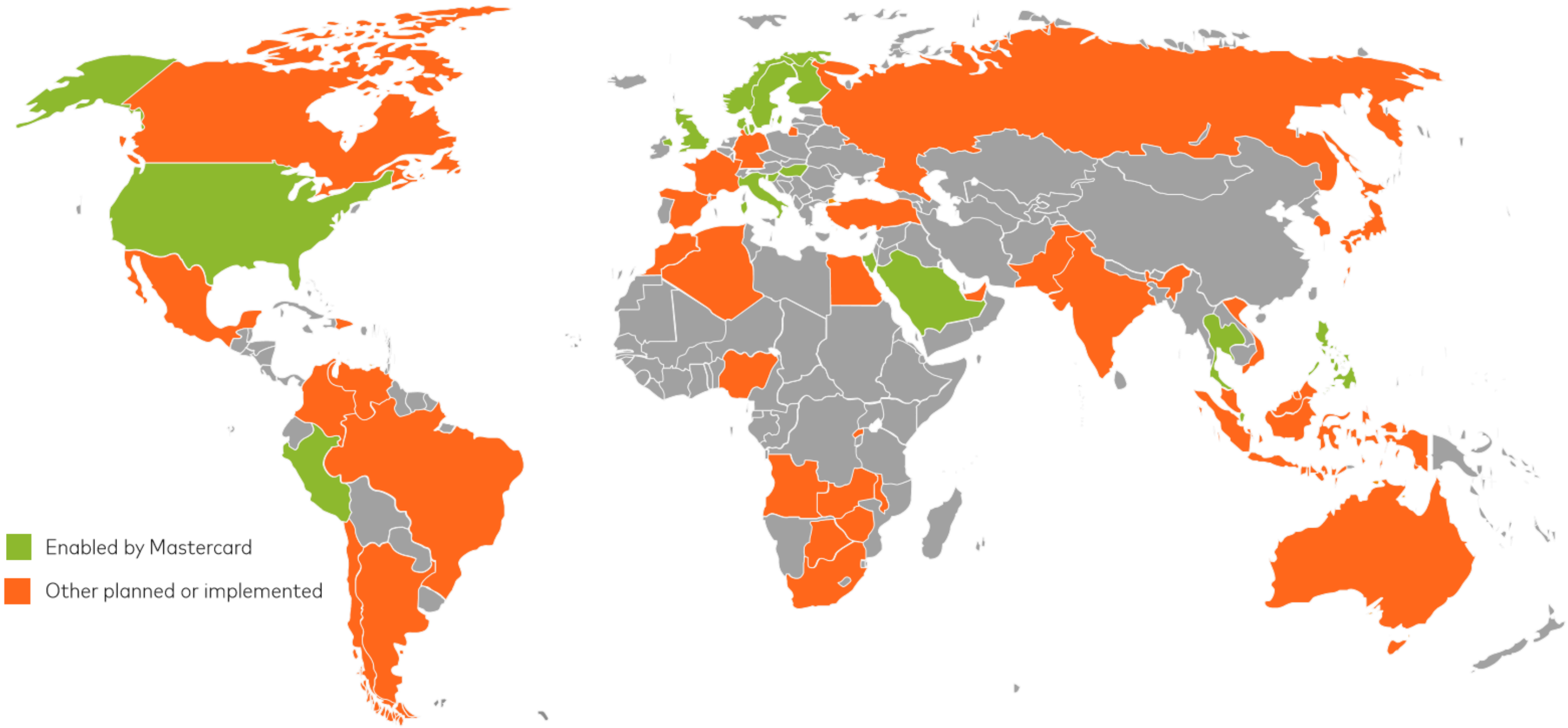
Source: FIS (41 scored above)

27. "Faster payments" & "RTP" become more real

Mastercard's role in RTP as an important global enabler

- Made possible in part by the acquisitions of both Vocalink (2016) and Nets (2019)
- Mastercard also has a leading (first-mover) position with Fintech companies that will use faster payment rails

Mastercard, the leading provider of Fast ACH globally with Vocalink and Nets (working with 11 of the top 50 GDP countries already); 54 countries in total now have real-time payments systems



Source: Mastercard, FIS, Credit Suisse research

27. “Faster payments” & “RTP” become more real

Mastercard’s three-pronged approach (rails, apps, & services)

- Holistic approach on all three layers of RTP: (1) infrastructure (rails), (2) applications, and (3) services
  - Important because all three layers are necessary for the ecosystem to start utilizing RTP (i.e., infrastructure layer to enable FinTechs, while apps & services support incumbents)
  - For the first time, scaled industry incumbents are innovating on a new set of rails beyond just cards
- Global approach with regional hubs in each market will facilitate directly connecting domestic payment systems; numerous FinTechs were founded to solve inefficiencies caused by lack of global connectivity (Revolut, Transferwise, Airwallex)
  - Domestic payment systems not being connected globally is an advantage of card rails today (vs. traditional correspondent banking system)
  - Enriched transaction data from ISO 20022 messaging standard (in +70 countries), an important ingredient that will help empower FinTechs to create services that compete with the card rails (albeit today a non-perfect solution given numerous iterations of the standard, but potential to be fully interoperable in time)

Company	Vocalink	Nets	Mastercard
Infrastructure	• Larger markets • Sophisticated & customized	• Smaller markets • Fast deployment • Region-specific capabilities	• Extended global coverage • Industry-leading solutions
Applications	• US Bill Pay (C2B) • Transactis • Pay by Account (P2M)	• Europe Bill Pay • E-invoicing & new billing platform	• Proven applications (e.g., Pay by Account) • New flow penetration (e.g., bill-pay) • Extensive roadmap
Services	• Suite of services & analytics • Can be provided across technologies	• Additional market access	• Broad opportunity to sell suite of services & analytics

Source: Mastercard, Credit Suisse research

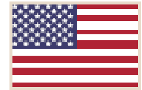
27. "Faster payments" & "RTP" become more real

A focus on progress being made in the US, RTP by TCH

- Where it stands today – roughly 50% of all US bank accounts are connected to TCH's RTP, expected to reach near ubiquity in 2020
- Utilizes a unique approach – "equity in a pooled account" at the Federal Reserve to allow for instant settlement
- Credit push only (no debit pull), with a request for payment feature (effectively a merchant or biller can ask for a push)
- Where will these faster payments rails be used?
  - Banks making B2B, P2P, B2C, and C2B transfers (24/7, 365)
  - B2B payments using this system can be thought of as "precision payments" given the known send/receive time (~15 seconds vs. up to three days for traditional ACH); RTP will include data important for B2B payments (e.g., invoice details via use of the ISO 200 22 messaging standard)
  - Instant deposit products for merchants and consumers (PayPal using RTP already as an alternative to card-based instant transfer)
- What rails will it replace?
  - Alternative to checks and the traditional "slow ACH" rails (which operate via batched or delayed payments) initially, expanding over time
  - These rails could also be used domestically as a substitute for Visa Direct and Mastercard Send when possible (likely due to reduced costs)
- Vocalink is the underlying system, but not the operator (licensing only)

RTP in the US has been live since 2017

UNITED STATES



Name: RTP

Year live: 2017

FPII score + = API: 4

Average daily volumes/value: Avg. volume = unknown
Avg. value = unknown

Speed of posting to accounts: Real time

Maximum value: $25,000

Individual and/or batch payments: Individual

Speed of settlement: Immediate/continuous

Operating hours: 24/7

Open Access API interface: No

Payment applications and overlay services: B2B, B2C, C2B, P2P, A2A, G2C, etc. Consumers, businesses, and the government can use the RTP network

Commentary growth, additions, changes, etc.: Clearing House ensures all U.S. institutions can access RTP network by 2020 but other schemes competing for real-time payments include Faster Payments Council, Zelle and the Federal Reserve's FedNow (live 2023).

Source: FIS, The Clearing House, Levvel, Credit Suisse research

27. "Faster payments" & "RTP" become more real

A focus on progress being made in the US

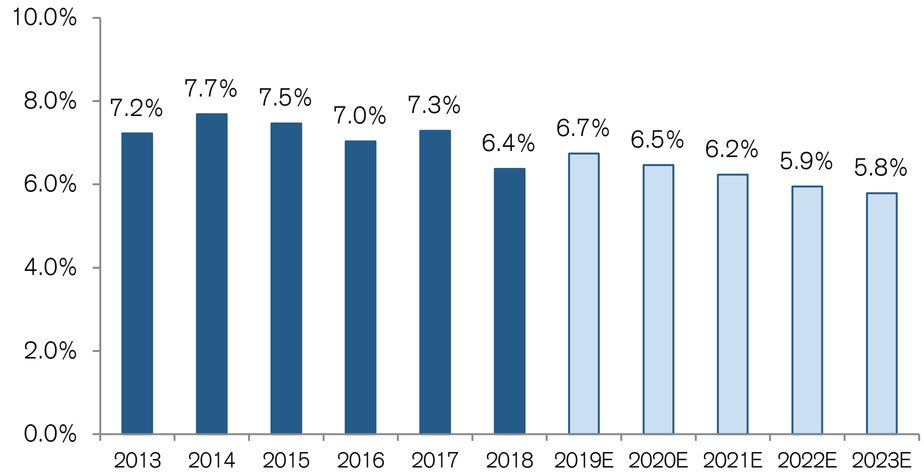
System	Owners	Overview & Status
The Clearing House (TCH) Real-Time Payments (RTP)	25 large US commercial bank owners	• Launched in December 2017, now reaches +50% of US bank accounts • First new core US payments infrastructure to be built in over four decades, licensing Mastercard's technology (Vocalink) • Pricing structure consists of flat fees and no volume discounts, and only the originating bank pays for a transaction • Credit transfer sent costs $0.045 per transaction (e.g., P2P), request for payment sent $0.01 per transaction, and a $0.10 request for payment incentive fee paid by the bank that initiated the payment
Zelle (Early Warning Services)	7 large US commercial banks	• Initially launched by JPM, Wells Fargo, and Bank of America in 2011 as clearXchange, rebranded to Zelle in 2017 • US banks view Zelle as their antidote to compete with Venmo and Cash App • Participating banks represent 80% of bank accounts in the US • Zelle can reach any Visa or Mastercard debit card in the US, providing reach to consumers that don't have Zelle available through their bank, leveraging network push payment rails (Visa Direct, Mastercard Send) • Current use cases are for P2P and disbursements (government, corporate-like insurance payouts) • Potential to be used for consumer purchases, per comments from Fiserv • Real Time? For end users, transactions occur in real time via banks "fronting" the funds, but the actual funds settle overnight via ACH rails
FedNow (live in 2023-2024)	US Federal Reserve	• Similar to TCH's RTP network, but operated and owned by the Federal Reserve • Expected to launch in 2023-2024 and will increase competition in RTP, a net positive for the ecosystem • "*The U.S. real-time retail payment infrastructure stands to gain from competition, including through higher service quality and lower prices over the long run*," – Fed Governor Brainard

28. Issuer Processing key drivers and overview

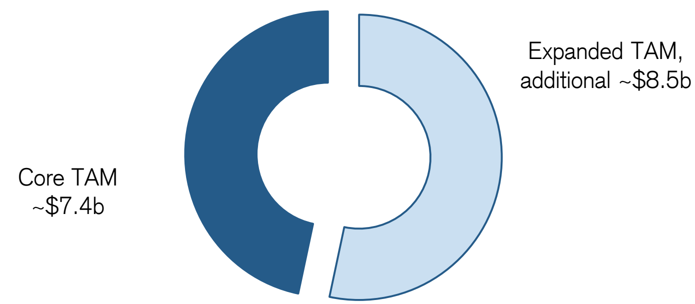
Card issuer processing seeing stable volumes and TAM additions

- Traditional issuer processors enable banks to approve card transactions and can provide end-to-end card services, with key functions including:
  - Outsourced authorization and settlement of card transactions
  - Card production, billing, and statement printing
  - Operating customer service call centers
- Key drivers of issuer processing revenues are (1) account growth and (2) transaction growth
  - Number of customer accounts: Receive monthly service fees based on the total number of active customer accounts
  - Card transaction growth is expected to remain in the mid-single digits through 2023E
  - Credit is generally more economically sensitive than debit
  - Note: This is how traditional issuer processing fees are earned – modern issuer processors (e.g., Marqeta) do not charge fees directly to their customers – rather, they share in the interchange earned (i.e., are not compensated by the issuer on a per account or transaction basis, rather via a revenue share)
- $15b+ traditional issuer processing TAM
  - Core TAM: ~$7.4b growing ~3% CAGR long-term, based on spend by card issuers on processing costs that are currently or can be outsourced
  - Expanded TAM: $8.5b additional value-added services that card issuers spend on digital experiences, self-service, digital marketing, and customer acquisition and commercial payments

US card transactions have grown in the ~6-7% range and are expected to sustain mid-single-digit growth (account growth & transaction growth are revenue drivers for issuer processors)



TSYS sizes the issuer processing market $15b+ when including expanded services that card issuers spend on digital, customer acquisition, etc.



Source: Company data, Euromonitor, TSYS, Credit Suisse research

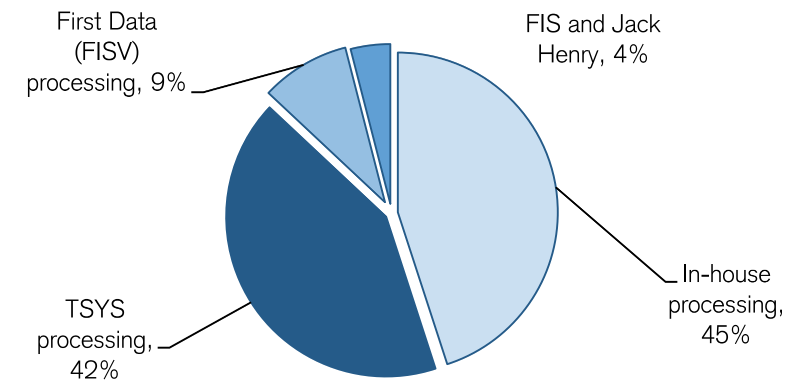
28. Issuer Processing key drivers and overview

Concentrated market in credit issuer processing, less so for debit

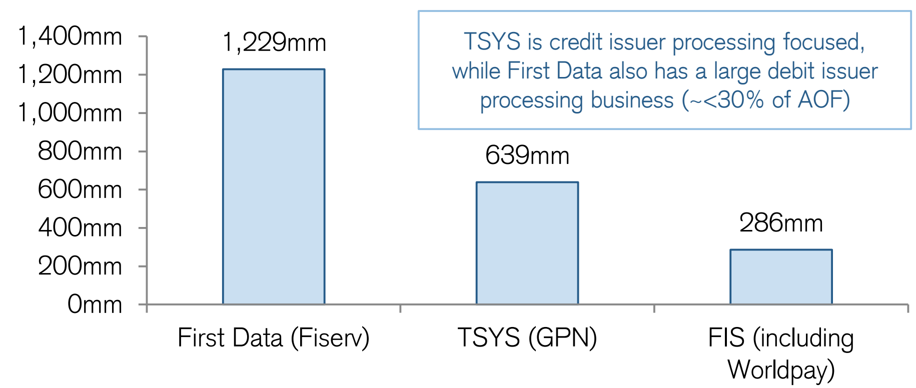
- Credit issuer processing is dominated by TSYS (Global Payments), which maintains ~40% share, processing ~40% of all US Visa and Mastercard accounts, including ~90% of their US commercial credit cards.
- For larger financial institutions, TSYS, First Data (Fiserv), and FIS (including the legacy Worldpay issuer processing) are the key players.
  - TSYS is focused almost exclusively on credit issuance and larger issuers (although we could see TAM expansion for TSYS further into debit and/or by engaging with smaller issuers on a select basis).
  - TSYS has dominant share in the US (8 of the top 10 issuers), Canada (7 of the top 10 issuers), UK (6 of the top 10), Ireland (4 of the top 5 issuers), and China (JV with China Union Pay), along with the second largest issuer processing business in Western Europe.
- For smaller community banks & credit unions, Fiserv (legacy Fiserv), Worldpay (legacy issuer processing), and Jack Henry are the more common providers.
- Additional players more in the "modern card issuance" category include Marqeta, i2c, Stripe Issuing, InComm, Galileo, CoreCard, and others.

Smaller bank/issuer skew — Larger bank/issuer skew

US credit card issuer processing market share data based on number of accounts (estimated), with TSYS the clear leader (largest competition being in-house processing)



By accounts on file (credit and debit) on a global basis, First Data is the largest base, while TSYS is the leader in US credit issuer processing (and in Canada, UK, Ireland, and China [JV with CUP] and is the number two business in Western Europe)



Source: TSYS, Company reports, Credit Suisse estimates

29. Bank Tech key drivers and outlook

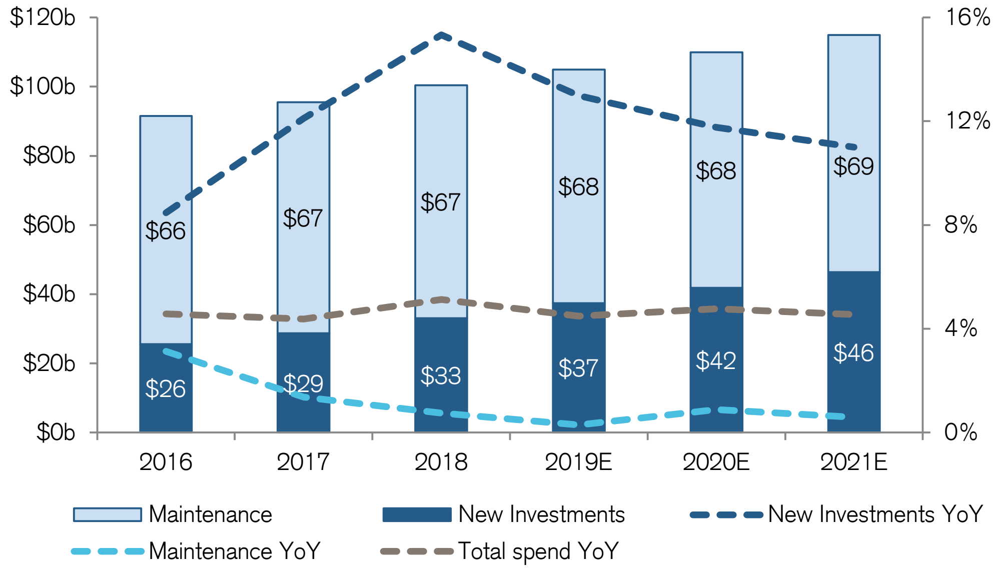
Healthy bank IT spend outlook driven by a need for banks to modernize

- Bank IT spend environment (+4.5% through 2021) is driven by an increasing need for banks to modernize their infrastructure by leaning on technology providers.
- Banking is increasingly becoming a technology business, with 73% of US consumer banking interactions now occurring digitally, lowering barriers to entry for FinTechs and large technology platforms (e.g., Apple, Amazon) on one side of the barbell and favoring large incumbents with the capital to invest on the other.

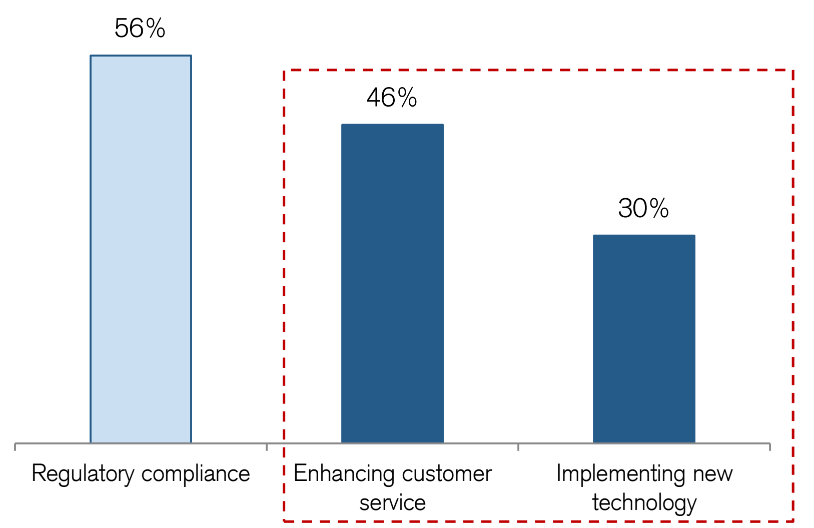
"It is a constant, never-ending set of investments that have to be made because as everyone in the audience knows our expectations change every day as we visit Amazon or Google or WeChat or whatever technology provider – Facebook – that you want to talk about, it changes the expectations that we have for our financial institutions. That puts pressure on the institutions to invest and that's good for us because it allows us to go into the market, aggregate services, deliver them both on a one-off and is scalable.."

– Jeff Yabuki, Fiserv CEO (March 12, 2019)

~2/3 of bank tech spending in North America is maintenance related, but 80% of the growth in IT spending is earmarked for new investments



The top three IT spending priorities of banks are regulatory, customer service, and implementation of new technology

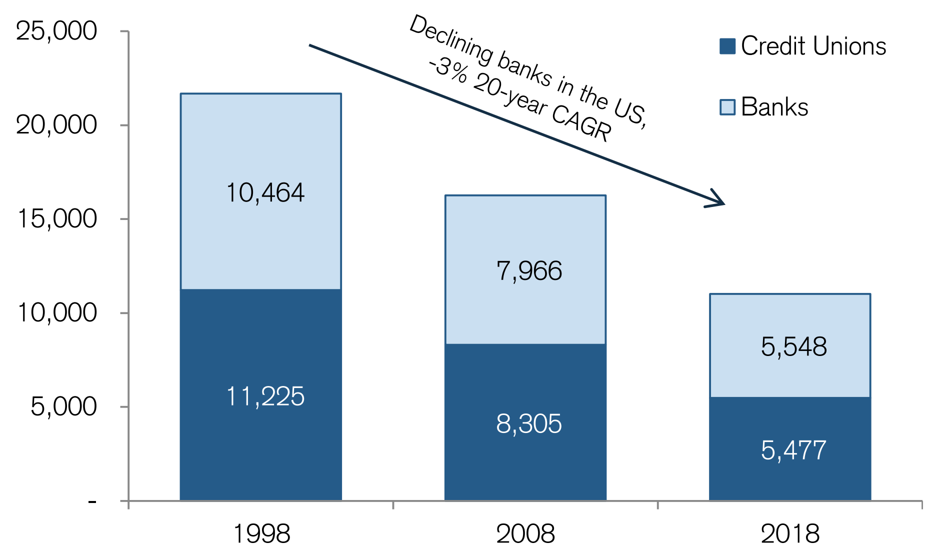


Source: Celent, PWC, Company data, Credit Suisse estimates

29. Bank Tech key drivers and outlook
Consolidation headwinds offset by shift toward digital

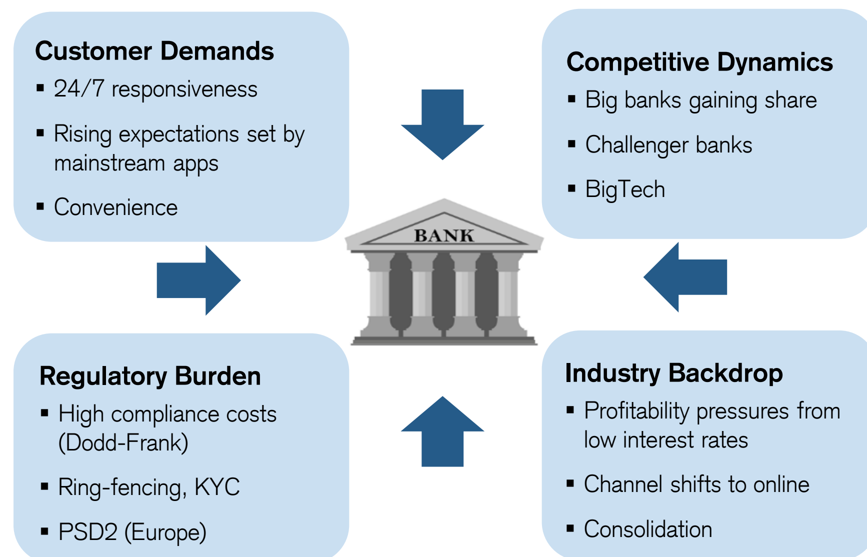
- Despite long-term consolidation trends, US retail banking remains highly fragmented with >10k institutions (~2x Europe)
- Consolidation among US banks set to continue, driven by:
  - Desire for M&A cost synergies to reduce spend given high costs of regulation and technology upgrades
  - Intensifying competitive pressures from both sides of the barbell (i.e., the larger money center banks and FinTechs/BigTech)
  - Exacerbated by profitability pressures from historically low interest rates (net interest margin pressure)
- Predominantly at the low end of the market (impacts Fiserv and Jack Henry most), leaves fewer bigger banks to serve

Consolidation trends in the US banking industry, with the number of banks decreasing ~3% per year (although both accounts & transactions continue to grow, more important near-term drivers of growth)



Source: CUNA, Credit Suisse research

Banks seeing pressure from all sides (customer demands, regulatory, competition, industry consolidation, and profitability pressures)



29. Bank Tech key drivers and outlook

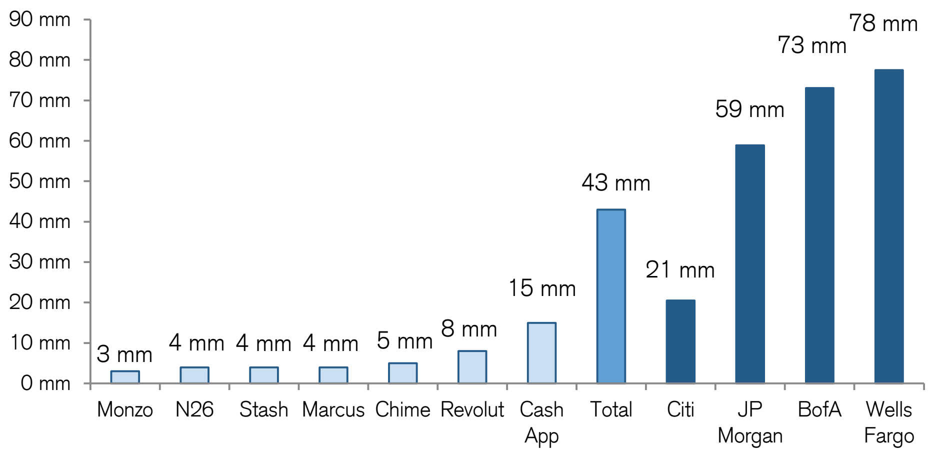
FinTechs are on one end of the "barbell", big banks are on the other

- Scale of the top four big banks in the US (which maintain ~63% of assets) allows for annual technology budgets of ~$40b, equivalent to the entirety of global FinTech funding in 2018 (per CB Insights).
- We estimate Fiserv and FIS spent a combined ~$10b in 2018 technology spend supporting their banking clients.
- As FinTechs (and BigTech) continue to gain new accounts, there is a longer-term potential for these platforms to pressure accounts and transaction growth at small- to mid-sized US banks (although we currently believe the majority serve as secondary accounts, and are thus, at least currently, incremental from an account basis and a rounding error in terms of transactions).

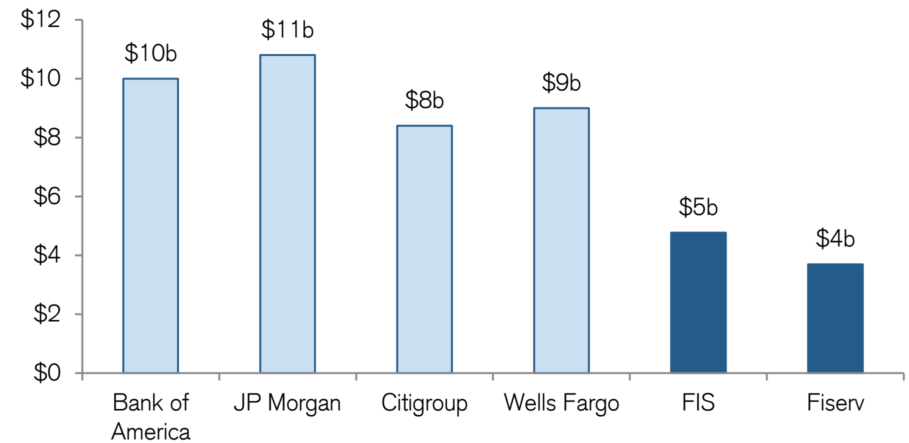
Both ends of the "barbell" are gaining share, in part due to better technology/user experience, along with tech & marketing spend

Neo/Challenger banks (FinTech) and large technology platforms (BigTech)	Regional banks, community banks, & credit unions (core FISV, FIS, JKHY customers)	Large US banks
Chime, Revolut, Monzo, N26, Uber Money, Google, Square Cash App, Varo Money, Apple, Marcus by Goldman Sachs, Affirm, etc.	~10-11k US financial institutions	JP Morgan Chase, Bank of America, Wells Fargo, Citi, US Bank, PNC, TD Bank, Truist, Capital One

FinTechs in the US now have ~43mm users in aggregate; longer-term potential to pressure account growth and transactions



2018 estimated technology spend budgets show the big banks in a league of their own (annual technology spend of ~$40b) vs. FISV & FIS's combined ~$10b in spend

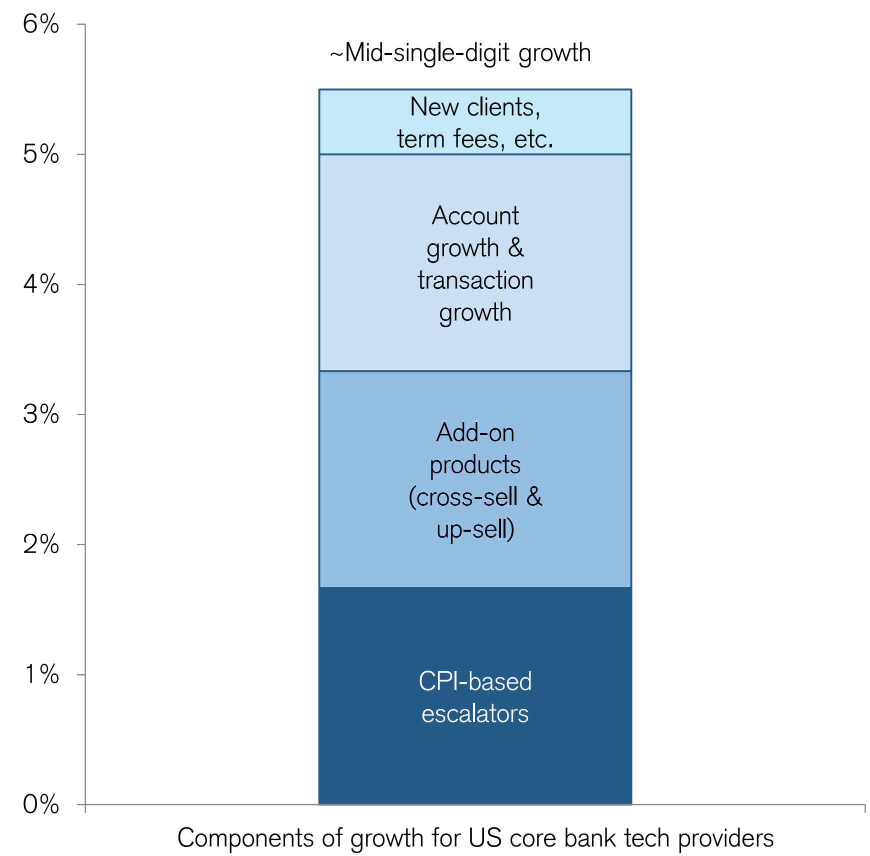


Source: Company data, Credit Suisse estimates; Note: FISV and FIS bank tech spend estimates are based on a combination of related 2018 operating expenses (ex-SG&A), capex, and acquisitions (fluctuates by year) and are meant solely to be directional indicators vs. precise figures

29. Bank Tech key drivers and outlook
Key drivers of growth for US banking technology providers

- US banking technology businesses (e.g., Fiserv, FIS, Jack Henry) are mid-single-digit growers, with the majority of growth coming from existing customers.
- Four components of growth:
  1. CPI-based escalators included in contracts
  2. Add-on product sales (e.g., bill-pay, Zelle, RTP, online banking, and other services sold by core providers and integrated into the core system), including upgrades to more dated versions
  3. Account & transaction growth (checking accounts, debit cards, transactions processed)
  4. New client additions (smallest driver), term fees, and other
- While there are potential headwinds to monitor in the longer term (traditional banks' potential to lose account & transaction share among digitally native generations, increased desire for and investment in third-party bank technology competitors, any acceleration in US banking consolidation trends), existing providers have meaningful moats with their bank customers (sticky relationships – with just ~1-2% of banks changing core providers per year, the ability to price ancillary bank IT services attractively given low incremental costs, a track record, and an increased capacity to maintain technology leadership organically and via bolt-on M&A, further supported by elevated FCF due to recent mergers and associated cost synergies).

Four key components to growth in US banking technology businesses (e.g., Fiserv, FIS, Jack Henry, etc.)



29. Bank Tech key drivers and outlook

Core conversions viewed as challenging and expensive IT projects

"…"And then finally, modern core banking system. Many of you know, this is something that we started working on about a year ago that's progressing very nicely. It's a multiyear project. But we've moved steadily through the due diligence phase. We know who we want to partner with, although we haven't announced that publicly yet. We expect that next year will be much about planning and testing for the conversion, which will then probably take place in 2021. So right now, that is on time, on budget. We're quite excited about how that's going. I can tell you this about the system that we'll be moving towards, it is a much more modular and much more open system than the one that we have now. It's tested, it's true, it's already in implementation. But we're delighted by the fact that it's got a lot more open APIs, it facilitates many more integrations, not only with their own modules, but with other partners, which will allow us to partner with FinTechs where we want to, with other providers, allows us to choose best-in-breed services and facilitate a true omnichannel experience. Because all of the transaction data comes into one place and can then be used to populate things like CRM systems or other means of tracking transactions and taking care of our clients."

– Jason Bender, COO, First Republic Bank (November 2019, at First Republic Bank's Investor Day)

Factors for Core System Replacement	Factors Against Core System Replacement
Legacy cores are expensive to maintain	Viewed as the hardest project a bank can undertake; it can be risky and take ~6 months to 2 years to complete
Faster time to market for new products	Expensive, with potential de-conversion and integration fees that often equal ~>90% of the remaining contract value
Need for more open platforms that remove friction from partnering with FinTechs	Long contracts (3-7 years), comfort with existing provider, and desire for a single vendor limit other options
Need for a centralized view of customer data across product silos, full access to customer data, and real-time transaction posting	Limited IT budgets and digital investment priorities
Legacy programming languages (Cobol) are not relevant for top tech talent and are inefficient	Different talent requirements: modern core platforms written in modern language

Source: Company reports, Aite Group, Credit Suisse research

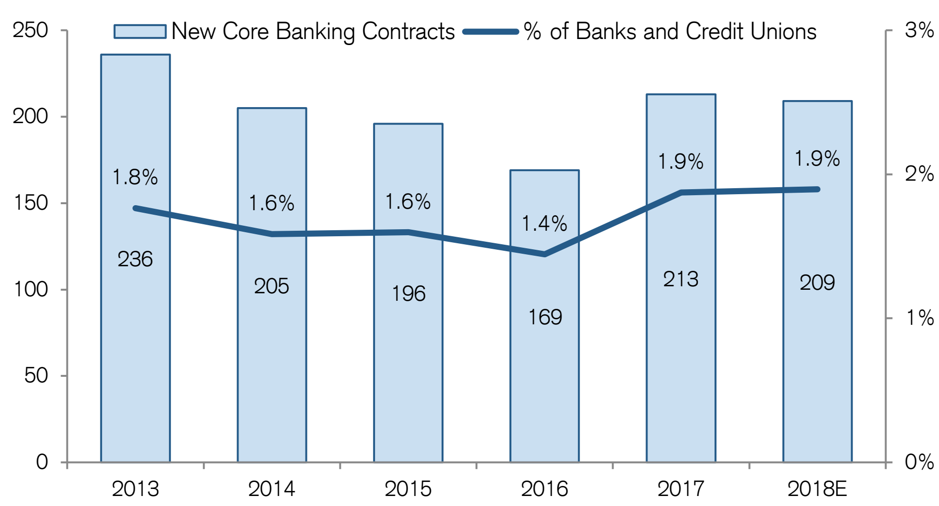
29. Bank Tech key drivers and outlook

We estimate that only ~1-2% of banks switch core providers per year

- We estimate that only ~1-2% of banks switch core providers per year, with core conversions viewed as the most challenging and expensive IT project a bank can undertake.
- This dynamic alone makes it difficult for new entrants to gain meaningful market share.
- The ABA Core Platforms Committee (and ABA investment behind Finxact) suggests some degree of desire from a subset of banks and credit unions to at least consider alternatives.

> *"…I've heard time and again the desire to have a nimble and agile core so they can provide a customer experience served with efficiency and effectiveness.. I've discussed it with hundreds of bank CEOs.. A great portion of them are very excited about a future core dialogue that moves in this direction.."*
>
> – American Bankers Association CEO, Rob Nichols, in an interview discussing their Finxact investment

Only ~1-2% of US banks switch their core providers each year (vs. ~20% that come up for contract renewal given ~5-year average contracts)



US bank tech market share shows Fiserv as the leader by the number of banks, with FIS more skewed to larger-sized banks

Banks by asset size	FIS	Fiserv	Jack Henry
Market share (# of banks)	*12%*	*38%*	*16%*
Large banks (>$30b)	41	7	1
Mid-size banks ($10-$30b)	37	19	6
Small banks ($5-10b)	37	24	14
Community banks (<$5b)	909	2,164	1,020
Credit Unions	239	1,886	695
Total	1,263	4,100	1,736

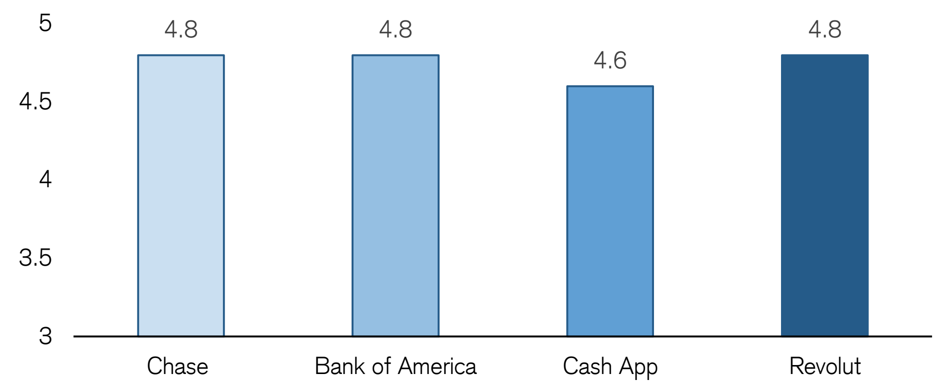
Source: Company reports, Aite Group, Credit Suisse estimates

29. Bank Tech key drivers and outlook

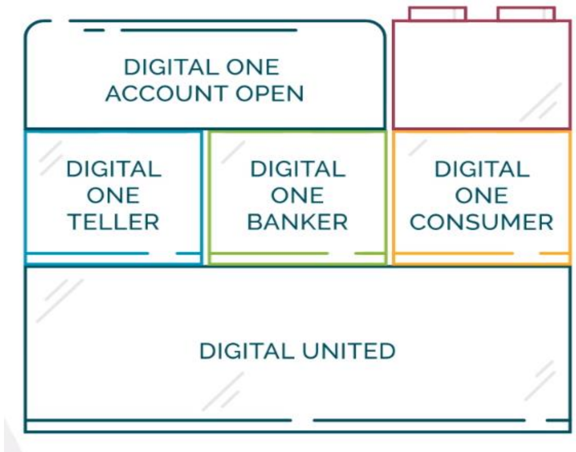
Bank technology providers' mobile banking solutions

- Fiserv has experienced mobile-related growth of ~20% over the past ~4-5 years and plans to allocate a portion of its $500mm innovation investment (as part of the First Data merger) on digital enablement
  - Mobiliti, Architect, Corillian, and other services to a range of community banks and credit unions
  - Recently signed New York Community Bank (> $50b assets), which opted to use Fiserv's DNA along with ~40 additional solutions, including Mobiliti and OpenNow/FundNow (online account acquisition)
- FIS launched its 3rd generation digital banking in 2018
  - Digital One is an integrated digital banking platform that allows community banks to offer a consistent omnichannel experience
  - Includes Digital One Account Open, which allows for an online account opening experience that takes less than five minutes, specifically targeting customers that prefer not to visit a branch
- Jack Henry's mobile offerings are part of the Banno Digital Banking Suite, including digital account opening capabilities (JHA OpenAnywhere)

Mobile banking app ratings offered by larger banks within the Apple App Store are generally receiving high scores, creating a challenge for community banks and credit unions



FIS Digital One platform of integrated solutions delivers an omnichannel banking experience for both the customers and employees of the bank



Source: Credit Suisse estimates; Number of ratings per app: Chase (1.72mm), Bank of America (1.27mm), Cash App (218k), Revolut (7,870)

29. Bank Tech key drivers and outlook

SaaS (hosted) vs. Licensed (on-premise)

- Generally speaking, break-even between SaaS and licensed can be reached at ~3-4 years (i.e., if a bank keeps its system longer than 3-4 years prior to upgrading to the next license, the math works on a direct basis).
- Legacy FISV's 85% recurring revenue (Q3 2018 earnings)
- Legacy FIS's revenue ~80% recurring (2018 Investor Day)

"…But generally, if you move from an in-house or on-premise to an outsourced, there is a multiple of long-term revenue. I'd call it probably 3x overall of what the revenue profile could look like versus just an ongoing maintenance stream. But it all depends on where they're at, how much is developed in-house, is it your technology versus -- just in-source versus outsource, or are they really going a different direction and taking an old in-house developed capability and moving to an outsource, which is all incremental there…"

– James Woodall, CFO, FIS (November 2019)

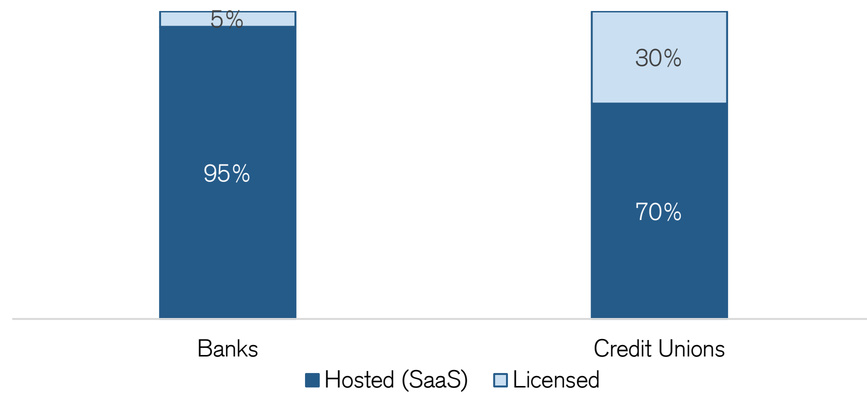
Aspect	SaaS	Licensed
Upfront fees	• Little to none	• Upfront perpetual license (with revenue recognition also upfront, which can create a degree of lumpiness)
Recurring fees	• Monthly or quarterly fees (and revenue recognized similarly) • No maintenance fees (monthly fees are all inclusive)	• Annual maintenance fees (~20% of total cost)
Data storage and processing	• Runs on a private cloud (not AWS, Azure) managed by the core provider (e.g., Fiserv, FIS)	• Typically runs on-premise, but banks can pay their core provider for a private cloud
Customization	• More likely to be out-of-the-box and less customizable, and tends to attract smaller banks • Fiserv and Jack Henry have a greater degree of this vs. FIS, due to smaller bank and credit union skew (i.e., Fiserv has more SaaS mix than FIS)	• Customizable and tends to attract larger banks that make these modifications • FIS has a greater degree of this vs. Fiserv and Jack Henry, due to larger bank skew

Source: Company data, Credit Suisse research

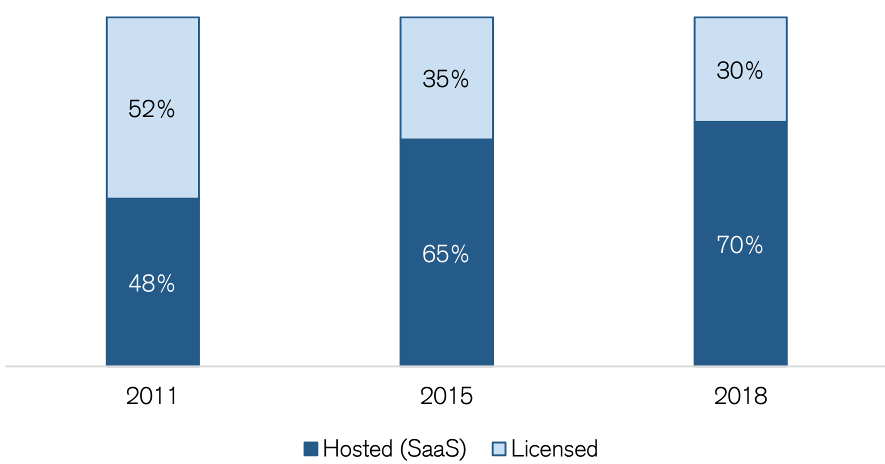
29. Bank Tech key drivers and outlook
SaaS (hosted) vs. Licensed (on-premise)

- Market shifts toward SaaS core deployments have been ongoing for the past decade with room
- Hosted deployments generally lead to faster time to market, reduced capital expenditures, and more frequent software updates
- We expect this trend to benefit the Bank Technology providers by increasing their ability to cross-sell new products and reducing revenue volatility from reduced license sales

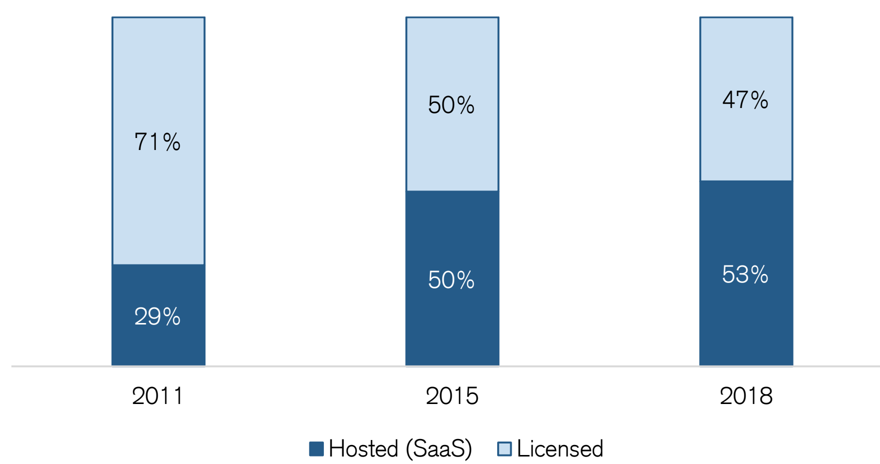
In 2018, ~95% of new core system contracts signed by banks were hosted vs. ~70% for Credit Unions



US Bank Core Systems deployment types over time



US Credit Union Core Systems deployment types over time



Source: Aite Group, Credit Suisse

29. Bank Tech key drivers and outlook

Emerging vendors – Can they break through in the US?

- After a period of consolidation over the past 20 years, with the big three vendors now serving 66% of market (counted by number of banks), we are starting to see new vendors re-emerge.
- While the next-gen core banking platform providers are worth monitoring for investors, we believe that a meaningful portion of bank CEO/CTOs are reluctant to embrace due to (1) lack of client references (chicken and egg), (2) long-term strategic decisions that favor providers with balance sheets indicative of continued investment and longevity, and (3) preference for minimizing the number of vendors.
- We believe that next-gen core providers (e.g., Finxact, MAMBU, Nymbus, etc.) have the potential to be successful in their own right, accumulating more bank customers over time; however, even with a great deal of success, it is unlikely that any meaningful financial impact would be felt by FIS, Fiserv, and/or Jack Henry over the foreseeable future.
- We would also expect the legacy providers to consider acquiring next-gen providers (i.e., deliver their technology via vast distribution networks, reduce risk of market share loss), consistent with their historical approach.
- On the core banking side, we expect them to be competitive for digital-only De Novo banks (including Neo/Challenger banks) and with select mid-sized banks.

Finxact, as an example of a Core-as-a-Service model, was formed by a former FIS executive and recently received investment ($30mm) from the ABA, Accenture, First Data, and SunTrust

Ecosystem Partners are at various stages of integration.

Source: Finxact, Credit Suisse research

29. Bank Tech key drivers and outlook

Not a near- to medium-term risk, but developments to monitor

2016
Incoming CEO of the American Bankers Association (ABA) spends first year on the job speaking with members:

"…met with roughly 3,900 bank CEOs…one narrative came up again, and again, and again…we're struggling with our core relationship – the core is not as nimble, it's not as agile, we're not able to offer the innovative customer experience that we'd like to with the same efficiency or the speed…"

May 2019
ABA Core Platforms Committee meets with Fiserv, FIS, Jack Henry, and Finastra (to discuss three items): (1) contracts; (2) access to innovation (i.e., FinTech advances & API access to core); and (3) access to data (getting to a bank's owned data to better personalize)

October 2019
ABA Core Platforms Committee publishes "Principles for Strong Bank-Core Provider Relationships"

January 2019
Finxact raises $30mm from strategic investors (American Bankers Association, Accenture, and SunTrust)

September 2019
Chime surpasses 5mm FDIC-insured accounts in < 5 years

October 2019
Chime looking to raise new funding at a $5b valuation (to be led by existing investor DST)

2016 | 2017 | 2018 | 2019 | 2020

May 2017
Finxact raises initial seed round of $12mm via Live Oak Ventures, First Data, Woodforest National Bank, and TNI

November 2017
Iowa Falls State Bank v. Jack Henry & Associates, Inc. related to access to the bank's data in context of a new vendor discussion

October 2018
ABA sends letter to "three major core providers" with an aim toward coming to a solution to what is a "significant problem"

Formation of the ABA Core Platforms Committee (of ~20 reps. from banks ranging in size from $150mm to $25b in assets) invested in improving relationships with core providers

July 2019
Monzo, a UK challenger bank (~2-3mm accounts) launches in the US

July 2019
N26, a leading European challenger bank (~3.5mm accounts) launches in the US with a 100k user waitlist

October 2019
Revolut looking to raise $500mm in equity and $1b in debt for global expansion in partnership with Visa

September 2019
Revolut announces expanding global partnership with Visa, including the US, with plans to expand headcount from 1.5k to 5k during 2020

As of today
Traditional core providers are 0 for 10 with the top/fastest growing Neo/Challenger banks, i.e., so far not showing signs of involvement with the potential next generation of banks (although we note FIS won Atom bank in the UK, a meaningful challenger)

Source: American Bankers Association (ABA), WSJ, the BLOOMBERG PROFESSIONAL™ service, Credit Suisse research

29. Bank Tech key drivers and outlook

A selection of emerging bank IT vendors

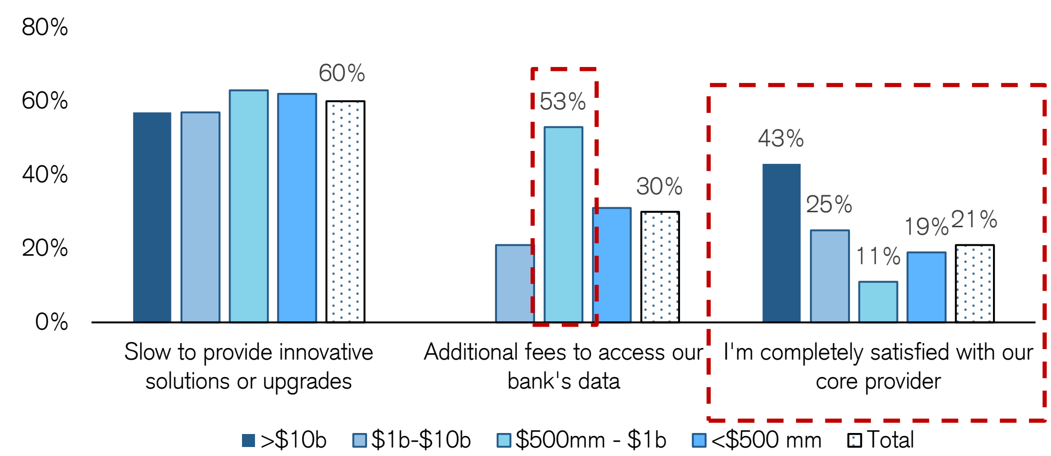
Company	Year Founded	Description	Expertise	Customers	Investors
Alkami	2009	Provider of online and mobile banking for retail and business customers	Ancillary services	Nicolet National Bank ($3b), Oregon Community CU ($1.7b)	General Atlantic, S3 Investors, Argonaut
Apiture	2017	Vision to "redefine the digital experience across the financial industry..." 500+ customers, API-first mindset (i.e., build everything as an API vs. wrapping old technology in an API layer)	Ancillary services	SunTrust, Live Oak Bank	Canapi Ventures, First Data
nCino	2012	Modern cloud-based core banking system provider built on Salesforce with a particular strength in lending solutions	Ancillary services	TD Bank, KeyBank, Navy Federal Credit Union	T. Rowe Price, Salesforce Ventures, Bessemer Venture Partners, etc.
Synapse	2014	Modern provider of ancillary banking services including card issuance, brokerage accounts, and loan origination and servicing products	Ancillary services	Not disclosed	Andreessen Horowitz, Core Innovation Capital
Backbase	2003	Core overlay service, also offering omnichannel banking and digital solutions	Core overlay	ABN AMRO, Barclays, ING, KeyBank, Lloyds Banking Group	Not disclosed
Treasury Prime	2017	Core overlay service, also offering instant digital onboarding for account opening	Core overlay	Not disclosed	Not disclosed
Corelation	2009	Core provider focused on serving credit unions	Core platform	60+ Credit Unions	N/A
Finxact	2016	Core-as-a-Service banking system provider built on AWS with a curated ecosystem of third-party partners	Core platform	Live Oak Bank	First Data (now Fiserv), SunTrust Banks, American Bankers Association, etc.
Mambu	2011	Modern cloud-based core banking system focused on Europe with headquarters in Berlin, Germany	Core platform	ABN AMRO, Santander, N26, OakNorth, TBC Bank, new10	Bessemer Venture Partners, Acton Capital, CommerzVentures
Neocova	2019	Modern cloud-based core banking system provider focused on community banks and credit unions	Core platform	Not disclosed	Not disclosed
Q2	2004	Provider of digital and mobile banking, lending and leasing services, and cloud-based core banking systems	Core platform and ancillary services	Core customers: Sallie Mae, Qapital, H&R Block	Public company (QTWO)
Temenos (limited US presence)	1993	Switzerland-based provider with expertise in core banking, digital, payments, wealth management, and fund administration; international platform, with limited core banking traction in the US currently	Core platform and ancillary services	HSBC, PayPal Credit, EQ Bank, UBS	Public company (TEMN)
Nymbus	2015	Modern cloud-based core banking system with a particular strength in payments; acquired R.C. Olmstead in 2016 and gained 46 core Credit Union clients; also features NYMBUS SmartPayments real-time payments suite	Payments: NYMBUS SmartPayments real-time payments suite	~46 Credit Unions	Insight Partners, Home Credit Group, Venture Enterprises
Additional providers:		Thought Machine (core), Allied Payment (community banking payments), Fisoc (loyalty programs sold to banks and credit unions), Treasury Prime (core overlay), Mistral Mobile (mobile banking), Hydrogen Platform (platform helping financial institutions speed development and innovation)			

Source: Company data, Crunchbase, Credit Suisse research

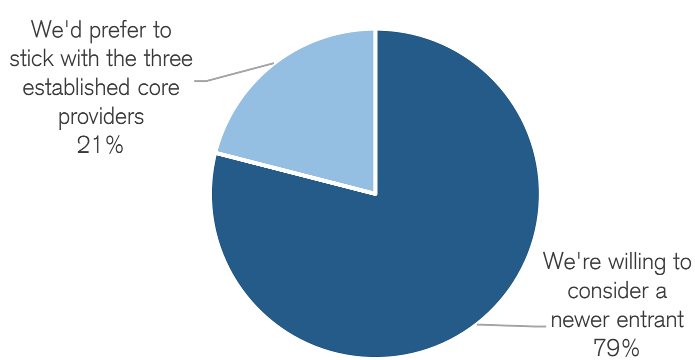
29. Bank Tech key drivers and outlook
2019 Bank Director technology survey

- Broadly, survey data suggest smaller banks appear to be less satisfied with their core providers, with banks from $500mm to $1b in assets and banks with <$500mm in assets satisfied with their provider at a rate of 11% and 19%, respectively, whereas 43% of banks with >$10b in assets are satisfied with their core.
- At the very least, survey data suggest banks appear willing to listen to pitches from new providers (~80% agreed they would consider it).
- Survey data suggest a rising consensus around a lack of innovation at the core providers, with infrequent update cycles for software/data solutions (small and large banks agreeing on this point, ~60% of respondents).

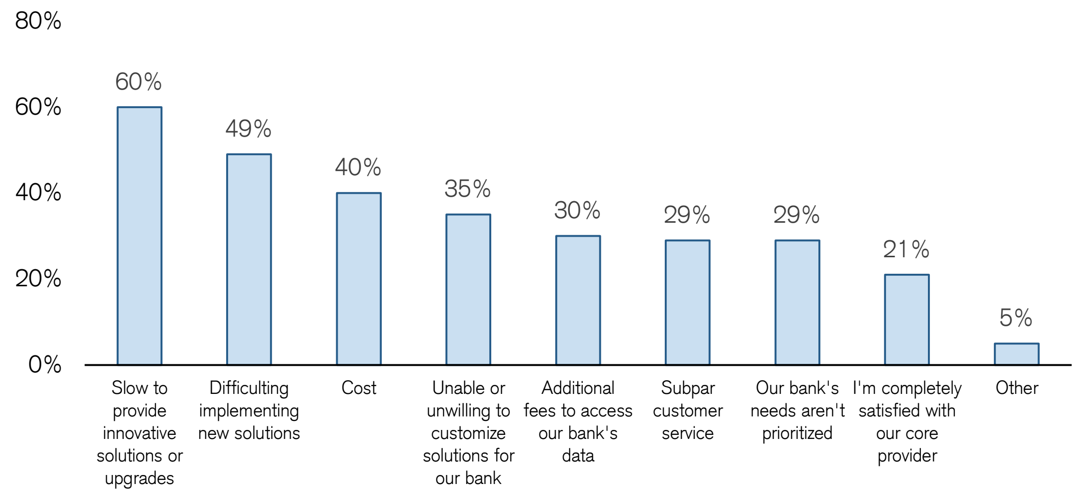
Survey data suggest satisfaction with core provider was limited to 21%, while most participants agree providers are slow to innovate or upgrade technologies



~80% of participants would be willing to consider a new entrant for core banking needs



Survey participants were asked about pain points with core providers, and most respondents feel core providers are not on the cutting edge of innovation

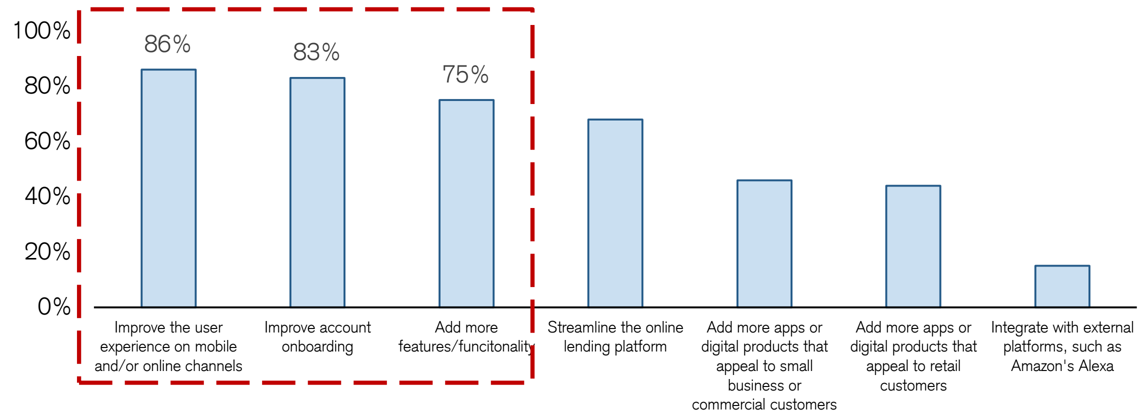


Source: Bank Director 2019 Technology Survey – Sponsored by CDW (n = 150 bank executives, conducted June-July 2019), Credit Suisse research

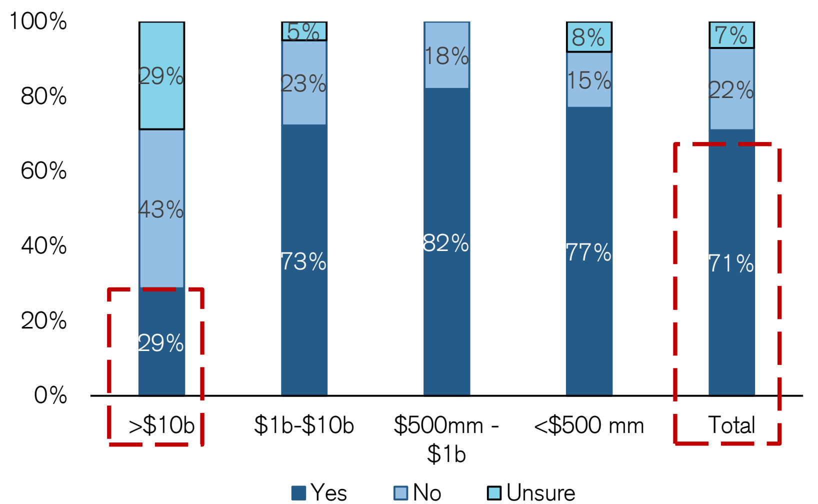
29. Bank Tech key drivers and outlook
2019 Bank Director technology survey

- Most survey participants noted they are looking to upgrade basic account functions, such as user experience, mobile & online banking applications, and account onboarding, along with adding more features and functionality.
- While larger banks (>$10b) may have the capital and support to implement these projects via outside providers and internal IT staff, most banks <$10b likely do not have the capital or are not willing to spend (i.e., costs to tie outside providers into existing legacy cores).

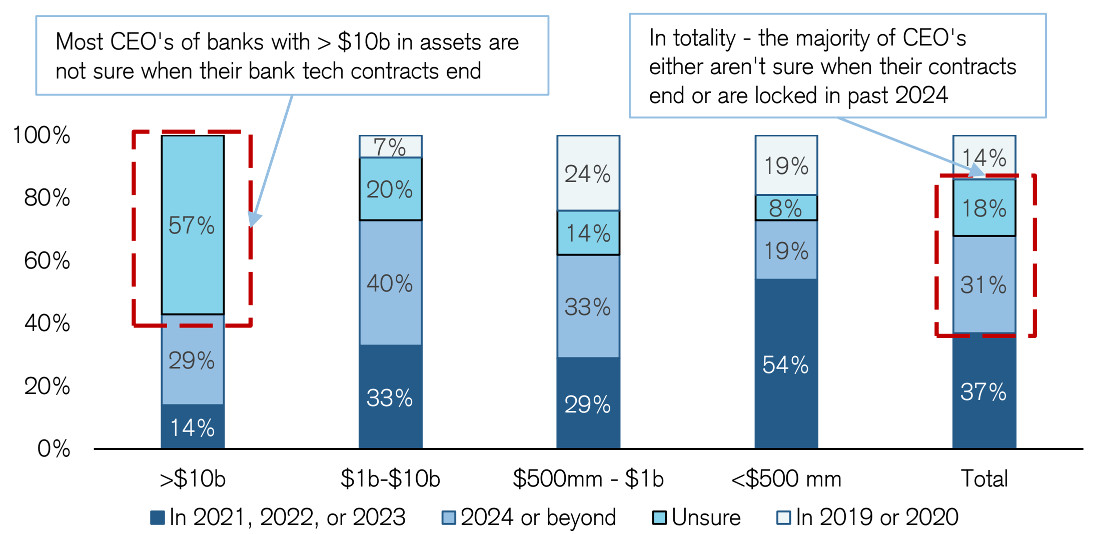
The majority of survey respondents are looking for improvements in user experience (mobile, online, account onboarding), along with adding features & functionality…



…and when asked if they would use a core provider to enhance digital, most larger banks would opt for outside parties, while smaller banks are more or less tied into updates with the core



Many participants did not even know when their bank tech contracts end (likely due to complexity, multitude of contracts) or are locked in for 5+ years



Source: Bank Director 2019 Technology Survey – Sponsored by CDW (n = 150 bank executives, conducted June-July 2019), Credit Suisse research. Rounding differences amount to <1%

30. Modern Card Issuance Platforms
Enabling any platform, brand, or FinTech to issue cards

- Card issuance is no longer just for traditional banks (e.g., Chase, Bank of America, Capital One) and large merchant co-brands (e.g., Delta Airlines, Marriott , Costco).
- Platforms and service providers ("modern card issuance" technology companies such as Marqeta, Stripe Issuing, i2c, Green Dot, Galileo Financial Technologies, etc.) are now enabling any company or brand to issue cards across a wide range of use cases, including:
  - Employers (to employees for smart expense control)
  - On-demand platforms (for couriers)
  - Challenger banks ("Neo banks")
  - Core payments & P2P platforms (e.g., Square, PayPal, Venmo)
  - Additional FinTech issuers (e.g., Transferwise, Betterment, etc.)
  - Brands (for customers, i.e., loyalty, engagement)
- To date, modern issuer processing platforms like Marqeta have been more focused on new channels of card issuance (FinTechs, brands, etc.) vs. traditional banks, although we believe that both could begin to win portions of larger traditional issuer portfolios (which would be meaningful business and a positive for Marqeta and/or i2c, but likely *di minimis* for the likes of TSYS, FIS, and FISV.

Technology platforms and FinTechs are partnering with licensed card-issuing banks (typically smaller, Durbin-exempt) to issue cards (typically pre-paid debit cards) for employees, contracts, and customers

COMPANY	Betterment	wealthfront	STASH	acorns	N26	TransferWise	NOVO
PARTNER BANK	GBC	green dot	green dot	Lincoln Savings Bank	axos Bank	CFSB	Middlesex Federal
COMPANY	Square	Cash App	Uber	PayPal venmo	chime	Current	zero
PARTNER BANK	Sutton Bank	Lincoln Savings Bank	green dot	The Bancorp	The Bancorp	Metropolitan Commercial Bank	Evolve bank & trust

Source: Company reports, CB Insights, Credit Suisse research

30. Modern Card Issuance Platforms

The four roles (and key players) in modern card issuance

- Green Dot is the only player that has offerings across all four capabilities and expands beyond cards (BaaS).
- Often times, the issuer processor and program manager are the same (e.g., Marqeta handles both).
- Additional players are the networks (Visa, Mastercard) and, at times, a distribution partner (e.g., Blackhawk).

Non-bank issuer	Issuing Bank	Issuer Processor	Program Manager
• Owns the cardholder relationship (e.g., employee, contractor, consumer) • Marketing and/or distribution of the cards (sometimes through a distribution partner)	• Holds an actual bank license • Final approval on account creation (i.e., risk tolerance on NSF, fraud) • Typically a more minimal role, but cobrand issuers (e.g., SYF, ADS) can be more active in marketing	• Routing of card transactions for approval (including advanced rules for case-specific approvals) • Account number & card generation • Offer APIs to developers	• Oversees P&L of program, along with fraud and compliance • Maintains relationship with issuing bank and card networks (V/MA) • Earns the largest portion of interchange on smaller programs
Examples: • DoorDash • PayPal & Venmo • Uber • Square • Green Dot • Walmart • Hyundai • Apple	Examples: • Green Dot Bank • Axos Bank • Sutton Bank • Cross River Bank • Lincoln Savings Bank • MetaBank • Evolve Bank & Trust • The Bancorp Bank	Examples: • Marqeta • Stripe Issuing • i2c • Green Dot • Galileo • InComm • CoreCard • Large-caps FISV, FIS, GPN/TSS	Examples: • Marqeta • Stripe Issuing • Green Dot • Galileo • Fiserv, FIS, & TSYS • NetSpend (GPN/TSYS-owned) • I2c • BREX

Source: Company reports, Credit Suisse research

30. Modern Card Issuance Platforms

“Smart” controls on card transaction approvals

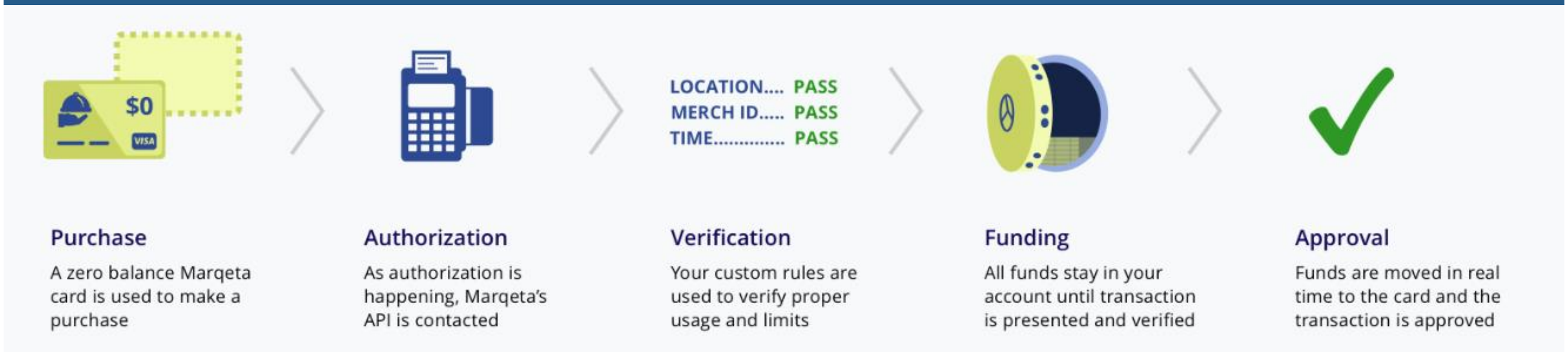
- An increasing use case provided by modern card platforms is the placement of smart controls on transaction approvals. Generally speaking, controls on cards can be placed at three difference levels:

1. **At the network level** – Visa and/or Mastercard are able to stop a transaction before it reaches the issuer for an approval decision (e.g., “no international transactions”).

2. **At the issuer (issuer processor) level** – Certain Merchant Category Codes (MCC) can be turned on and off or purchase caps can be placed over a time period (e.g., a dollar amount that can be spent at a certain location over the course of a week). Fuel cards are another example (e.g., may enable only fuel, supplies, and vehicle maintenance-related MCCs). All issuer processors can restrict MCCs, although Marqeta APIs allow co-brand partners to control these by making real-time and/or grouped changes to restrictions.

3. **An additional layer of control – Just-in-Time (JIT) funding** – Auto-funding of card-linked accounts in real time, only after the transaction is approved through the custom evaluation process (e.g., approval rules based on the specific order, time, and merchant).

Marqeta JIT example: DoorDash uses JIT funding by Marqeta to help reduce fraud related to delivery courier order pick-up, allowing DoorDash to ensure couriers are paying for the exact orders (and only exact orders) at the right time and at the right merchant (e.g., transaction approvals are specific to the order that came through the DoorDash platform)



Source: Marqeta, Credit Suisse research

30. Modern Card Issuance Platforms

Economics of pre-paid debit (majority of modern card issuance)

- **The vast majority of modern card issuance platforms are issuing prepaid debit cards**, with the economics on prepaid debit interchange generally ~20-40bps higher than on traditional debit.
- Bank partners used by FinTechs are typically exempt from Durbin debit interchange caps (unregulated) – e.g., The Bancorp, MetaBank, Green Dot Bank, Sutton Bank, Axos Bank, etc.
- Economics are spread across all four parties in the stack (non-bank issuer and/or co-brand partner, bank issuer, issuer processor, and program manager), with the program manager generally receiving the largest portion, although depending on volumes (tier-based contracts), the non-bank issuer may garner the majority of the economics.
- Example: Square Cash Card receives ~65% (CS est.) of the prepaid debit interchange, while its bank partner (Sutton Bank) and issuer processor & program manager (Marqeta) share the remainder.

Visa US Interchange (US Retail category)	Regulated debit	Exempt debit (unregulated)	Exempt prepaid (unregulated)
Illustrative transaction size	$39	$38	$38
+ Cents per transaction	$0.21	$0.15	$0.15
x Bps of volume	0.05%	0.80%	1.15%
= Total interchange ($)	$0.23	$0.45	$0.59
Total interchange (%)	***0.59%***	***1.19%***	***1.54%***

Rank	Pre-paid debit issuer	2018 purchase volume
1	The Bancorp Bank	$41.9b
2	MetaBank	$37.7b
3	Green Dot Bank	$26.0b
4	Comerica Bank	$19.6b
5	JPMorgan Chase	$18.7b
6	Axos Bank	$9.7b
7	Bank of America	$8.5b
8	MB Financial	$5.5b
9	US Bank	$5.4b
10	UMB Bank	$5.0b
11	Sunrise Banks	$4.6b
12	Sutton Bank	$3.2b
13	Webster Bank (incl. HAS)	$2.4b
14	Comdata	$1.7b
15	PNC Bank	$1.4b
16	KeyBank	$1.3b
17	Wells Fargo	$1.0b
18	Metro. Comm'l Bank	$0.7b
19	BB&T	$0.6b
20	Fifth Third Bank	$0.5b

Source: Company reports, Visa USA Interchange Reimbursement Fees, Board of Governors FRB, The Nilson Report, Credit Suisse research

30. Modern card issuance platforms

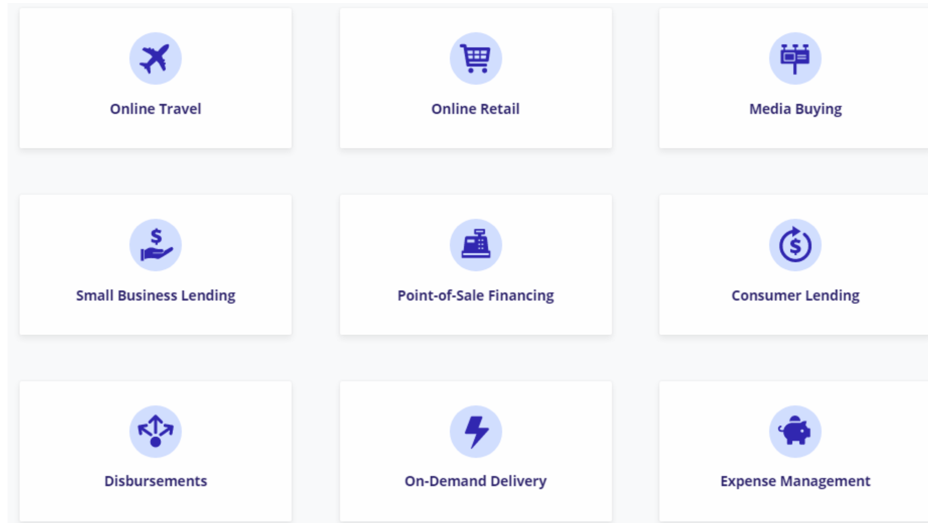
Marqeta 2019 update and highlights

- Platform would now rank as a top 25 issuer of debit cards in the US (if consolidated as a single card issuer)
- Issued 140 millionth card & saw revenue double for the 4th consecutive year
- New offerings launched in 2019
  - Marqeta Reserve Financing - financing option that allows for seamless funding of reserve accounts
  - Push-to-Card – allows funds to be loaded on to virtual cards or tokenized into a digital wallet (used in lending applications and beyond)
  - One Sandbox Project – developer interface enhancement
- Additional highlights disclosed:
  - Added to premier customer list (naming Expensify, Lydia, YAPEAL, Twisto, Ramp Financial, ConnexPay, and Capital on Tap as examples of wins)
  - Extended Visa partnership to 10 Asia-Pacific markets (vs. most issuers active in three countries), as part of early global expansion efforts
  - Headcount ~400 (+175 YoY), with offices in Oakland and London
  - Valuation increased (~4x) to ~$2b, after closing a $260mm Series E

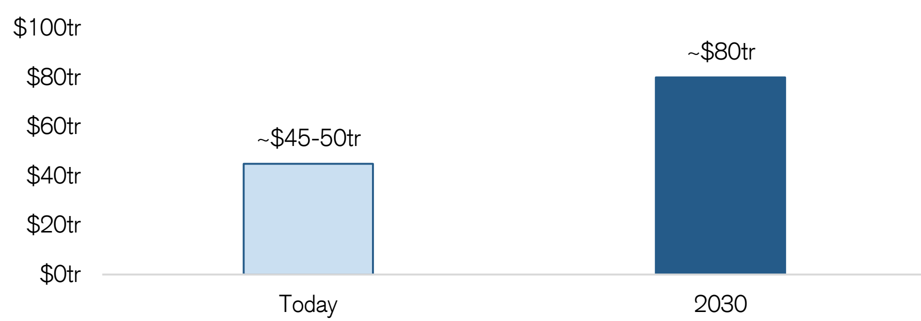
"…We are in the midst of a transformation in card issuing around the globe," said Jason Gardner, founder and CEO of Marqeta. "When today's innovators are in need of modern payment solutions, they aren't turning to banks as their primary issuers anymore and want a platform built for their needs. We've been proud to power this transformation as the most advanced card-issuing platform built in over two decades. It has been exciting to see our customers embrace these new possibilities and build extraordinary products and services that have helped define markets in their own right.."

– Jason Gardner, Founder and CEO, Marqeta (May 2019)

Marqeta serves a range of issuers, with modern card issuance extending beyond the traditional bank issuers of the past (i.e., non-bank issuers)



Marqeta sees the global card issuance market reaching ~$80tr in volumes by 2030, increasing ~$30tr+ over the decade (per to Edgar, Dunn & Company)



Source: Company reports, Credit Suisse research

30. Modern card issuance platforms

Cards allow for a “recycling” of volumes (get paid 2x on the same business)

- Traditional fund access was done via ACH bank transfers, which are not only slow but come with a small cost (vs. card issuance, which is immediate and is a revenue generator).
- Example: Square Card for sellers
  - Square gets paid when a consumer makes a purchase at a seller’s POS or website (~3% gross), and then Square gets paid again (~2% unregulated debit interchange) when the seller accesses the funds (spends) via card.
  - Fees earned by Square, PayPal, and Venmo (interchange share with partner bank and program manager) are roughly similar to the “Instant Transfer” and “Instant Deposit” fees earned today (which we consider to be at risk longer term due to increased usage of The Clearing House’s RTP network and eventually FedNow, although not a near-term concern).
- Square is an example of a platform that has successfully monetized cards both from a consumer (Cash Card associated with Cash App balances) and merchant perspective (Square Card associated with seller account balances).

Square Card issuance to sellers allows instant access to seller balances (sales made that day) at no charge, yet Square still earns commercial debit interchange when card is used…

…similarly, Cash Card issuance to consumers provides instant access to Cash App balances at no charge, and Square earns prepaid debit interchange when the card is used

30. Modern card issuance platforms
“Recycling” examples in PayPal, Square, Stripe, Adyen, etc.

- While PayPal (both for core PayPal and Venmo), Square, and Stripe all offer forms of “instant transfer” to bank accounts or debit cards (i.e., Visa Direct or Mastercard Send), we believe card issuance could prove to be the better way to address supplier liquidity needs.
- It also increases seller stickiness via expansion into expense management (a payments platform’s involvement was traditionally more limited to the revenue side of the business).
- Stripe Issuing was launched in July 2018, followed by Stripe Corporate Card in September 2019.
- Adyen announced a card-issuing program in November 2019, highlighting the access to faster funds for its merchant base (e.g., for marketplaces to provide to their sellers).

PayPal & Square business debit cards earn unregulated debit interchange and provide instant access to funds for sellers, while Stripe Issuing offers cards for employees (dynamic expense controls), contractors (on-demand platforms), and customers, along with a formal Corporate Card program

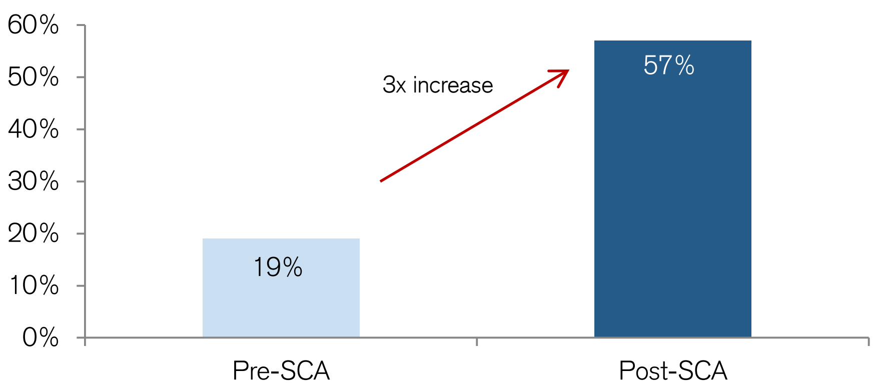
Source: Company reports, Credit Suisse research

Regulation & Litigation

31. Two-Factor Authentication Implications
Customer experience and fraud prevention

- What is Strong Customer Authentication (SCA)?
  - Two-factor identity authentication is a requirement for online purchases in Europe (part of PSD2 regulation).
  - Card-issuing banks will be required to decline non-SCA compliant transactions.
  - SCA deadline was delayed to Dec. 31, 2020 (from Sep. 2019).
- Why is SCA important? SCA poses a significant challenge to eCommerce merchants by adding friction to online shopping.
  - Retailers in India experienced a 25% drop in online checkout conversion over night from two-factor requirements in 2014.
  - 451 Research estimates a €57 billion loss of eCommerce sales in the first year after SCA is enforced.

Mastercard estimates SCA will triple the number of online transactions requiring two-factor authentication from 19% to 57%



SCA requirements: 2 of 3 factors below

SCA exemptions

- Low-value transactions (< €30); SCA required after 5 transactions regardless of size or after €100 in cumulative spend
- Trust websites – first use required SCA
- Recurring payments
- Contactless payments
- Corporate payments
- Merchants are liable for fraud on exempt transactions that do not go through SCA

Source: Mastercard, Stripe, 451 Research, Credit Suisse research

31. Two Factor Authentication Implications
3-D Secure 2.0 – Industry SCA Solution

- What is 3-D Secure (3DS)?
  - 3DS is an authentication protocol that enables issuing banks to verify the identity of cardholders during a CNP transaction
  - 3DS is the primary framework for addressing PSD2's SCA
  - Utilizing 3DS transfers fraud liability from merchant to issuer
  - 3DS specifications are governed by EMVCo
- Key benefits of 3DS 2.0?
  - Lower checkout friction (Visa claims a 70% improvement in cart abandonment rates)
  - Increased transaction approval rates (+5% lift in approval rates)
  - Reduced fraud rates
- 3DS 2.0 is big improvement but not a panacea for SCA
  - Optimizing for SCA exemptions is complex
  - Not all issuers will be able to support 3DS 2.0 by the SCA deadline

"…SCA will make or break Internet businesses. The urgency to get ready for it cannot be overstated…"

- Guillaume Princen, Head of Continental Europe, Stripe (June 2019)

Key differences between 3DS 1.0 and 3DS 2.0

3-D Secure 1.0	3-D Secure 2.0
Static passwords	Sophisticated authenticators (e.g., biometrics, one-time passwords)
Browser dependent	Mobile enabled
Limited dataset (supports 15 data elements)	Enriched dataset (supports 150 data elements, 10x the number of 3DS 1.0)
Enrollment required	No enrollment required
Merchant bound by issuer decision	Merchant opt-out option

SCA complexity favors tech-oriented merchant acquirers

Adyen
First to market its SCA-compliant 3DS 2.0 Solution to help merchants boost conversion rates and security

FIS (Worldpay)
Launched Exemption Engine for SCA in June 2019 to work with its 3DS 2.0 solution "3DS Flex"

Stripe
Launched 4 types of SCA-compliant merchant products in 2019 and acquired Touchtech to help banks prepare for SCA

32. Trends in Global Payments Regulation

Commonalities across Payments regulations worldwide

1. Centered around stimulating competition in financial services via Open Banking regulatory initiatives (practically every major developed economy has such regulations aside from the US)
2. Reducing card payment fees borne by merchants and consumers (indirectly) via Interchange caps
   - Australia – Caps on debit and credit interchange
   - Europe & UK – Caps on debit and credit interchange (IFR)
   - US – Caps on debit interchange for banks with over $10b in assets

North America		Europe	Asia-Pacific	
USA	▪ Ongoing US Merchant Interchange Fee Antitrust Litigation ▪ Anti-steering case with American Express deemed legal by US supreme Court (2018) ▪ EMV Liability shift (2015) ▪ Interchange caps on debit transactions (Durbin, 2011)	▪ Interchange reduction on cross-border transactions from consumers outside the EU spending inside the EU ▪ PSD2 regulation (2018-2020); Open Banking APIs & SCA mandated ▪ GDPR (2018); EU consumer data protections	Australia	▪ 2017 Interchange caps on credit and debit ▪ Open Banking mandated in July 2019
			Singapore	▪ Open Banking support but not mandated ▪ Published API playbook for financial industry in 2016
Canada	▪ Launched publication consultation on Open Banking merits (2019)	▪ Interchange Fee Regulation (2015 and 2016), Interchange caps on credit and debit, Separation of Scheme and Processing, Co-badging, Anti-steering & Honor all cards relaxation, Un-blending of MDR	India	▪ RBI expected to release Open Banking guidelines in 2020
Mexico	▪ FinTech law effective (2018)		Hong Kong	▪ Open Banking mandated in four phases from 2019 to 2020

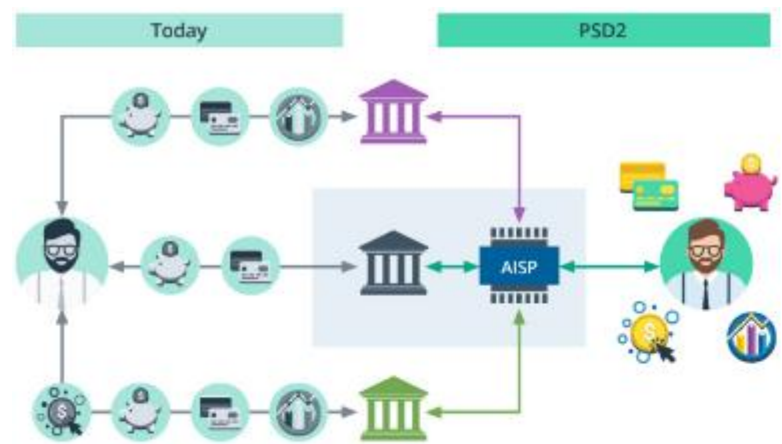
Source: Company reports, Credit Suisse research

33. European Payments Regulation
PSD2 in Europe: Evolution, not revolution

- The Second Payment Services Directive's (PSD2) regulatory objective is to stimulate competition in financial services, reduce fraud, and increase consumer protection in the European Economic Area, with an emphasis on two key aspects:
- Open API mandates on European banks
  - Requires European banks to grant qualified third parties automated access to customer accounts (retail and corporate) via open APIs
  - Empowers new platform-oriented business models and pulls them into regulatory scope: (1) Account information service providers (AISPs) can provide a consolidated view across a consumer's financial accounts; and (2) Payment initiation service providers (PISPS) can initiate transactions payments directly from a bank account (e.g., PayPal) without relying on screen scraping
- Enhance customer security
  - Requires strong customer authentication (SCA), two-factor authentication when a consumer initiates an online payment or accesses bank account information online; detailed in Theme 32
  - Reduces consumers' liability for unauthorized payments
  - Prohibits surcharging

PSD2 Timeline – Key Dates	
November 2015	Final approval of PSD2 by European Council
January 2018	PSD2 becomes national law
February 2018	Regulatory technical standards (RTS) on open banking APIs and SCA published, giving European banks and merchants 18 months to implement
September 2019	RTS mandated to start (for open banking API requirements, not SCA). In June 2019, the EBA allowed for time extensions on an exceptional basis
December 2020	RTS enforced for SCA

Open Banking brings the platform model into financial services



33. European Payments Regulation

Open Banking Perceptions from European Banking Executives

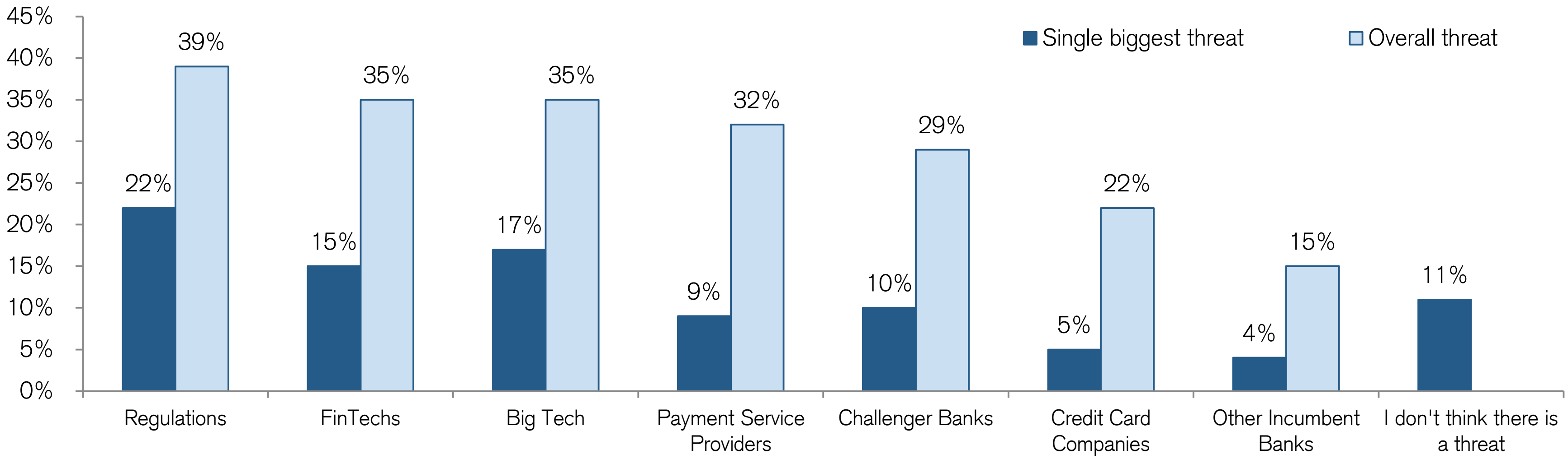
- 22% of European Banking Executives view regulations as the biggest threat to their business
- 17% view BigTech as the single biggest threat (Google, Amazon, Apple), given established customer relationships, large user bases, brand recognition, and technical talent
- 64% believe the financial services industry will significantly evolve as a result of open banking

Top Open Banking Challenges & Priorities from Tink's Survey of European Banking Executives

Top 3 Challenges
Modernize IT systems, comply with EU regulations, and finding the right talent

Top 3 Opportunities
Develop better digital services, increase customer personalization, and reduce costs of customer acquisition

Biggest Threats to Incumbents from Open Banking (European Banking Executives)



33. European Payments Regulation

Europe Interchange Fee Regulation (IFR)

- Regulatory objective: Reduce the cost of card payments and increase competition
- Applies to all card-based payment transactions in the European Union as of June 2016 (aside from Interchange caps, which became effective in December 2015)

European Commission presentation on IFR regulation

IFR Articles	Description	Objective & Potential Impact
Interchange Caps (articles 3 & 4)	• Cap domestic interchange rates to 0.30% and 0.20% for credit and debit card transactions, respectively; also applies to intra-Europe cross-border	• Lower acceptance cost of card payments and stimulate merchant acceptance of card payments
Separation of Processing & Scheme (article 7)	• Card networks must separate their processing and scheme operations (accounting, organization and decision-making) • Bans price bundling for processing and scheme fees	• Increase competition in the processing market to reduce prices • Prevents card schemes from favoring their own processing by enabling choice for banks and retailers • Facilitated Mastercard and Visa's processing share gains in Europe
Co-badging (article 8)	• Restricts card networks from charging scheme fees for transactions made on co-badged cards that were not processed on the scheme's network	• Improves competition in cross-border payments among card schemes
Honor all cards relaxation & Anti-steering (articles 10 & 11)	• No longer required to accept all card types issued by a particular scheme (consumer prepaid, debit, and credit) • If a merchant wishes to accept one type of consumer card across the 3 categories, it must still accept all (e.g., if you accept 1 type of Visa credit, you must accept all Visa credit cards) • Prohibits card schemes banning merchants from steering consumers	• Allows merchants to decide if they want to accept various card types (consumer prepaid, debit, and credit)
Unblending (article 9)	• Acquirers required to separately list interchange fees, scheme fees, and the acquirer mark-up	• Improves transparency on card transaction fees paid by merchants

Source: ECB, Credit Suisse research

33. European Payments Regulation
Cross-Border Europe Interchange Fee Regulation

- Regulatory objective: Reduce the cost of cross-border card payments in the European Economic Area (EEA)
- Each of the three regulations listed below brought more transactions occurring within the EEA into scope

Date	Description	Example of Cards/Transactions in Scope
December 2015	• Interchange Fee Regulation (IFR): Caps domestic interchange rates to 0.30% and 0.20% for credit and debit cards issued and used in Europe, respectively; also applies to intra-EEA cross-border	• Applies to all domestic and cross-border transactions for cards issued and used in Europe • For example, a French consumer making card purchases in France • And a French consumer making card purchases in Germany
~October 2019 (within 6 months of April 2019)	• Regulates/reduces interchange on cards used in Europe but issued elsewhere (tourists visiting Europe), by 40% on average • For in-store transactions (card present), caps interchange rates to 0.30% and 0.20% for credit and debit cards, respectively • For online transactions (card not present), caps interchange rates to 1.50% and 1.15% for credit and debit cards, respectively	• For example, a US tourist making an in-store card purchase in Belgium • And a US consumer making a card purchase at an eCommerce merchant in Belgium while in the US
December 2019	• Regulates/reduces interchange on cross-border card payments in euro, in non-Eurozone Member states (Bulgaria, Croatia, Czechia, Denmark, Hungary, Iceland, Liechtenstein, Norway, Poland, Romania, Sweden) to be the same as domestic payments (December 2015 IFR caps listed above) • These transactions account for ~80% of all cross-border payments from non-Euro area member states	• For example, a Polish consumer making card purchases in France

Source: European Commission, Credit Suisse research

34. US vs. International FinTech regulations and market dynamics

A big opportunity in the US with big hurdles

Regulations

"Market-driven" approach in the US vs. Innovation-oriented regulations abroad

- Un-mandated consumer financial data rights vs. mandated consumer financial data rights abroad (mandated Open APIs)
  - Dodd-Frank mandates direct consumer access to data but not specifically data aggregators, meaning technically banks aren't required to allow companies like Plaid to connect (e.g., PNC turning off Venmo and telling customers to use Zelle in December 2019)
- Interchange unregulated (ex. Debit for big banks)
  - Interchange rate decisions left up to the courts in the US vs. addressed by regulators abroad
  - Unregulated Debit interchange enables US FinTechs to monetize at materially higher rates than FinTechs in regions where interchange is regulated (e.g., Europe debit interchange is 20bps vs. 150-190bps + $0.10 in the US), reducing their need to monetize via new products

"…the PNC-Venmo spat shows how much we need to adopt open banking that lets customers own their own data."

\- Karen Mills, Senior Fellow at Harvard Business School

Licensing

US FinTech licensing is fragmented across 50 states and 10+ federal agencies

- In the US, FinTechs must get money transmitter licenses in 50 states with varying requirements and interpretations of the same law, vs. significantly more fluid processes abroad
  - E.g., 50 licenses required for 1 country vs. 1 license for 31countries in Europe…
- CSBS' Vision 2020 initiative is working to harmonize/streamline the multistate licensing process:
  - Currently creating a model money services business (MSB) law given each State defines and interprets legal terms differently (26 states on board to-date)
  - This reduced application times by two-thirds in 2019
- US FinTechs subject to overlapping authority and jurisdiction from 10+ federal agencies, 50 state regulators vs. 2 in other countries (e.g., UK, Australia)
  - Insightful testimony to the Senate discussing this here

Banking Market Dynamics

US banking market is more consolidated at the top and fragmented at the bottom

- Top 4 big banks spend ~$40bn/year on IT, equal to total Global VC Fintech funding (in 2018, ~>2x in other years)
- Top 4 US Banks have 63% of assets, the next 11k have the remaining 37%
- Europe has ~50% less banks (~6k) yet ~50% more people (i.e., ~12 banks per million citizens vs. the US with ~34 banks per million citizens)
- Bank technology provider market for the majority of banks is led by Fiserv, FIS, Jack Henry, Finastra, and others

"Although it boasts one of the world's largest FinTech ecosystems, the US lags behind other major countries in providing a cohesive and consistent regulatory framework for FinTechs."

\- White & Case

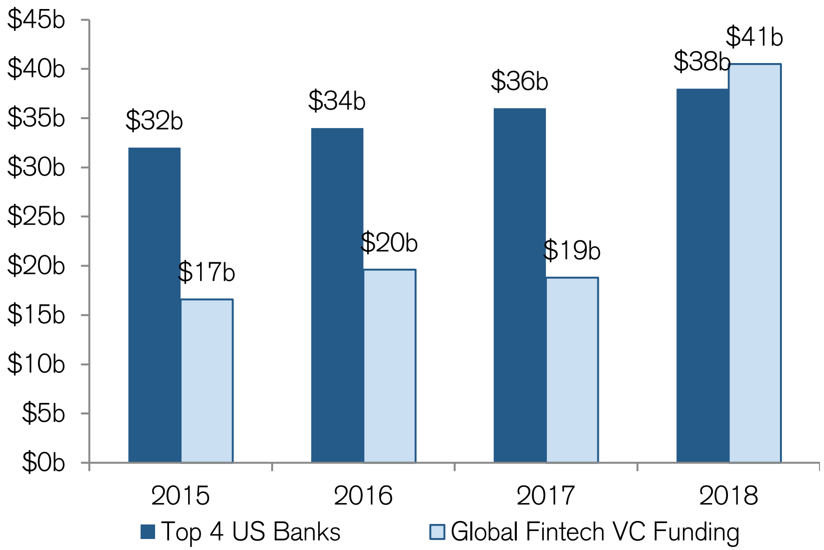
Source: 2018 US Treasury Report: "A Financial System That Creates Economic Opportunities", CSBS, Credit Suisse research

34. US vs. International FinTech regulations & market dynamics

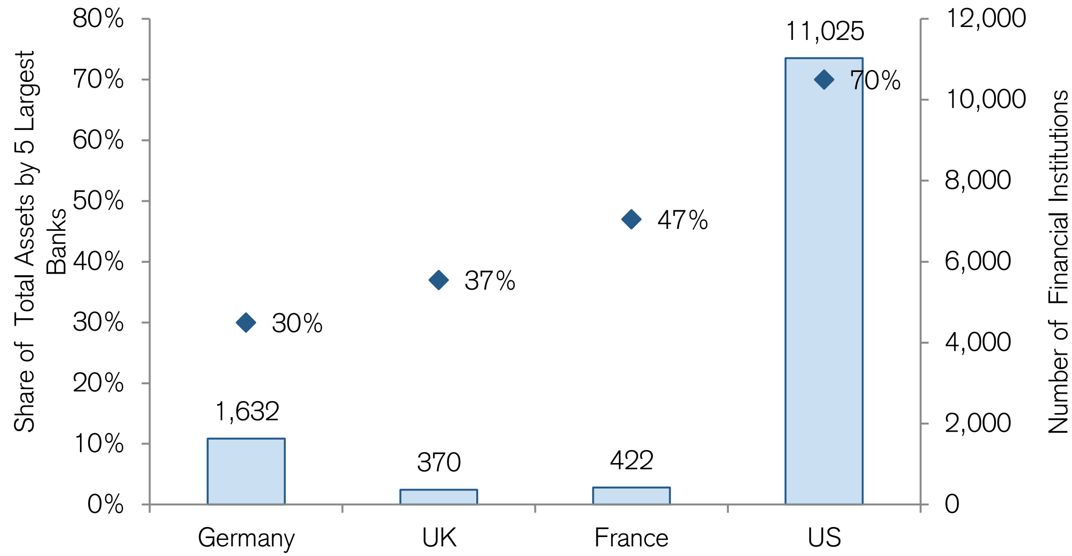
Fragmented US Banking Market

- ~6,000 financial institutions in Europe compared to ~11,000 in the US
- The US market is significantly more concentrated at the top and fragmented at the bottom
- This is evidenced by the scale and resources of top 4 big banks with annual IT spend of ~$40bn, equal to total Global VC Fintech funding in 2018 and ~>2x 2015-2017

IT Spend of Top 4 US Banks vs. Global Fintech Funding

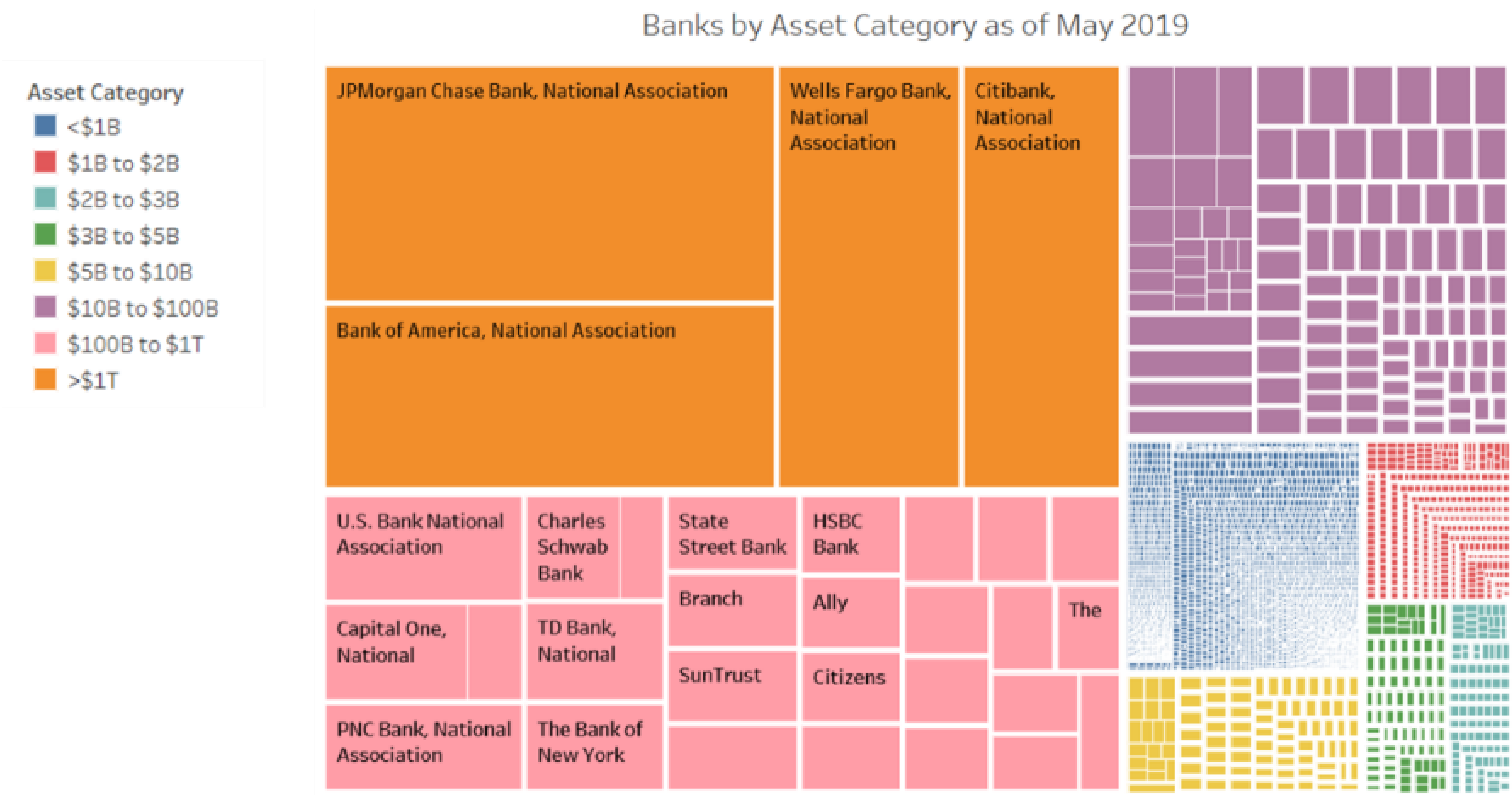


Share of Total Assets by 5 largest Banks



Source: Credit Suisse research. CB Insights, CSBS, the BLOOMBERG PROFESSIONAL™ service

34. US vs. International FinTech regulations & market dynamics
Fragmented US Banking Market



Source: CSBS (only shows US banks, excludes credit unions), Credit Suisse research

34. US vs. International FinTech regulations & market dynamics

Overview of US Payments Regulations

Regulation	Date	Description
US Interchange Regulation (MDL 1720)	Ongoing since 2005	• Case of all US merchants against Visa, Mastercard, and US banks, with the plaintiffs contending the defendants violated antitrust laws and caused merchants to pay excessive fees for accepting credit and debit • Detailed overview on the following page
Anti-Steering	June 2018	• Supreme court ruled AMEX's anti-steering practices that ban merchants from "steering" consumers to use alternative cards that have lower fees are legal and do not violate antitrust laws
Prepaid Accounts	April 2019	• Improved consumer protections for prepaid cards from fraud and unauthorized charges • Increased transparency on prepaid account fees and provide free ways to access account information
Dodd-Frank (Durbin Act)	October 2011	• Capped debit interchange at $0.21 + 0.05% for banks with >$10bn in assets • Issuers must enable at least 2 unaffiliated card networks on each debit card and allow the merchant to select to lowest-cost option

Source: Credit Suisse research

34. US vs. International FinTech regulations & market dynamics
US Merchant Interchange Case

<table>
<tr><th>Timeline</th><th>MDL 1720: Payment Card Merchant Discount and Interchange Fee Antitrust Litigation</th></tr>
<tr><td>2005</td><td>Merchants brought suit against Visa, Mastercard, and their card-issuing banks for:
• Default interchange fees on every transaction
• Honor all cards, requiring merchants to accept all cards regardless of the differences in interchange fees
• Rules banning surcharging</td></tr>
<tr><td>2012</td><td>$7.25B settlement approved
• Visa, Mastercard, and the banks agreed to pay a $7.25Bn settlement and allowed merchants to surcharge
• In return, merchants (current and <u>all future merchants</u>) forfeit right to sue banks and card networks on these topics</td></tr>
<tr><td>2016-Present</td><td>case re-opened, settlement overturned
• 2012 settlement overturned in summer 2016 because the future merchant class was “inadequately represented” in the settlement negotiations (given they were represented by the same counsel posing a conflict of interest)
• 2 classes of plaintiffs: comprising all the merchants in the US that accept Visa and/or Mastercard
1. Current merchants (monetary relief class) who accepted Visa/Mastercard from January 1, 2014, through January 25, 2019; AKA monetary relief class, receiving a portion of the $6.24bn settlement amount; have option to “opt-out” of settlement and individually sue the card networks and bank
2. Rules relief (injunctive relief class) negotiations are ongoing</td></tr>
<tr><td>Recent Developments & Next Steps</td><td>• January 2019: Preliminary approval of $6.24bn settlement for the current merchant class
• December 17, 2019: Court granted final approval of a $5.5settlement
• The most important aspect of the case relates to any potential rule changes to the card networks business practices with Rules Relief class, with no major rule changes likely to occur in our view</td></tr>
</table>

Source: Credit Suisse research, PACER.

35. Industrial Loan Company (ILC) bank licenses for US FinTechs
What are they and why are FinTechs applying?

- Can make loans and offer FDIC-insured deposits
- Parent company is not subject to Federal Reserve oversight
- Concentrated in 7 states, Utah contains ~60% of all ILCs (remaining ~40% in CA, CO, HI, IN, MN, and NV)
- WEX Bank is one of the 25 current ILCs; Square has an application pending; no applications approved since 2006
- Square's motivation? (1) speed (removing 3rd party), (2) economics (no revenue share), (3) low-cost funds, and (4) accept deposits
- OCC FinTech charter – proposed in 2015 as an alternative option; US District Court for the Southern District of NY ruled in October 2019 that the OCC does not have legal power to grant such a charter to non-banks ineligible for federal deposit insurance (currently in review)

Item	Industrial Banks	Commercial Banks
Make loans?	• Yes	• Yes
FDIC-insured deposits?	• Yes, but not demand deposits if assets are > $100mm	• Yes, including demand deposits
Interest on deposits?	• Yes	• Yes
Regulation of parent company?	• No, not a bank (as defined by the BHCA) • The bank itself is subject to federal (FDIC) & state banking regulators (e.g., Utah Department of Financial Institutions), <u>but the parent company is not</u> • License in one state allows for credit extension nationwide	• Yes, defined as a bank by BHCA • Parent company limited to banking and/or financial services • Cannot mix commerce and banking • Regulated by Federal Reserve and State regulators • National banks regulated by the OCC, while US State banks (non-member banks) are regulated by the FDIC
Additional	• Low-cost source of funds (discount window & deposits) • Can become a member of Visa & Mastercard • Two separate applications (Utah and FDIC), but state will generally accept the FDIC application • Utah DFI and FDIC generally review in close coordination • 25 current ILC in the US	• ~4.7k commercial banks in the US (vs. 12k in 1990)

Source: Utah Center for Financial Services (University of Utah), James Bart (Lowder Eminent Scholar in Finance, Auburn University), Pepper Hamilton LLP, FDIC, Credit Suisse estimates

Threats to Monitor for the Existing Ecosystem

CREDIT SUISSE

36. Amazon's building blocks in Payments & FinTech

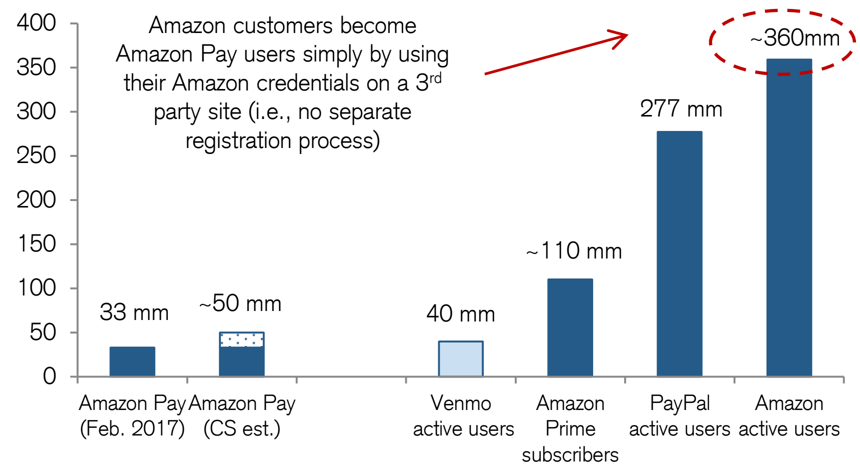
All of the pieces are there, and the rationale is sound

- Rationale for Amazon in Payments & FinTech
  - Amazon "flywheel" benefits to both sides of Amazon's network (consumers, merchants), allowing Amazon to enter adjacent businesses without having to be directly profitable (e.g., Fulfillment by Amazon [FBA] not profitable on a direct basis, but adds product selection, an indirect, but meaningful benefit)
  - Large addressable markets (digital payments), including portions ripe for disruption and/or new TAM creation (SMB lending)
  - Monetizing existing assets in terms of users (~350mm), data (merchant sales history), trust (19% of cart abandonments due to lack of trust), and capabilities – i.e., payments honed internally ahead of extending to 3rd parties (the Marketplace, AWS, Logistics playbook)
  - Potential for reduced payments acceptance costs

- Consumer-side (~350mm buyers with cards in Amazon wallets)
  - Increased spending (credit extension, rewards & incentives)
  - Extends customer base into lesser-penetrated demographics (e.g., Amazon Credit Builder secured credit card)

- Merchant-side (~2-3mm 3rd party sellers on Amazon Marketplace)
  - Lending specifically for inventories to be placed on Amazon.com
  - Amazon Pay "button" on brand.com sites expands merchant relationships (increase stickiness)

Amazon Pay disclosures understate the true customer base



Amazon 3rd party sellers contribute more than half of units sold

36. Amazon's building blocks in Payments & FinTech

Building a consumer ecosystem in-house and via partnerships…

Amazon Consumer Payments & FinTech offerings	Description	Partner	Pricing and/or Incentives
amazon pay	**Amazon Pay** allows Amazon customer to checkout at 3rd party websites using their Amazon credentials, accessing the payments methods already stored with Amazon, address & shipping preferences, etc. The trust of the Amazon brand is a key aspect of the offering, along with the customer-base that Amazon brings to bear. Worldpay as an acquiring partner reduces the integration work required by merchants to accept Amazon Pay.	None (although Worldpay is an acquiring partner for merchant distribution)	2.9% + $0.30 web & mobile; 4% on transactions done over Alexa; Cross-border an additional 1% fee
	**Amazon Prime Rewards Signature Visa Card** is an open-loop card for Amazon Prime members only, with 5% back at Amazon and Whole Foods, 2% back at restaurants, gas stations, and drugstores, and 1% back on all other purchases. There is also a non-Prime version of this card (Amazon Rewards Visa Signature Card, which features 3% cash back at Amazon.com.	Chase Bank (J.P. Morgan Chase)	No annual fees, no foreign transaction fees; $50 Amazon Gift card sign-up bonus; ~16-24% APR
	**Amazon.com Store Card** is a closed-loop card for Amazon customers, although Prime members earn 5% back. Provides no interest financing offers for 6, 12, and 24 months for purchases of above thresholds ($149, $599) and/or select items. Also, EqualPay allows for equal split of payments over time at 0% APR. There is also an Amazon Prime version of this card which earns 5% back.	Synchrony Bank	No annual fees; $60 Amazon Gift card sign-up bonus; APR is 28% if not paid off within agreed monthly plan
	**Amazon.com Store Card Credit Builder** and Amazon Prime Store Card Credit Builder are secured card versions of the traditional store cards above (closed-loop cards). Customers make a deposit that becomes their credit limit, and allows for building or rebuilding credit. Provides access to the under-banked. A more recent offering, launched June 2019.	Synchrony Bank	No annual fee; Minimum deposit of $100 (max of $1,000); $10 Amazon Gift card sign-up bonus; Non-prime version has no rewards
reload	**Amazon Reload** and Amazon Prime Reload allow customers to earn a 2% bonus if they agree to provide both a debit card and checking account & routing number. Amazon sometimes routes the reloads through checking accounts instead of debit cards. Reloads occur when the balance drops below a set amount.	None (although the balance technically sits in a gift card, provided by ACI Gift Cards)	2% bonus for using these lower cost funding methods (debit, checking account) and reloading in bulk
amazon cash	**Amazon Cash** allows customers to add cash to an Amazon account at a physical retailer (e.g., convenience store, pharmacy) location. Allows Amazon to expand into an under-banked demographic.	Numerous retail partnerships (7-Eleven, CVS, Rite Aid, etc.)	No fees
amazon allowance	**Amazon Allowance** is a prepaid, reloadable, closed-loop card offering. Can add funds one-time or routinely (e.g., weekly as an allowance).	ACI Gift Cards issues the gift cards	No fees
amazon protect	**Amazon Protect and other insurance offerings** are insurance products for Amazon purchases (i.e., added coverage above and beyond those offered by the manufacturer). Can cover accident and theft as well.	London General Insurance Company Limited for UK; Asurion for US	By product and purchase price

Source: Company website

36. Amazon's building blocks in Payments & FinTech

…and beginning to bolster the Business side as well

Amazon Business Payments & FinTech offerings	Description	Partner	Pricing
	**Amazon Business American Express Card** and Amazon Prime Business American Express Card are open-loop cards for non-Prime and Prime member business accounts. Standard Business card (non-Prime) features 3% back or 60 day terms, while the Business Prime card has 5% back or 90 day terms (on US purchases at Amazon Business, AWS, Amazon.com and Whole Foods). Also, both cards get 2% back at restaurants, gas stations, and wireless phone service, along with 1% back on other purchases. This is a more recent offering, having been launched by Amazon and American Express in October 2018.	American Express	No annual fee; $100-$125 Amazon Gift card sign-up bonus for; ~16-24% APR
amazonlending	**Amazon Lending** is an invitation only program that offers $1k-$75k loans for sellers to purchase inventory for use on Amazon's marketplace. Amazon has data that others (banks) don't, including real-time sales data (and growth), customer reviews, profitability metrics, etc. Amazon has the ability to be "paid back first" via topline earned by sellers on Amazon (similar to Square Capital). Amazon also can provide fast decisions (minutes), in part due to the invite only nature of the program pre-screening applicants. Further, these smaller business loans are often not profitable for traditional banks, which prefer to focus on larger dollar amounts. Terms on the loans tend to be 12 months or less (i.e., short term). In January 2018, Amazon disclosed that "Amazon Lending surpassed $3 billion lent to small businesses on Amazon since the program started in 2011."	Bank of America added as a partner in early 2018 (and the Amazon 2015 shareholder letter referenced bank partnerships ahead)	Range from 6-16%, but depends on the seller-specific offer made by Amazon
	**Amazon.com Revolving Corporate Credit Line and Amazon.com Corporate Pay-In-Full Credit Line** offerings are made available to business accounts that want more flexible payment terms (i.e., pay-in-full or make minimum monthly payments only). Credit line can only be used at Amazon.com. Allows businesses to authorize multiple buyers/employees through Amazon Business US. The Pay-in-Full Corporate credit line offers 55 day payment terms (no interest, no fees) and is marketed more toward larger businesses (e.g., libraries, schools, government organizations).	Synchrony Bank	No annual fee; APR 12.99%

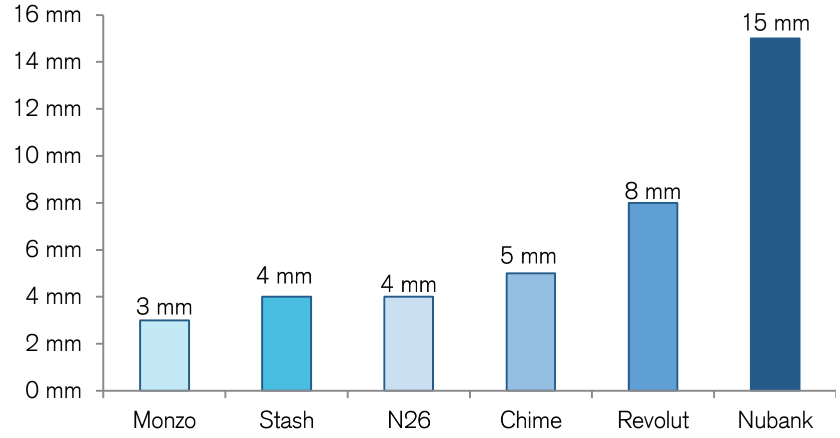
Source: Company website, Fundera, PYMNTS.com, Credit Suisse

36. Amazon's building blocks in Payments & FinTech

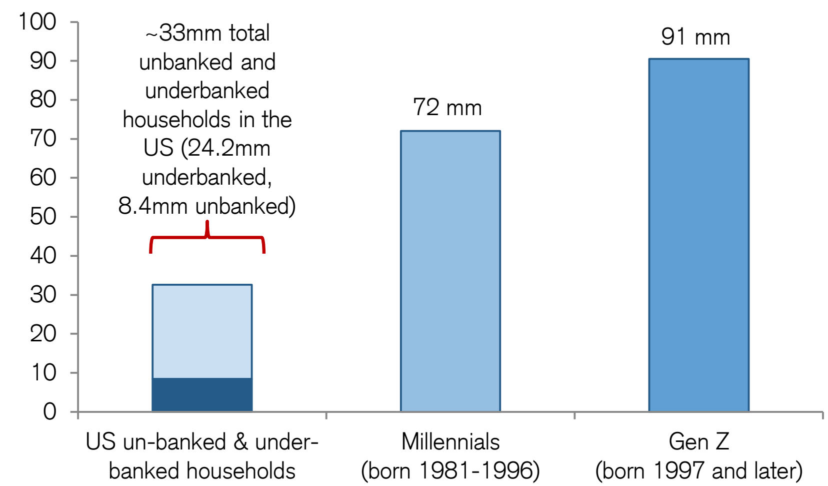
Could a digital bank be a logical/potential next step?

- Neo banks are gaining users at an impressive rate by innovating faster, reducing fees, offering higher interest rates on savings, providing a hook (e.g., International P2P, robo-investing, savings analytics), and in many cases, targeting niche demographics (Millennials, GenZ, underbanked)
- Why not Amazon? Lower customer acquisition costs (brand, user base) and the fact that Amazon would not need to turn a direct profit
- A digital bank from Amazon would have the potential to:
  - Increase user engagement (account balance views, conducting other transactions, bill-pay, etc.), another reason to open Amazon app
  - Increase wallet share with account holders (funds kept within Amazon ecosystem) enhanced by even more purchase behavior information
  - Offer low or no fees, with monetization coming indirectly (flywheel effect)
  - Come with user-friendly and high utility saving and spending analytics
  - Target a combination of: (1) Amazon Prime subscribers and (2) underbanked consumers, which expands Amazon's customer reach (similar to the Amazon.com Credit Builder card offering)
  - Utilize a bank partner (we do not expect Amazon to pursue a bank license)
- Would also stimulate adoption of Amazon Pay on 3rd party merchant sites
  - Offer rewards on debit cards that can be spent on Amazon.com and Amazon Pay merchants (differentiated given debit interchange is now regulated for large banks, meaningfully limiting rewards offers on debit)
  - Offer discounts on Amazon.com and at Amazon Pay merchants when purchases are funded via checking or savings accounts vs. cards
- Concerns? Competing against existing partners (bank partners) and any consumer data privacy fears (even un-founded)

Leading digital banks are accumulating impressive user numbers



Underbanked, Millennial, and Gen Z populations in the US



Source: Company reports, 2017 FDIC Survey of Unbanked and Underbanked Households, Statista, Credit Suisse research; Digital bank user data based on most recent disclosures as of time of publishing

36. Amazon’s building blocks in Payments & FinTech
What are some of the other logical/potential next steps?

- Additional incentives for consumers & merchants to use Amazon Pay
  - Amazon-funded discounts to expand the Amazon Pay network effect, both in the US and Europe (Amazon Pay is now in 18 countries)
  - We note that Amazon offered limited-time pricing that was ~36% below competitors for over a year (while ongoing pricing was ~9% below)
  - Opening up Alexa to 3rd party merchants using Amazon Pay; we suspect Voice-related payments apps will be an area where Amazon takes a leadership role
  - Competitor retailers may resist (Amazon Pay is on 25% of non-competitive travel & hospital sites vs. just 11% for toys, hobbies, & electronics sites)
  - Financial app relationship with consumers enables expansion of Amazon Pay in-store and potential to offer geo-targeted offers to drive foot traffic to merchants (e.g., similar to Square Boost driving Cash App users in-store, at greater scale)
- Digital bank offerings for Amazon Business customers
  - Potential to feature added SMB software (e.g., expense management, inventory, etc.), leveraging internal data and products, along with white-labeled offerings
  - Business debit card produces interchange revenue and expense management data
- Offering additional financial services within Amazon (or a digital bank app)
  - P2P, Wealth Management & Investing/Trading, high-yield savings, P&C Insurance etc.; some could be done asset light (i.e., lead-generation, similar to Ant Financial & WeChat)
- Additional thoughts & broader expansion (and what we’ll be watching for)
  - Furthering the JP Morgan partnership (as Apple and Goldman Sachs do the same)
  - Risk of Amazon becoming more closed (i.e., less reliant on the traditional four-party model, similar to Ant Financial & WeChat-like), although given numerous bank partnerships and a desire to reduce friction (increased choice of payment method, keep conversions high), we think Amazon will generally play ball

Amazon Local Register (2014-2015) offered introductory transaction fees of 1.75%, meaningfully undercutting Square (2.75%), PayPal Here (2.7%), and others

Could Amazon and JP Morgan begin to partner on additional financial services, alongside the more recent partnership between Apple and Goldman Sachs?

amazon

JPMorgan Chase & Co.

Goldman Sachs

Source: Company reports

37. Alipay & WeChat expand acceptance beyond China

Strategy that caters to Chinese outbound tourists

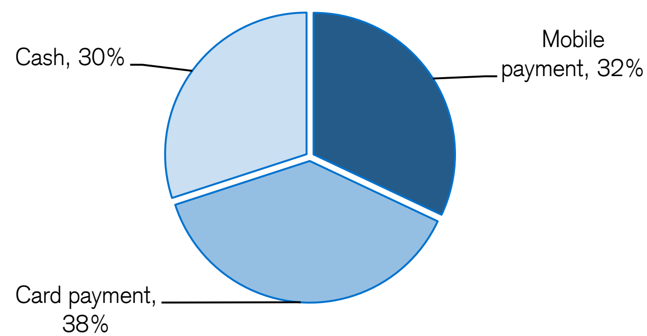
China outbound tourism is important to the payments ecosystem

- 140mm China outbound tourists in 2018 spent ~$280b, growing at a ~6.5% CAGR (2015-2020E), majority in the "4-hour fly zone" (e.g., Korea, Japan), but increasingly Europe; ~3.5mm Chinese visitors to the US
- ~1/3rd of transactions already done via mobile payments (despite nascent merchant acceptance), with Alipay and WeChat the dominant platforms (~1b users each, access to the majority of China consumers by dollar volume)
- 93% of Chinese outbound tourists state that they would increase their spending while travelling if mobile payments were more widely accepted
- Retail, restaurants, accommodations, tourist attractions, and in-market transportation (e.g., ride-share) are the largest areas of spend

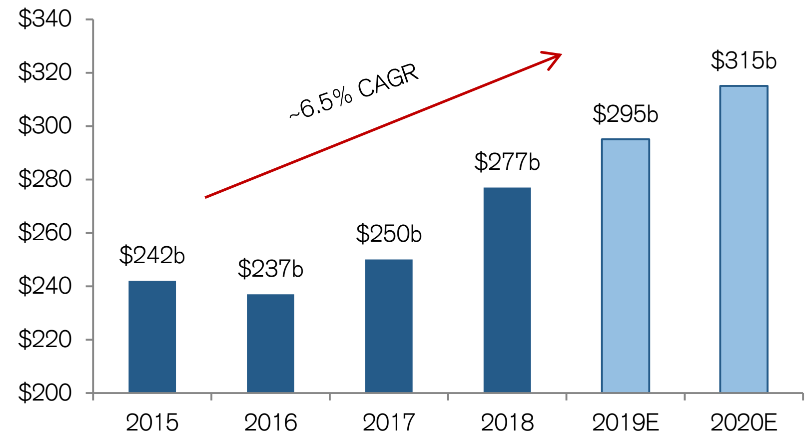
Alipay's strategy for expansion beyond China is currently focused on Chinese travelers' outbound spend (expanding global acceptance) and expanding the user base across Southeast Asia (not competing for users in US & Europe)

- Gain merchant acceptance in key international destinations (e.g., New York, Los Angeles, London, Paris, Rome) for Alipay users
- Leverage existing ecosystem to support direct distribution, working with various payments service providers and merchant acquiring (e.g., First Data, Adyen, Ingenico, Wirecard, Barclaycard, Citcon, Verifone, etc.)
- At least 9 local eWallet partnerships allow Alipay users to leverage acceptance network (e.g., Paytm in India, GCash in Philippines, Kakao Cash in the Korea, TrueMoney in Thailand, Line Pay and Paypay in Japan)
- Pitch to merchants? (1) Drive traffic and volume, including use of marketing platform ("drive to store"); (2) Lower acceptance costs for merchants vs. cross-border credit cards (price determined by payments partners, not Alipay)
- Recently enabled a version of its app for foreigners visiting China (Tencent also announced plans to allow foreigners to use international cards in China as well)

Mobile payments usage by Chinese tourists already surpassed cash in 2018, despite a still nascent acceptance footprint



China outbound tourism spend is approaching $300b, a figure that is ~10% the size of Mastercard's ex-US purchase volume



37. Alipay & WeChat expand acceptance beyond China
Sizing the impact within the payments ecosystem

- Our analysis suggests ~1% of volume, ~4-6% of revenue could be exposed to increasing Alipay & WeChat acceptance expansion beyond China over the course of a multi-year period (i.e., at least 3-5 years, potentially more)
- As Alipay & WeChat, and to a lesser extent, China Union Pay, expand acceptance outside China, Visa and Mastercard should see modest pressure to their top lines. We note this has already been happening for years (gradually), but we attempt to quantify overall exposure to China below.
- Our analysis assumes ~40% of China outbound tourism is spent via bank cards, the majority of which are Visa and Mastercard branded (although we note that China Union Pay has a Discover network partnership), along with meaningfully higher yields (cross-border pricing vs. domestic).
- Alipay's current strategy is not to gain users outside China (i.e., risk to Visa and Mastercard is currently contained to China outbound tourism and eCommerce); the current focus is on broader APAC consumers, which likely eases cooperation with existing ecosystem.

Sizing China Exposure relative to V/MA	2018E	Comment / Rationale
Mastercard	$4,338	FY 2018A
Visa	$8,450	CY 2018A
Total	$12,788	
China outbound tourism	$277	McKinsey, which implies ~$2k per trip
% of combined V/MA volume	*2.2%*	Represents entire opportunity (card, cash, Alipay/WeChat) as a % of V & MA volume
China outbound tourism on card	38%	"2018 trends for mobile payment in Chinese outbound tourism" (Nielsen & Alipay)
Implied China outbound card volumes	$105	
Assumed V & MA portion	80%	Assumes China Union Pay (Discover network) & American Express have some share
Implied China outbound V & MA card volumes (via tourism)	$84	
Gross up assumption for eCommerce	35%	Assumes China cross-border eCommerce ~30% of tourism spend
Total implied China outbound V&MA card volumes (tourim anc	$114	
% of V/MA combined volume	***0.9%***	**Represents est. V & MA volume exposure to China cross-border**
Multiplier on yield	~4-7x	Meaningfully higher cross-border yield, offset by non-volume based revenue mix
% of V/MA combined revenue	***~4 - 6%***	**Implied contribution to combined V/MA revenue**

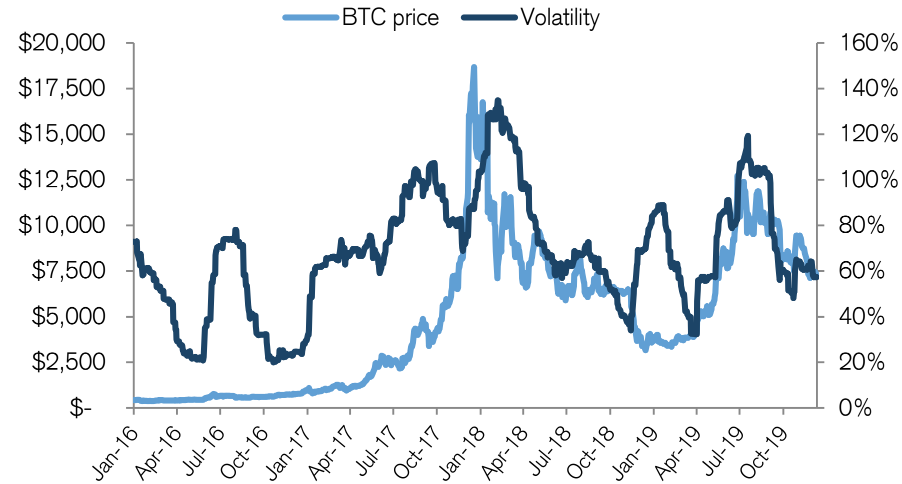
Source: McKinsey, Nielsen, Alipay, The World Tourism Organization (UNWTO), Credit Suisse estimates

38. Cryptocurrency impact on the Payments ecosystem
Unlikely to gain C2B payments adoption at least for the medium term…

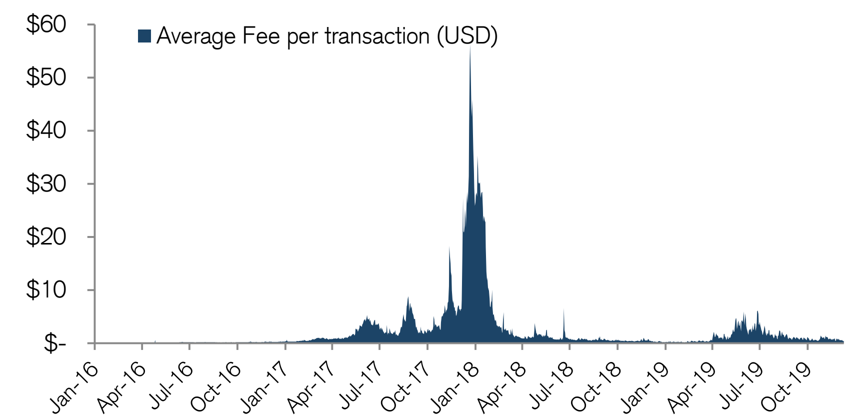
Reasons we believe cryptocurrencies will be challenged to make a meaningful impact on the existing consumer payments (C2B) ecosystem over the near to medium term (i.e., minimal downside risk to our companies under coverage):

1. **Lack of chargeback & dispute process** – lack of consumer disputes mechanism, and adding such functionality would add costs (Note: merchants would welcome a system with no chargeback risks, but consumers would not, nor would regulators)
2. **Taxation** – each cryptocurrency transaction is a taxable (capital gain or loss) transaction; means for calculating vs. cost basis, tax reporting, etc. yet to be solved
3. **Regulatory uncertainty** – lack of regulatory certainty creates a "holding pattern"
4. **Price volatility** – elevated levels of volatility bring additional risk into the merchant acceptance equation (absent a third-party aggregating such risk)
5. **Requires merchant adoption** – Visa & Mastercard cards are accepted at 46mm+ merchant locations with an established distribution channel (e.g., banks and acquirers)
6. **Requires consumer adoption** – Visa & Mastercard have gathered ~3.5b (Visa) cards worth of consumption power, along with incentive systems (rewards on credit)
7. **Transaction costs** – absolute levels under normal circumstances are not challenging, but the transaction cost volatility is – costs can prohibitive at times of congestion, particularly for smaller transaction sizes (fees are decoupled from transaction size)
8. **Debit-only substitute** – lack of credit extension mechanism exists in cryptocurrency
9. **Vast number of coins** – approximately 1.6k competing coins as of 2018
10. **Speed** – Bitcoin can process ~7 transactions per second vs. ~65k capacity for VisaNet, with time spanning up to 10 minutes (or more, with backlogs), albeit with an understanding that other (non-Bitcoin) cryptocurrencies are meaningfully faster (e.g., Dash, EOS, Litecoin, Bitcoin Cash, Bitcoin SV, Ripple, etc.)

Bitcoin volatility creates challenges in payments for both merchants (acceptance risk) and consumers (taxable events)



Average fees per Bitcoin transaction can be volatile, particularly under times of congestion (a challenge for payments acceptance)



Source: CoinMetrics, Credit Suisse research

38. Cryptocurrency impact on the Payments ecosystem

…but there are nascent and niche use cases we plan to monitor…

Select innovations could alleviate some of the drawbacks of using crypto in C2B payments

- Numerous examples of innovations that effectively solve for one or many of the status quo challenges (i.e., speed, volatility/certainty to merchants accepting payments, costs), but not all (i.e., taxation remains an issue, along with regulatory uncertainty and lack of chargeback and dispute processes)
- A key rationale for crypto is decentralization – which appears unlikely for C2B payments given a need for taxation, instant conversion, consumer protection, etc.

We see select C2C remittances use cases for more volatile and lower-volume EM markets

- Existing platforms (e.g., Transferwise, Remitly, Western Union, Ria) already have developed global treasury operations and innovations (matching) that effectively enable real-time C2C cross-border payments at reasonably low fees
- While matching (netting) can "match volumes" across high-volume developed market currencies (G10), and use traditional banking rails for the remaining amounts, challenges remain in lower-volume EM currencies

Cross-border B2B is the most meaningful, medium-term use case for crypto payments

- Up against an existing bank wire transfer (SWIFT messaging) system that is viewed as less than ideal and utilizes multiple correspondent banks per transaction, resulting in uncertain timing (3-5 days), high (and also uncertain) fees, and high failure rates
- Platforms like Ripple have the potential to reduce settlement times (from days to seconds) and provide savings (low bps, but large absolute dollars)

C2B innovation will have a higher bar for adoption, given the status quo works well…	
The Lightning Network	Additional layer on top of the blockchain, using payments channels between parties; when the channel is closed, the transactions are added to the blockchain
BitPay	Bitcoin payments processing for merchants at a fee of 1%; removes volatility issue for merchants (by promising a $ amount at the time of the transaction) and aggregating the volatility risk on their end
Stable Coins	Less volatile due to linkage to either one (e.g., USD Coin by Coinbase and Cirlce) or many (e.g., Libra) fiat currencies
Libra	Potential example of a stable coin, backed by a basket of fiat currencies

…while cross-border C2C (remittances) solves a problem for volatile EM currencies…	
MGI-Ripple	MoneyGram and Ripple are partnering to introduce XRP into the MoneyGram platform. This 2-year agreement allows for XRP (and xRapid, which is a platform for utilizing XRP) to be used in MoneyGram-sourced cross-border transactions. In addition to a $50mm investment from Ripple, MoneyGram also hopes to improve its working capital (i.e., reduce need for funds in foreign banks).
Transferwise	Evaluated various blockchain technologies (including Ripple), but have yet to find a solution that enables them to improve on their current speed, costs, etc.
Western Union	Also evaluating Ripple, although initially was less bullish, trials continue

…cross-border B2B payments are an actual pain point (i.e., a problem to be solved)	
Ripple	~300 financial institutions using platform (RippleNet), which provides an option to use XRP cryptocurrency
JPM Coin	JP Morgan's stable coin (USD backed) for use in B2B payments, securities transactions, and treasury applications
IBM World Wire	Cross-broder solution that uses the Steller protocol and a multi-digital asset approach (e.g., stable coins, centeral bank coins)
R3	Offers Corda Settler, which supports XRP (but intended to support multiple options); Partnering with SWIFT on standards, Global Payments Innovation (Swift gpi); Bank of America recently joined MPN

Source: Ripple, BitPay, Credit Suisse research

38. Cryptocurrency impact on the Payments ecosystem

…along with crypto-related activities for our covered companies

Company	Cryptocurrency-related activity
Square	• Launched Bitcoin buy/sell capabilities within Cash app in Q4 2017 • "*It's not an if, it's more of a when and how do we make sure that we're getting the speed that we need and the efficiency*." – Jack Dorsey, CEO in speaking about integrating the Lightning Network into the Cash app (February 2019)
FIS	• Worldpay is the acquirer for Coinbase, a leading cryptocurrency wallet (i.e., Worldpay benefits when users load fiat currency into their Coinbase account)
PayPal	• Currently does not support cryptocurrency (does not see demand for it from merchants) • Braintree-enabled Bitcoin acceptance in 2014, but pulled it back due to lack of demand/usage • Originally announced as part of the original Libra Association (although later removed itself)
Visa	• Partnered with Coinbase on the issuance of a Visa card • Originally announced as part of the original Libra Association (although later removed itself)
Mastercard	• Recent hiring in areas of cryptocurrency (payments, wallets) • Originally announced as part of the original Libra Association (although later removed itself)
Western Union	• Testing and considering use of Ripple (XRP) for cross-border (Ripple has made a $50mm investment in Western Union competitor, MoneyGram)

Note: We do not plan to express views on cryptocurrencies themselves. The scope of our research interest is limited to the potential to impact (benefit or harm) the financial results and stock prices of the companies we cover.

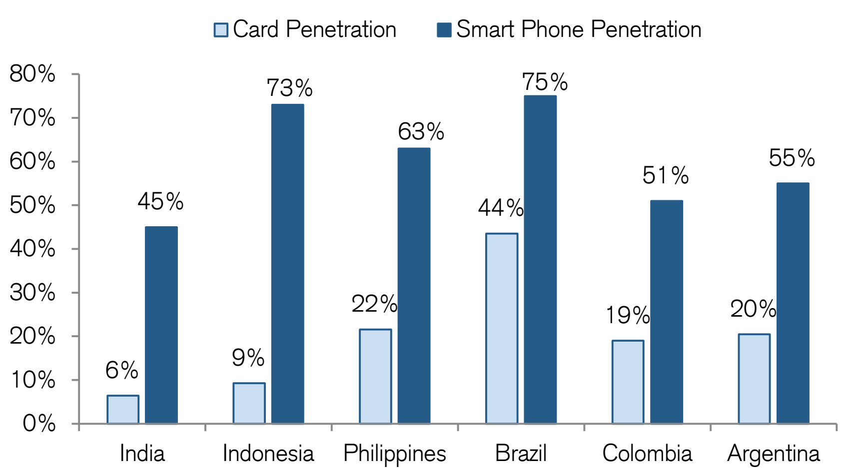
Source: Company reports / public commentary

39. Emergence of modern platforms in EM

Tech platforms & super-apps represent important partners for 4-party incumbents

- Ingredients are present to create “super-apps” in emerging markets (large population, high smart phone penetration, low credit card penetration, underbanked populations, fast-growing eCommerce markets).
- Smartphone penetration is north of 50% and approaching 75% in many markets, while credit card penetration remains low (~5-40%) – i.e., cash payment still dominant.
- Mastercard estimates 75% of Southeast Asians are underbanked, providing opportunity to increase card adoption while consumer electronic payment preferences are still being formed (i.e., Visa and Mastercard partnering with emerging platforms to avoid cards being leap-frogged in a similar manner to China with Alipay and WeChat).
- For e.g., Argentina-based MercadoPago has a large user base in Central/South America and issues Mastercard prepaid debit, while Columbia-based Rappi has ~4mm users recently launched Visa pre-paid cards in 2019

Emerging Markets characterized by high smart phone penetration but lower card penetration



Southeast Asia ingredients for the creation of “super-apps”

- ~75% underbanked
- Fast-growing eCommerce markets
- Low card penetration (~5-40%); i.e., cash payment still dominant
- High mobile penetration (~50-75%)

Source: Company Reports, Contoxo, CNBC, Credit Suisse research

39. Emergence of modern platforms in EM

Grab and Go-Jek as examples in Southeast Asia

- Fundamentally different business models vs. western platforms like PayPal – monetizing off across numerous revenue lines (e.g., ride-sharing, delivery, Ads, banking products, etc.) leads to a different approach to payments
- Payments as the "glue" to their ecosystems, justifying rationale to undercharge merchants to grow their platform
- Southeast Asia's rapidly growing super-apps: Go-Jek and Grab
  - User base includes ~1/3 of the regions ~>640mm population, representing ideal distribution partners for payments companies
  - The opportunity for the card networks is predominately cross-border spend on prepaid cards given these platforms utilize closed-loop payments in-country
  - Mastercard and Visa partnered with Grab and Go-Jek, respectively, to provide prepaid debit cards and global acceptance
- Grab's GrabPay and Go-Jek's Go-Pay are leaders of digital payments in the region online and offline
  - QR codes enable merchants to accept electronic payments with as little as a piece of paper (no terminal costs / integrations)
  - QR payment through Super Apps could offer attractive incentives to build consumer habits (e.g., QR wallets linked directly to banks, offering 10% off promotions), although not a longer-term sustainable approach.
  - Limited rationale to build platform via legacy 4-party model given high hurdles for merchant adoption

Grab's GrabPay and Go-Jek's Go-Pay are leaders of digital payments in Southeast Asia online and offline

Grab

gojek tech

Source: CNBC, Credit Suisse research

39. Emergence of modern platforms in EM

Grab: Southeast Asia's leading offline-to-online platform

- Founded in 2012 as a ride-hailing app – similar to Uber, expanded into delivery (2015), and launched GrabPay (2016), leveraging the power of its two-sided network
  - Operations in a market of >640mm consumers in 8 countries (Malaysia, Singapore, Indonesia, Thailand, Vietnam, Cambodia, the Philippines, Myanmar)
  - Now one of the largest employers across Southeast Asia with ~3mm drivers and >100mm users
- 2018 revenue exceeded $1bn and expected to double in 2019, according to Fortune
- Key investors include: SoftBank, Toyota, Experian, Microsoft; acquired Uber's operations in March 2018 in exchange for a 27.5% stake

On-demand Transportation

Largest player in the region

- ~3mm drivers vs. ~2m for Uber (globally)
- ~6mm rides per day
- Offers monthly subscription ride packages

Offerings include:

- GrabTaxi
- GrabBike
- GrabCycle
- GrabShuttle
- Offers car rentals

Financial Services

Grab Financial	– Loans and insurance services
GrabPay	– In-app mobile payments analogous to Alipay with online and offline capabilities through QR codes – Adoption supported by 2-sided network of drivers & users of ride-hailing feature – For merchants, powers online and offline storefronts, taps on Grab's large user base, access to partner-exclusive online promotions & campaigns – Mastercard prepaid card for cross-border spend
GrabRewards	– Earn points for spend on platform to be used at any Grab merchant

Market Place

GrabExpress	– On-demand delivery for users to send items such as documents, parcels, and gifts to business partners, family, and friends – Addresses local challenges of last-mile delivery in congested cities
GrabFood	– Food delivery platform similar to UberEats

Source: Company reports, Fortune, Credit Suisse research

39. Emergence of modern platforms in EM

PayPal becoming the Super App Equivalent in DM; partner ecosystem

Incumbent ecosystem partners

- Drives customer acquisition and payments volume growth (e.g., 40 bank-led marketing campaigns in 2018)
- Provides PayPal with in-store card network tokens and necessary acquiring bank relationships

J.P.Morgan
citi
BANK OF AMERICA
VISA
WELLS FARGO
mastercard

Traditional eCommerce (Large & Small)

macy's
Walmart

80% of Internet Retailer 500

Platforms & Market Places

Uber
mercado libre
Etsy

Other market places post eBay agreement

~23mm Merchants

~300mm Consumers

Social Networking

- PayPal powers Facebook Pay and also allows Venmo users to sync their Facebook friends list
- PayPal also powers Instagram Shopping

facebook
WhatsApp
Instagram

Travel Commerce

airbnb
skyscanner

Ride-Sharing & Food Delivery

Uber
seamless
Uber Eats
GRUBHUB

- Daily use case spend categories, aids consumer engagement
- Plans to power Uber's mobile wallet - direct distribution channel to underbanked driver's globally

Source: Company websites, Credit Suisse

40. National payment schemes, alternatives to V and MA

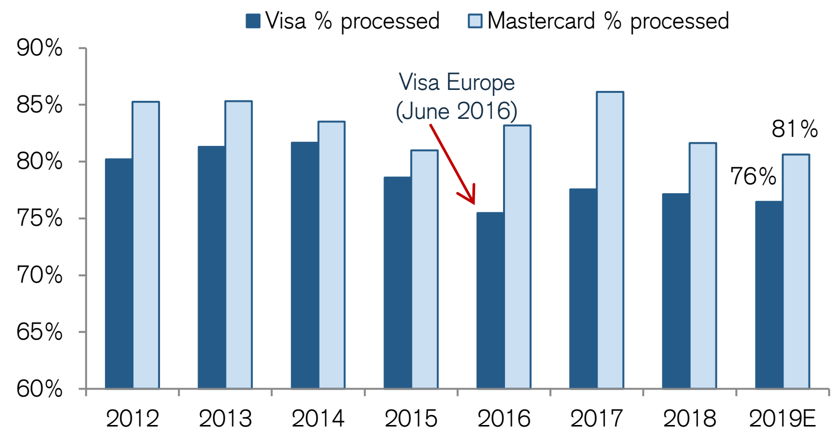
Payments is the most local, global business

- Nationalism related to payments schemes can make for an uneven playing field for Visa & Mastercard in some countries
  - Varying degrees of regulations supporting government-sponsored domestic payment schemes and/or mandating that processing (authorization, clearing, and settlement) be performed by local entities
  - China, India, Indonesia, Russia, Thailand, and Vietnam are examples where some form of government support or mandate exists
  - Some countries are mandating data localization, which aside from increasing operating expenses (a lesser concern), limits the use of the data in informing risk models
  - Additionally, there are certain countries where either the government itself or consortiums of local banks own domestic processing assets
- What are some of the offsetting forces for Visa & Mastercard?
  - Global scale and the ability to invest & innovate in an increasingly complex payments ecosystem (e.g., security & fraud management, global acceptance, eCommerce, tokenization); local schemes are challenged to keep pace given they are sub-scale, at times non-profit entities, and they often lack cross-border capabilities
  - For balance, almost every country has some form of local or domestic payments scheme that V/MA must compete with (this is not new), and despite this, V/MA have maintained processing share of their own transactions
  - We believe the widening gap between global card networks and domestic schemes will aid continued share gains for V/MA

Sample list of competing domestic networks, the majority of which are by definition sub-scale relative to Visa & Mastercard, and thus have a lesser ability to invest, innovate, etc.

AsiaPac	Eftpos (Australia), Eftpos (New Zealand), BC Card (South Korea, Smartlink (Vietnam), VNBC (Vietnam), Bancnet (Philippines), MegaLink (Philippines), NEPS (Nepal)
North America	US PIN debit networks (STAR, Accel, NYCE, Jeanie, Presto, Shazam, etc.), Interac (Canada)
Europe	Girocard (Germany), Carte Bancaire (France), PostFinance (Switzerland), Multibanco (Portugal), Eufiserv (Pan Europe ATM), BCC (Belgium), Nets (Nordic/Baltic), UPC (Ukraine), DIAS (Greece)
Latin America	Elo (Brazil), Prosa (Mexico), Redcompra (Chile)
Middle East & Africa	GCC Net (pan-Middle East), BENEFIT (Bahrain), UAE SWITCH, OMAN NET, KNET (Kuwait), NAPS (Qatar), InterSwitch/Verve (Nigeria), Monetique (Tunisia), EthSwitch (Ethiopia)

V & MA process ~75-80% of their transactions (i.e., transactions where V/MA earn processing revenue)



Source: Company reports, Reuters, Infosys, Credit Suisse estimates

40. National payment schemes, alternatives to V and MA

European example, and the moat around Visa & Mastercard

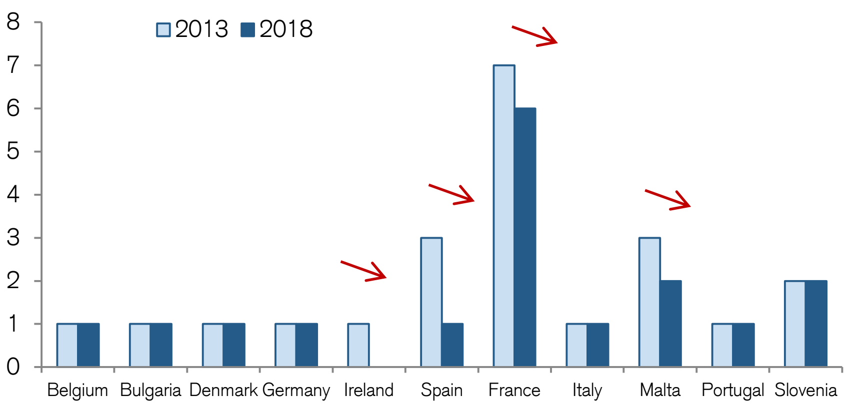
European domestic schemes continue to lose share to V & MA, partially driven by a lack pan-European acceptance without co-badging. European regulators are committed to unifying the domestic schemes:

- We believe this is likely the next focus of completing the SEPA vision (that lead to the euro, PSD2, IFR, etc.) and is a risk we plan to monitor, although past initiatives have failed
- Large upfront investment required to capture a smaller portion of transactions (~8% of European card transactions are cross-border)
- V/MA are partially hedged given; 1) their networks would be required for acceptance outside Europe; 2) incumbent banks increasingly need help from increasing competition with PSD2; and 3) SEPA for cards is “market-driven”
- The ECB believes a connected instant payment systems may be a viable solution, positioning MA best to help realize this objective (global networks have non-card capabilities that could be helpful to select domestic schemes, although case-by-case to avoid improving a competitor network)

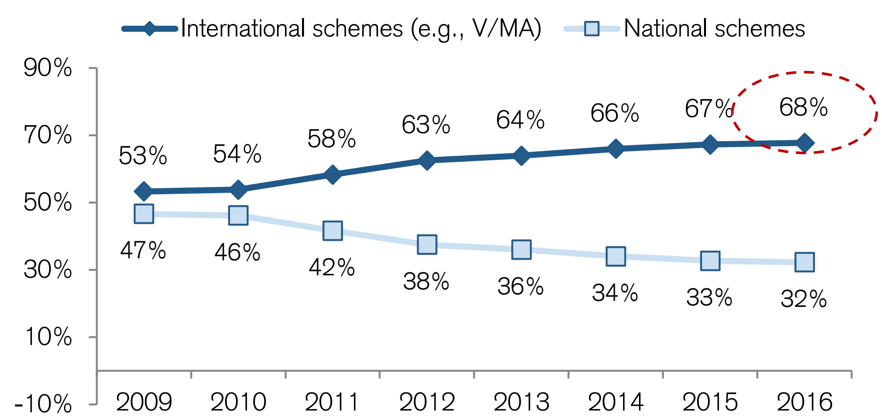
Reasons we believe V & MA will maintain/increase share in Europe (in addition to a greater ability to invest/innovate – e.g., online, tokenization, contactless, etc.) relative to comparatively sub-scale domestic schemes:

- FinTech issuers (“Challenger banks”) will continue to pick V/MA due to: 1) pan-European & global acceptance vs. single country; 2) card monetization is a main source of monetization, and thus best-in-class capabilities from V/MA are crucial: and (3) V/MA have invested in programs specifically to onboard FinTechs (i.e., why would a FinTech waste time with onboarding with each domestic scheme when they could get fast, global acceptance with V or MA?)
- Interchange has already been capped in Europe (both domestic and cross-border), removing the prior total MDR advantage for national schemes
- Co-badging is a solution that has worked for pan-European acceptance (i.e., domestic scheme for in-country, V or MA for cross-border)

According to the ECB, in 2013, there were 23 active national card schemes in Europe – that number dropped to 17 by 2018



International schemes have gained share, reaching ~2/3 of transactions on European-issued cards (2016 vs. ~half in 2009)



Source: European Central Bank, Credit Suisse research; SCT Inst is SEPA Instant Credit Transfer, launched November 2017

40. National payment schemes, alternatives to V and MA

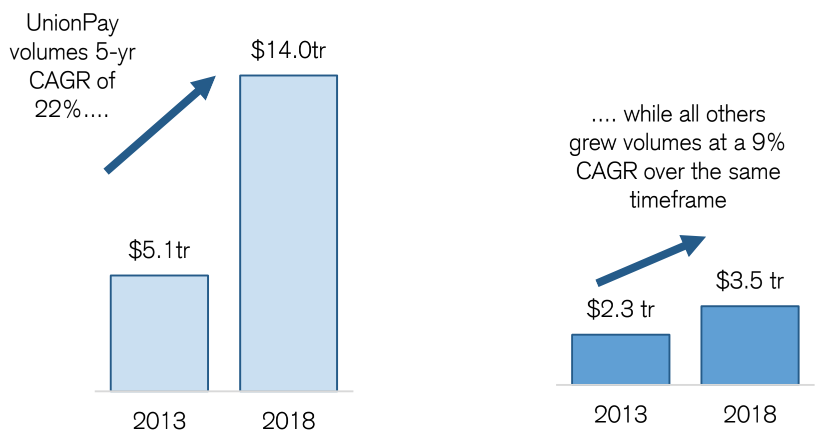
Payments in China, Union Pay the single domestic network

- Currently, the only network allowed to handle renminbi-denominated settlement and clearing is China UnionPay (majority owned by the People's Bank of China - PBOC).
- Visa and Mastercard offer single-badged and co-badged cards (through Chinese issuing banks) for use when travelling outside China.
- China Union Pay has ceded mobile payments share to both Alipay and WeChat (which combine for 90%+ share).

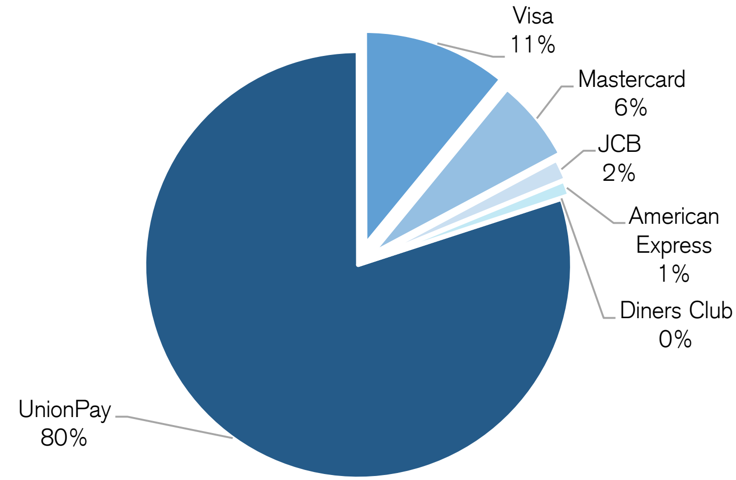
"… Alipay and Tencent -- Tencent's WeChat in the last 18 months has been able to really drive a Mac truck through payments in China. And the reality is that…they certainly have had the advantage of not being regulated as a bank, and I don't think that's going to be the case as they ultimately migrate out of China. But also I think CUP took their eye off the ball as they probably put more emphasis on looking at growing acceptance outside of China. And as a result, we've seen what happens…"

– Al Kelly, CEO, Visa (May 2017)

APAC general purpose card (GCP) payments volume



APAC card network volumes are dominated by China Union Pay, making up ~80% of the entire region



Source: The Nilson Report, Credit Suisse research

40. National payment schemes, alternatives to V and MA

Payments in China – 20 years of history since China joined WTO

- PayPal recently announced that the PBOC approved its acquisition (70% equity ownership) of Guofubao Information Technology Co (GoPay).
- China is the largest digital payments market in the world, forecast to represent nearly $2tr, or >50%, of global online retail sales in 2019 and ~40% of cross-border eCommerce by 2021 (>500mm Chinese consumers).
- PayPal believes this opportunity has the potential to be material in the medium to longer term (2021 and beyond) but acknowledges a relatively high degree of uncertainty (see timeline below).
- GoPay has a license enabling it to process online and mobile payments in China and issues UnionPay-branded debit cards.
- PayPal will not have the ability to clear and settle transactions.
- American Express was the first US-based network to enter China through its JV with China-based LianLian Group (November 2018). In January 2020 the PBOC announced it accepted American Express' application to start a bank clearing card business in China (final approval is still required)

PayPal announced intent to acquire 70% of GoPay in September 2019

PayPal

GoPay

2000
China admitted to the World Trade Organization (WTO)

2006
China mandated to allow payments access to US providers (but no agreement was reached)

2010
WTO asked by US Trade Representative to create a panel to discuss "discriminatory and restrictive" treatment of US payments networks prohibited from operating in China

2017
People's Bank of China (PBOC) issued Bank Card Clearing Institute (BCCI) license regulations – in order to clear and settle payments on renminbi-denominated cards

2017
Mastercard and American Express entered agreements with joint venture partners to pursue a BCCI license; Visa has not publicly announced any partners

2018
After the US gov't placed tariffs on Chinese goods, the approval process for Visa and Mastercard was suspended and has not resumed since

2019
PayPal acquired majority stake in GoPay – a small Chinese payments company

2020
The PBOC accepted AMEX's application to start a bank card clearing business in China which would make it first US network to enter China if final approval is granted

2000 — **2020**

Source: Company reports, Credit Suisse research

40. National payment schemes, alternatives to V and MA

Examples of government and/or local preferential treatment

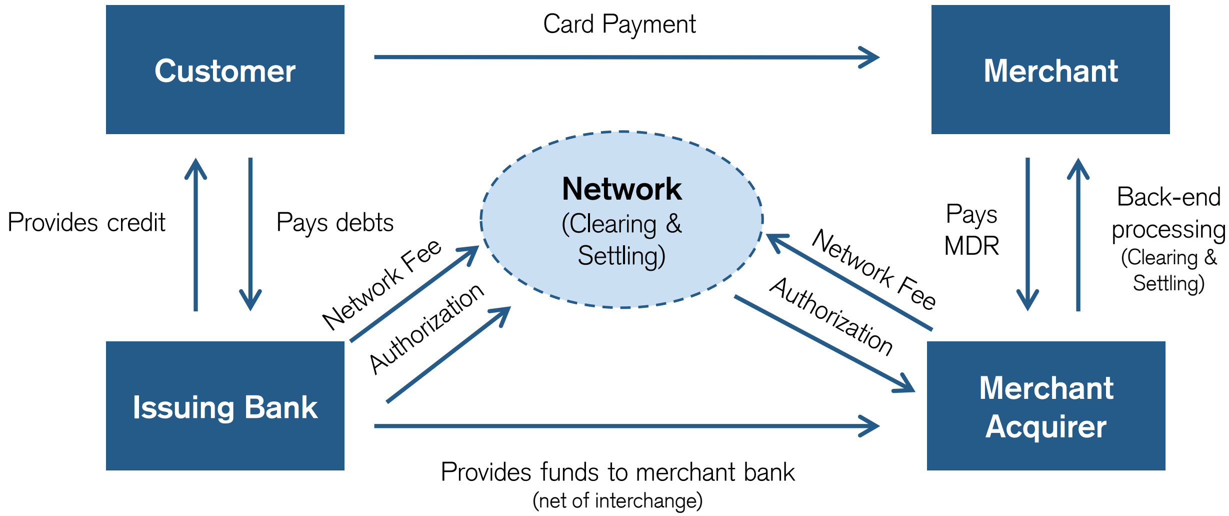
Country/Region	Benefiting domestic network	Government and/or local operating preferential actions
China	China Union Pay	• Only China Union Pay (CUP) is able to process domestic transactions • Both V & MA have filed applications via the People's Bank of China (PBOC) requesting a Bank Card Clearing Institution (BCCI) license, the applications have yet to be "recognized" • CUP (and Mir, below) have expanded acceptance outside their home countries, which puts a distant risk on the table around the networks' international routing rule (requires international transactions be processed by V & MA)
Russia	Mir	• Mir was created in 2014 and favored by Russia's National Card Payment System (NSPK) • Government disburses payments (e.g., pension, unemployment benefits) on Mir cards • Effectively prevents V & MA from processing domestic transactions (all domestic transactions run through NSPK)
India	RuPay	• RuPay is owned by the National Payments Corporation of India (NPCI), which is in turn owned by a group of state banks (along with private and foreign banks) • Publicly supported by Indian Prime Minister Narendra Modi • Demonitization (removing high-value paper notes) efforts in 2016 have led to increased digital payments and thus the importance of any potential favoritism • RuPay (similar to CUP) has a partnership with Discover to allow for more global acceptance
Indonesia	Gerbang Pembayaran Nasional	• Local regulations require processing be done domestically, per National Payment Gateway (NPG), via Gerbang Pembayaran Nasional • Switching companies must be at least 80% owned by a domestic entity
Thailand	Thai Payment Network	• Domestic processing mandate by the Electronic Transactions Commission (for debit)
Vietnam	Smartlink, VNBC	• Smartlink, VNBC are the domestic networks
Europe	All domestic schemes	• As of 2016, new regulations mandated that Visa and Mastercard could no longer earn fees on domestic European transactions if the processing was done by a domestic network • Card networks previously earned a small brand assessment in select countries (those fees were eliminated)

Source: Company reports, Reuters, Infosys, Credit Suisse research

Payments Primer Materials

Credit Suisse

1. The 4-party model
Diagram and economics



Issuing Bank:
+ 205bps – interchange
- 10bps – network fees
- 3bps – issuer processing
<u>+ 3bps – rebates</u>
= + 195bps net

Customer:
<u>- $100 – payment</u>
- $100 net

Network:
+15bps – merchant fee
+10bps – issuer fee
<u>- 6bps – rebates</u>
+19bps net

Merchant Acquirer:
+ 250bps – MDR
- 205bps – interchange
- 15bps – network fees
<u>+ 3bps – rebates</u>
= + 23bps net

Merchant
+ $100 – sale
- 200bps – MDR
<u>+ 2bps – rebates</u>
= + $98.02 net

Transaction notes:
- Customer inserts card into POS terminal (data capture), then the merchant acquirer routes the data to the network, which then queries the issuing bank for authorization (sufficient funds, fraud checks, etc.)
- Then the authorization flows back through the system to the merchant acquirer, allowing the transaction to close
- Then the issuing bank settles the outstanding balance with the merchant's bank, and the funds are deposited net of fees

1. The 4-party model
Description of parties with examples (illustrative economics)

Merchant	Network	Merchant Acquirer		Card Issuer	Issuer Processor
		Front-end processor	Back-end (acquirer processor)		
Accepts payments from consumers and pays the merchant discount rate (MDR) to the merchant acquirer	Acts as the hub for card payment transactions, relaying authorization and settlement messages between issuing and acquiring banks (earning fees from both in the process)	Signs up individual merchants, underwrites a merchant account for them at the underlying acquiring bank, and enables merchants to accept card payments; captures card/transaction data, routes the message to appropriate network for authorization (in real-time); earns the majority of the acquiring spread[1]	Handles settlement and clearing messages received from the card network, and deposits funds net of fees into the merchant's account; receives fixed fee per transaction, a minority portion of the acquiring spread[1]; chargebacks come to the merchant via the back-end processor	Provides consumers and businesses with bank accounts, credit extension, and cards; earns interchange on card transactions, the largest portion of the MDR. Interchange rates are set by V/MA	Sits in front of the issuing bank to receive authorization request messages from the card network, and relays decision back to the card network (in real time); then, clears and settles transaction for the issuing bank; earns account and transaction fees, outside of the MDR (indirectly funded by the issuers' portion)
Target, Home Depot, McDonald's, Lululemon, Reebok, Safeway, WaWa	Visa & Mastercard (open-loop); American Express & Discover (closed-loop); STAR, Accel, NYCE, Pulse, Interlink, Jeannie (PIN debit)	FIS (Worldpay), Global Payments & TSYS, Adyen, Chase Paymentech, Fiserv (First Data), Repay – all technically operate as ISOs in the US, sponsored by an acquiring bank		Chase, Barclaycard, Bank of America, Wells Fargo, US Bank, Capital One, Citi, Synchrony Financial	TSYS, FIS, Fiserv (First Data), Marqeta, Galileo, i2c, or in-house for larger banks (TSYS is the share leader among banks that outsource)
		Square, PayPal, Stripe	Acquiring banks (BIN sponsor): Wells Fargo, BMO Harris, BBVA USA, MetaBank, etc.		
Sample economics on $100 eCommerce credit card transaction					
+ $100 Customer payment - $2.50 (250bps) MDR = + $97.50	+ $0.15 Merchant network fee + $0.10 Issuer network fee - $0.03 3bps rebates (acquirer) <u>- $0.03 3bps rebates (issuer)</u> = +$0.19 net	+ $2.50 MDR - $0.15 Merchant network fee - $0.05 Back-end processing fee <u>- $2.05 Interchange</u> = + $0.25 acquiring spread - $0.05 back-end acquiring fee <u>+ $0.03 Network rebates</u> = + $0.23 net	+ $0.05 Back-end acquiring fee (~25% of acquiring spread ex-rebates, which was $0.20 in this example)	+$ 2.05 ($0.10 + 195bps) Interchange - $0.10 Issuer network fees - $0.03 (flat charge) Issuer processor fee <u>+ $0.03 network rebates</u> = + $1.95 net	+$0.03 (flat charge) issuer processor fee Note: Issuer processors also charge fees based on the number of accounts, along with other services like statement printing, card production, customer service, etc.

Source: Glenbrook Partners, Credit Suisse research, [1] Acquiring spread refers to the portion of the MDR the acquirer retains after all other parties receive their fees (networks, back-end acquiring processor, and the issuing bank); depending on the contract, these fees are fixed (cost +) or variable (in which case the spread is dictated by the level of interchange associated with the specific type of card), generally for smaller merchants without pricing power; merchant acquirers also pay small fees to their sponsoring acquiring bank for BIN rental (~1-3bps)

1. The 4-party model

Step 1. Authorization (illustrative example, credit cards)

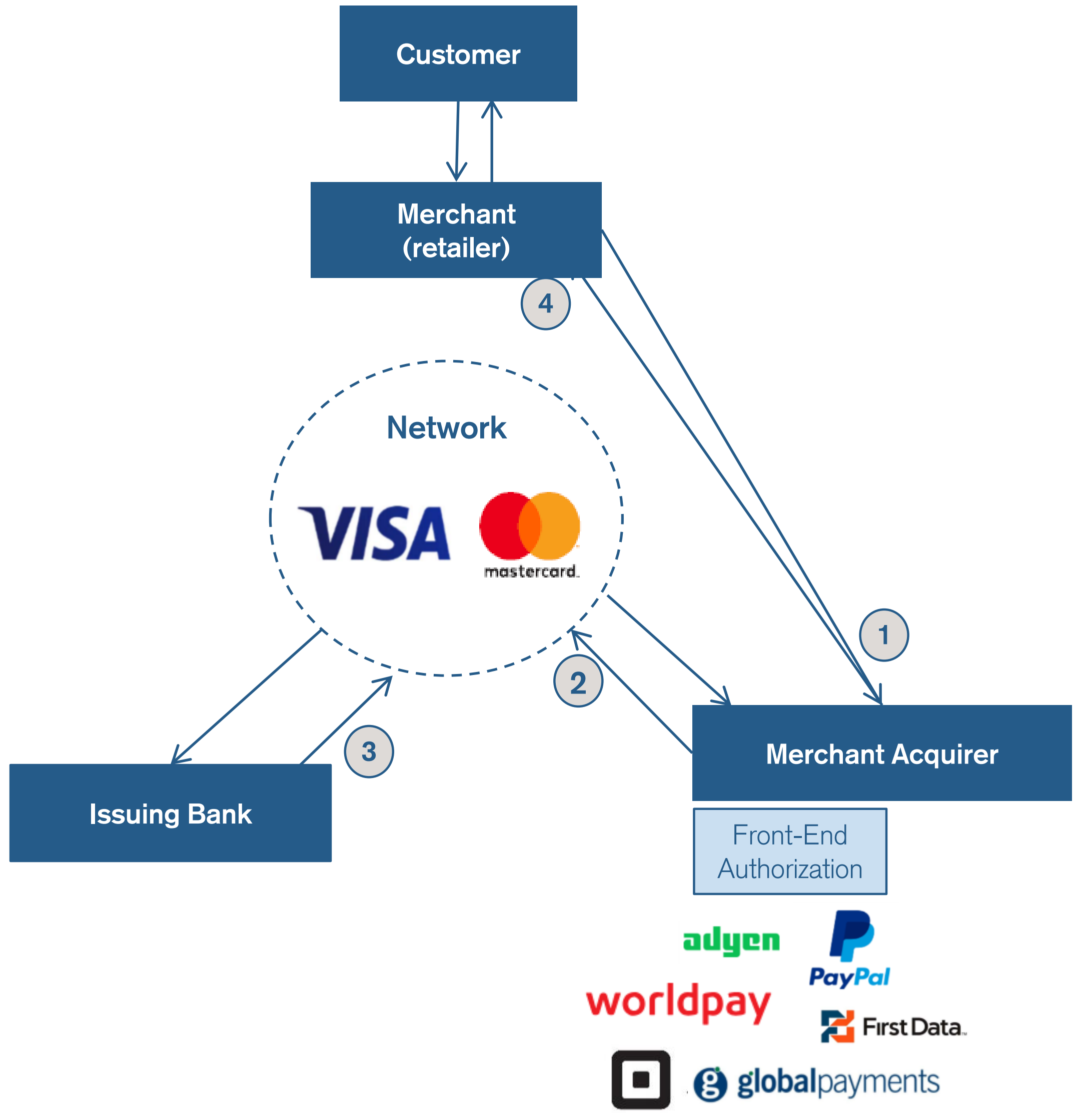
1. Data Capture – The customer inserts the credit card into the merchant's POS (online or in-store). Card credentials and transaction data are captured (and if prompted, the customer provides 2-factor authentication).

2. Authorization Routing - The merchant acquirer sends the authorization request through the network (e.g., V, MA) for the card being used, which is ultimately received by the issuing bank (that issued the card).

3. Once the issuing bank has authorized the transaction (sufficient credit available, fraud, risk analysis, etc.), it will communicate a confirmation back through the network to the merchant acquire in real time.

   Note: Europe – if a non-exempt issuer transaction, then issuer must verify using 2-factor authentication (PSD2 SCA)

4. The merchant receives confirmation (from its merchant acquirer) that the transaction is authorized and completes the sale.



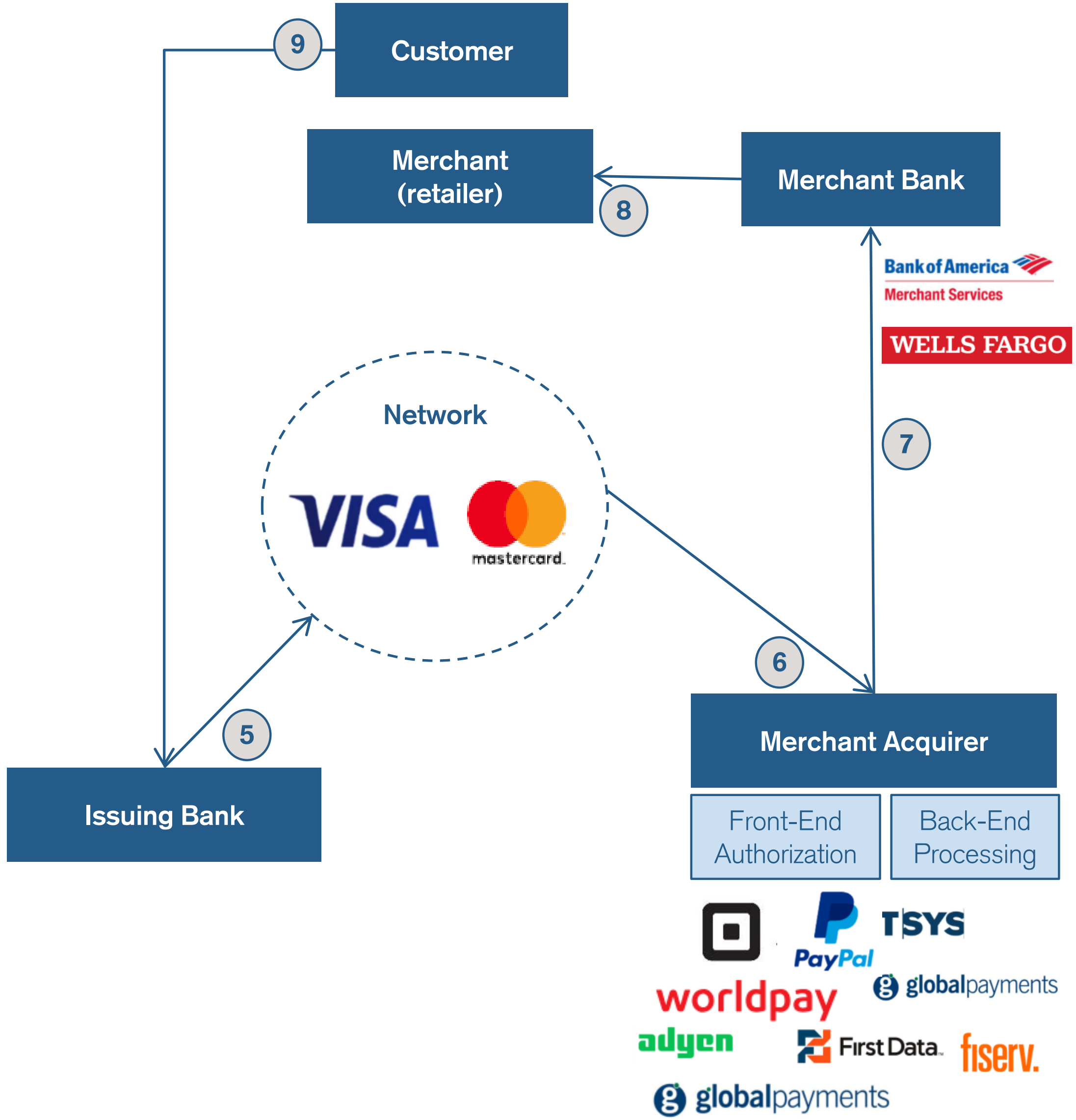
1. The 4-party model

Step 2. Payment and settlement (illustrative example)

5. To initiate the payment process, the credit card issuing bank will front credit on behalf of the customer to settle the transaction, which is then routed through the payments network.
6. The network passes the transaction to the merchant acquirer's back-end processor (which may be handled by a third-party) for settlement.
7. Ultimately, the back-end merchant processor will settle the net outstanding balance between the card-issuing bank and the merchant acquiring bank (where the merchant has its merchant account).

   The settlement bank sits between both the merchant bank and the issuing bank and settles daily via a netting process by account (facilitated by V, MA).

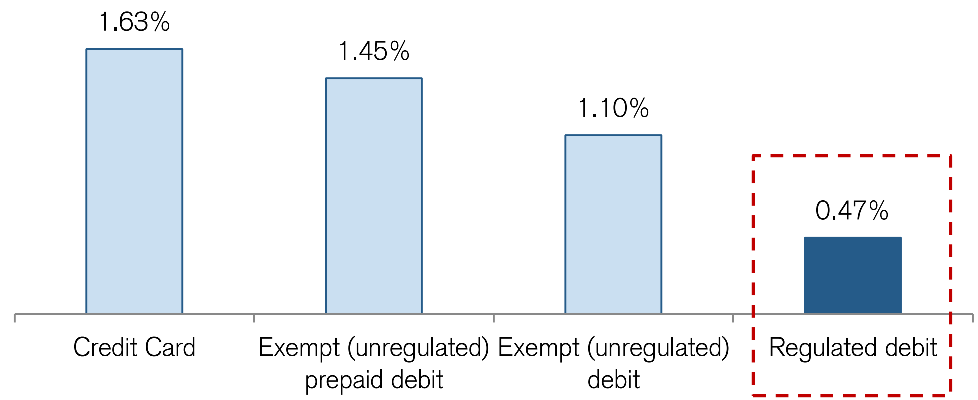
8. The merchant bank will then credit the merchant's account for the amount of the purchase, less fees charged for facilitating the transaction across multiple parties, such as:
   - Interchange ~150-300bps paid to the issuing bank,
   - Acquiring spread ~10-100bps (wide range) paid to the merchant acquirer (majority to front-end processor if separate),
   - Network fees ~15-20bps paid to the networks (net of rebates and incentives).
9. Credit card statement comes due, and the cardholder must pay the bill (interest on unpaid balances earned by issuing bank, which can represent the majority of total credit card economics).



1. The 4-party model
Interchange fee economics

- Interchange fee dynamics
  - Interchange fees differ by type of card used (credit, debit, prepaid debt, Durbin-exempt debit) and by transaction type, merchant type, domestic vs. cross-border, etc.
  - Interchange fees are set by the card networks (Visa, Mastercard) but earned by issuing banks
- Interchange rate caps
  - Generally increased over time due to increased mix of premium cards (e.g., Platinum rewards programs)
- Durbin Amendment (Dodd-Frank Act of 2010)
  - Reduced interchange fees earned by debit issuers with greater than $10b in assets
  - Non-Durbin exempt debit capped = 5bps + $0.21
- Interchange fee caps in Europe (IFR regulations)
  - ~20bps for debit
  - ~30bps for credit

Various US Interchange fees paid to issuers for a sample $50 Visa retail transaction; regulated debit cards carry significantly lower interchange rates



	e-Commerce	Retail			
Visa US interchange (US Retail category)	**Credit Card**	**Credit card**	**Exempt (unregulated) prepaid debit**	**Exempt (unregulated) debit**	**Regulated debit**
Illustrative Transaction Size	$50	$50	$50	$50	$50
+ Cents per Transaction	0.10	0.10	0.15	0.15	0.21
x % of volume	1.95%	1.43%	1.15%	0.80%	0.05%
= Total Interchange ($)	$1.08	$0.82	$0.73	$0.55	$0.24
Total interchange (%)	**2.15%**	**1.63%**	**1.45%**	**1.10%**	**0.47%**

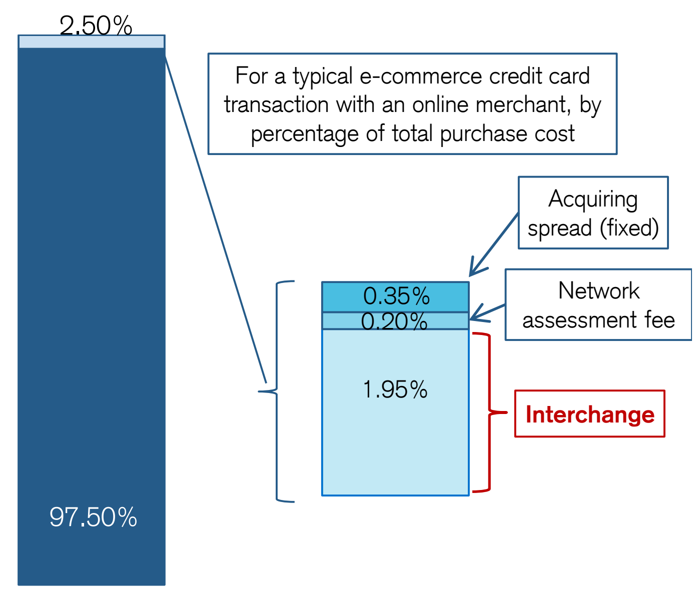
Source: Credit Suisse research

2. Merchant Acquiring Pricing

"Interchange plus (+ +)" pricing

- The merchant acquirer charges a fixed spread on top of interchange (paid to issuing bank) and card network fees (Visa, Mastercard)
  - Merchant Discount Rate (MDR) ~250bps (variable by definition) – Fee paid by the merchant accepting a transaction to the merchant acquirer
  - Interchange ~195bps – Fee paid to issuing bank based on a combination of card type (rewards level, gold card, platinum, etc.), merchant type, domestic vs. cross-border, etc.; largest component of MDR
  - Network fees ~10-30bps – Fee paid to the card networks (Visa, Mastercard)
    - Brand / service fee (assessment), *ad valorem* charges
    - Data processing fees (processing), cents per transaction charges
  - Acquiring spread (fixed under interchange ++, although likely associated with tiered volume discounts) but can range ~10-40bps – Set by and paid to merchant acquirer (and perhaps is shared with a third-party back-end processor) in exchange for acquiring, processing, and settling the transaction; Acquiring spread is inversely related to merchant size (higher volumes gives larger merchants pricing power)
- Price transparency considerations for merchants:
  - Larger merchants demand and receive greater price transparency versus smaller merchants (larger are more likely to use interchange ++ model)
  - European Union laws require greater pricing disclosures vs. US

e-Commerce Typical Interchange + Pricing for a Mid-Size Merchant

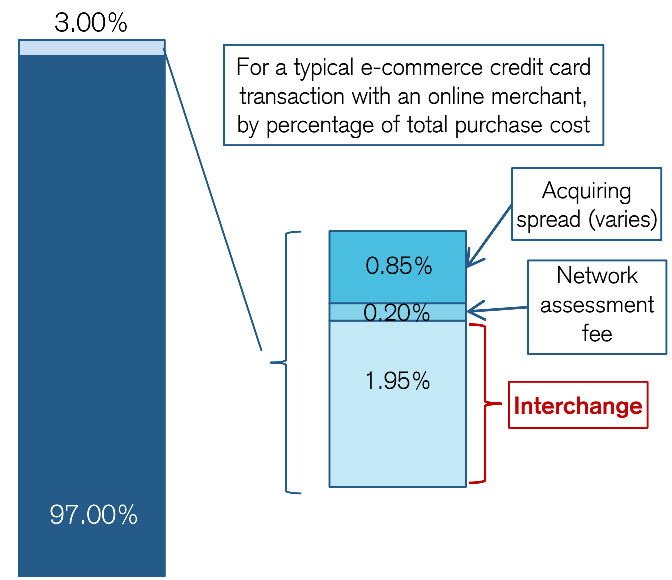


Source: Company websites, Credit Suisse research

2. Merchant Acquiring Pricing
Bundled fee model

- The merchant acquirer earns a variable spread but charges a standardized fee per transaction (acquirer then absorbs all other transaction-related fees)
- Example: Square's rack rate pricing is bundled fee
  - Flat 2.60% + $0.10 for each merchant transaction (card present, in-store), allowing Square to earn this amount less interchange, network fees, and any back-end processing fees (including sponsor acquiring bank fees)
  - Larger merchants are able to negotiate lower pricing based on volume levels and/or card mix (e.g., higher debit would allow the merchant to negotiate the bundled fee slightly lower)
  - Interchange ~195bps – Fee paid to issuing bank based on a combination of card type (rewards level, gold card, platinum, etc.), merchant type, domestic vs. cross-border, etc.; largest component of MDR
  - Network fees ~10-30bps – Fee paid to the credit card networks (Visa, Mastercard
    - Brand / service fee (assessment), *ad valorem* charges
    - Data processing fees (processing), cents per transaction charges
  - Acquiring spread ~30-100bps (variable) – Set by and paid to merchant acquirer (and perhaps is shared with a third-party back-end processor) in exchange for acquiring, processing, and settling the transaction; smaller merchants typically sign up for bundled fee pricing
- Simplified pricing model for merchants (pay one rate on all purchases vs. interchange++ varying by card type, transaction type, etc.), but less transparent as to underlying cost components (merchants cannot tell how much money goes to acquirer on each transaction)

Typical Bundled Pricing for a Small Merchant



3. Roles in merchant acquiring
Front-end processing and back-end processing

Front-end processing roles

POS Vendor | ISO | Gateway | Front-end Processor

Back-end processing roles

Back-end Processor | Acquiring Bank

- POS Vendor
  - A device at a physical store location allowing a merchant to accept card payments
  - Can be supplied by a merchant acquirer/ISO
- Independent Sales Organization (ISO)
  - Signs up merchants for card acquiring capabilities
  - Receives a portion of the acquiring spread (commission)
  - Merchant of record only in “wholesale” relationships
- Gateway
  - Receives transaction data from POS and transmits it to the network via front-end processor for authorization
  - Earns a fixed fee per transaction (lowest share out of 4 front-end roles)
  - eCommerce a frequent use case (bridging merchants to the front-end processor)
- Front-end Processor
  - Handles authorization message communication for merchants, earning a fixed fee
  - Gateways may allow a merchant to connect to multiple front-end processors
- Back-end Processor
  - Receives and processes batched settlement and clearing messages, earning a fixed fee
  - Nets interchange from transaction proceeds, routing the settlement amount to the merchant
  - Creates bill and reporting for underlying merchant
- Acquiring Bank
  - Acquiring license (from the card networks) is needed to be a merchant acquirer
  - In the US, non-acquiring banks achieve this capability via partnership (“renting a BIN” from a sponsor acquiring bank)
  - In Europe and other parts of the world, payments service providers can more easily directly obtain an acquiring license
  - Responsible for merchant’s and processor’s adherence to rules of the network

Source: Glenbrook Partners, Credit Suisse research; Note: often larger acquirers and ISO fulfill many or all of the roles above, while others specialize in certain aspects and outsource others to third parties

3. Roles in Merchant Acquiring
Local acquiring

- Acquiring licenses allow merchant acquirers to underwrite merchants, accept payments, and settle funds back to the merchant through the processing platform. The acquirer takes on the merchant default risk for situations in which the merchant has chargebacks and for any number of reasons it is not able or willing to pay (e.g., no funds in account, goes out of business, was fraudulent).
  - **Increased Authorization Rates** - When a payment processor is operating with a local acquiring license in the same market as the issuing bank, the risk associated with approving that transaction is perceived to be lower and, thus, results in a higher approval rate. This is of particular importance in eCommerce (card-not-present) environments, where authorization rates average in the mid-80%s and can be materially lower in certain markets.
  - **Reduced Interchange and Network Fees** - Local acquiring allows the acquirer to classify transactions as domestic (vs. cross-border), which results in reduced interchange (charged by issuing bank) and network fees (charged by the card networks). In “interchange + +” models (interchange + network fees + acquirer spread), this means the ability to provide reduced costs to the merchant.
  - **Faster Settlement of Funds** - Allows for the clearing and settlement process to be done over the local clearing solution.
  - **Local Merchant Accounts** - With a domestic license, the merchant acquirer can offer a domestic merchant account to its clients. This means the merchant can receive payments in the local currency and simply hold (or use) them in that market.
  - **Local Payment Methods and Experience** – Adding more locally relevant payment methods by country and/or region, provides for an increased choice at checkout and makes for a more familiar and local feel for the in market customer.
  - **Control of Data and Offering** - End-to-end ownership of data (not having to be exported to a partner) allows for control of how transaction details and card numbers are presented to issuing banks for authorization. This also means not having to wait for a local partner to begin accepting new forms of payment (e.g., Apple Pay, Google Pay) but can control the timing and availability itself.
- In markets where a payments provider does not have a directly owned acquiring license, an alternative is to rent a license from another acquiring bank (i.e., “bin sponsor”). Generally speaking, this works just the same as owning a license, and often comes down to a decision around the level of volumes expected vs. the required investment to achieve a license.
  - Many countries require BIN sponsorship to be done with a regulated bank, while others allow for acquirers to self-sponsor
  - Achieving a local acquiring license typically involves establishing a local business entity, establishing connections to the local banking system, meeting local regulatory requirements, and ultimately, applying for a license
  - Addition of an extra party (generally a local bank) can at times potentially impact control of the data, restrict merchant categories (e.g., airlines, gaming), merchant onboarding practices, and overall authorization rates (depending on bin sponsor arrangement)

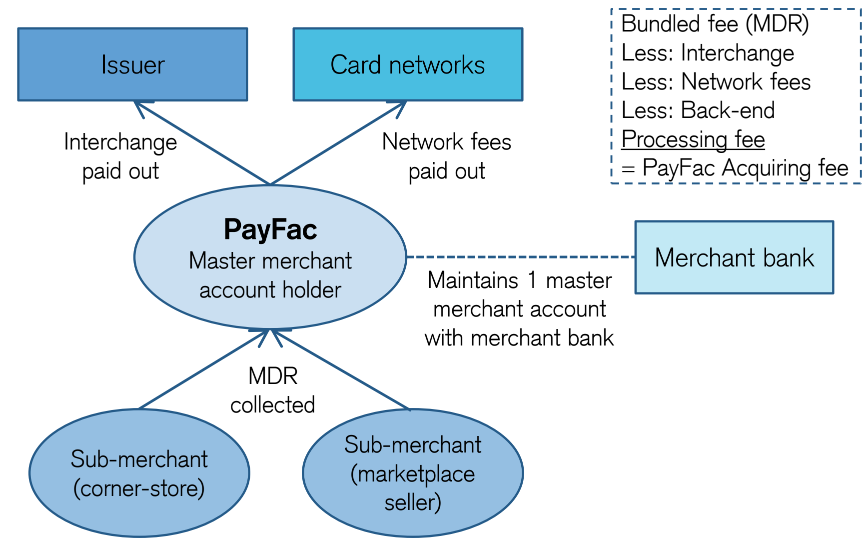
Source: Adyen, First Data, Credit Suisse research

3. Roles in merchant acquiring

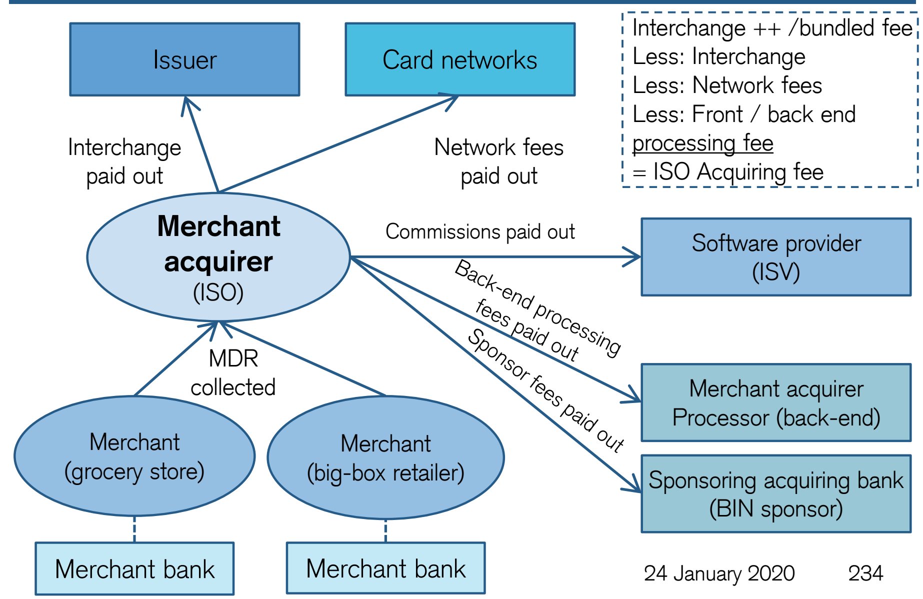
What is a Payment Facilitator?

- PayFacs, often referred to as merchant aggregators, sign up and process payments for small merchants as "sponsored merchants" or "sub-merchants" that reside under the PayFac's merchant account.
  - Visa has referred to PayFac's like Square as a single merchant when describing merchant acceptance location numbers.
- The PayFac handles all aspects of a payments transaction on behalf of the sub-merchant, including front/back-end merchant processing, and maintains sub-merchant accounts under their master account.
  - Facilitation allows for easy onboarding of sub-merchants, often done via an in-house proprietary underwriting program.
  - If a sub-merchant achieves > $1mm in annual volume, network rules (Visa, Mastercard) dictate that they cannot be a sub-merchant anymore and must have their own merchant account opened.
  - Merchants with volume beyond these thresholds must be onboarded under the Independent Sales Organization (ISO) model, a more lengthy, rigorous application process (numerous forms, days/weeks vs. instant).
- Companies that become PayFacs can be grouped into three buckets:
  1. Core commerce platforms/payments companies (e.g., Square, Stripe, PayPal, BlueSnap, PagSeguro, SumUp), although even within this group, both PayFac and non-PayFac models can be employed (e.g., Stripe can serve as both PayFac and ISO);
  2. Integrated Software Vendors (ISVs) with verticalized SaaS offerings (e.g., to operate a restaurant or fitness center), which have a payments aspect to their software/workflow (e.g., Toast, Mindbody, Lightspeed); and
  3. Marketplaces and related technology platforms that "take payments in-house" (e.g., Etsy, Shopify, Wix, Yapstone).

Typical PayFac structure, where the PayFac aggregates many sub-merchants (typically micro & SMB) under its master merchant account



Typical ISO structure (each merchant has its own account) integrated payments example shows merchant referral commission paid to ISV



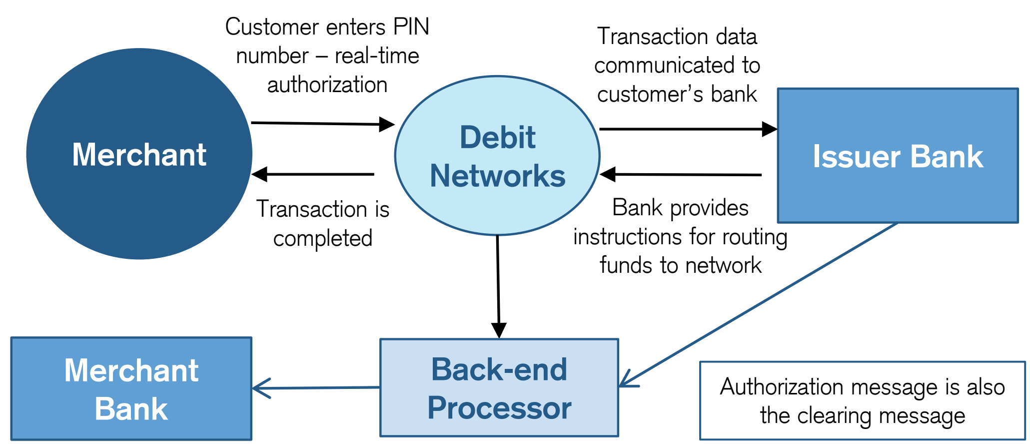
Source: Company reports, Glenbrook Partners, Credit Suisse research

4. Debit card network mechanics

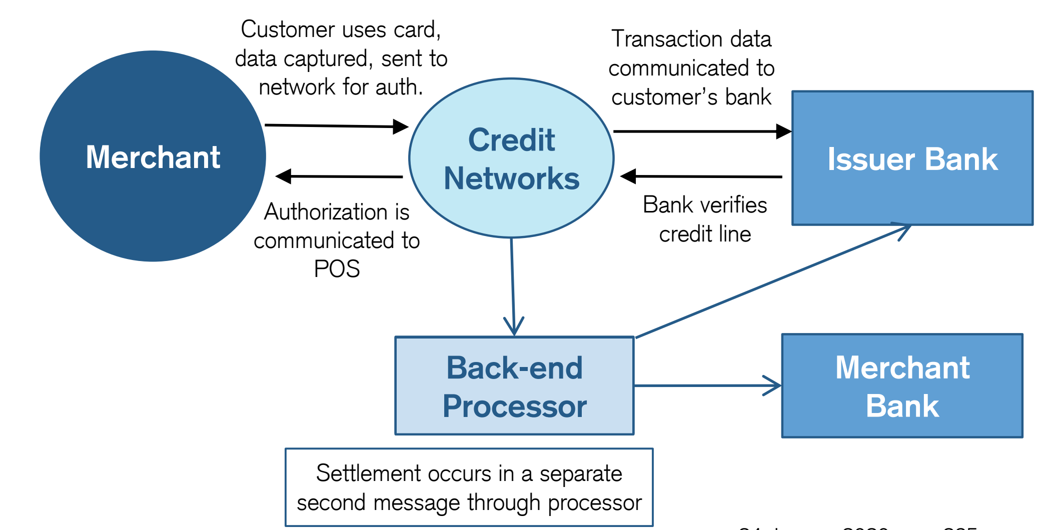
Single and dual-message

- Single message – Initially created for ATMs, where authorization & settlement are handled at the same time
  - Generally, a Personal Identification Number (PIN) is required to complete the transaction
  - PINLess debit allows for usage of single message but does not require a PIN entry (allowed for transactions under $50)
  - Allows customer to take cash back at point of sale
- Dual message (e.g., credit card rails) – 2 messages, 1 for authorization and 1 for settlement
  - Signature debit transactions flow similarly to credit transactions
  - Captured data gets routed over credit card rails
  - Signature debit use cases:
    - Recurring payments (utilities, car loan, phone bill, rent)
    - Pre-authorization requirements (e.g., in order to tip at a restaurant, the settlement amount has to be different than the initially authorized amount)
- Transaction funding differences
  - PIN - Money is pulled directly from the bank account linked to the debit card to fund the transaction
  - Signature - Transactions are posted in 1 day to the account after settlement occurs through back-end processor

Single Message Illustration (PIN Debit)



Dual-Message Illustration (Signature Debit)

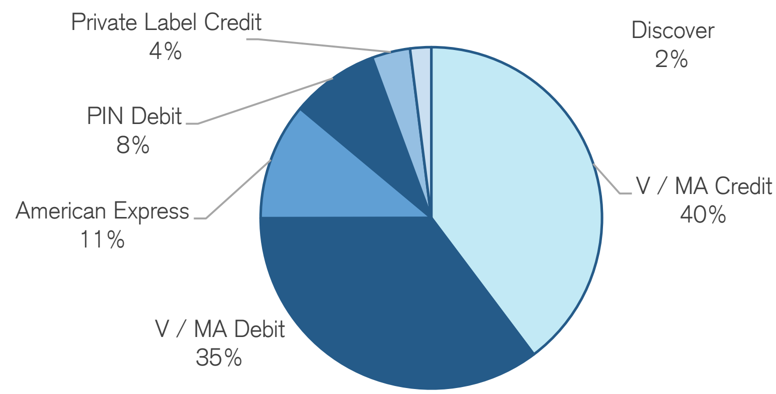


Source: Glenbrook Partners, Credit Suisse research

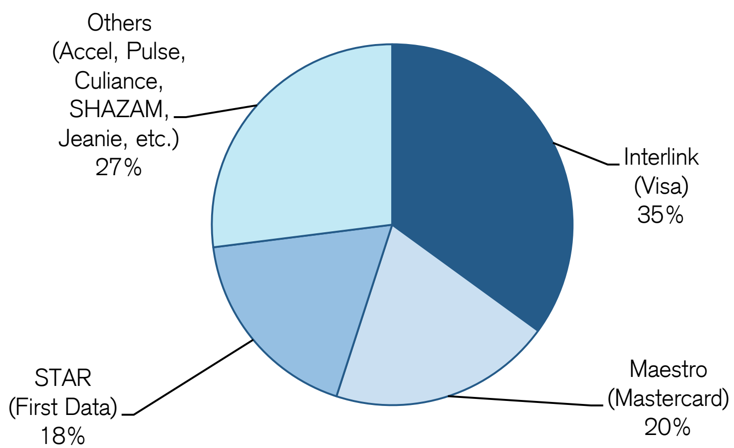
4. Debit card network mechanics
Competitive overview

- PIN debit usage has decreased in the past 5 years, while signature debit and credit card usage has grown HSD.
- After a period of consolidation beginning in the 1980s, the majority of debit networks are owned by scaled incumbents in the payments industry.
  - Visa – Interlink
  - Mastercard – Maestro
  - First Data – STAR
  - FIS – NYCE
  - Fiserv – Accel
  - Discover – Pulse
  - Worldpay - Jeanie
- Network fees are lower for PIN debit transactions vs. signature debit transactions.

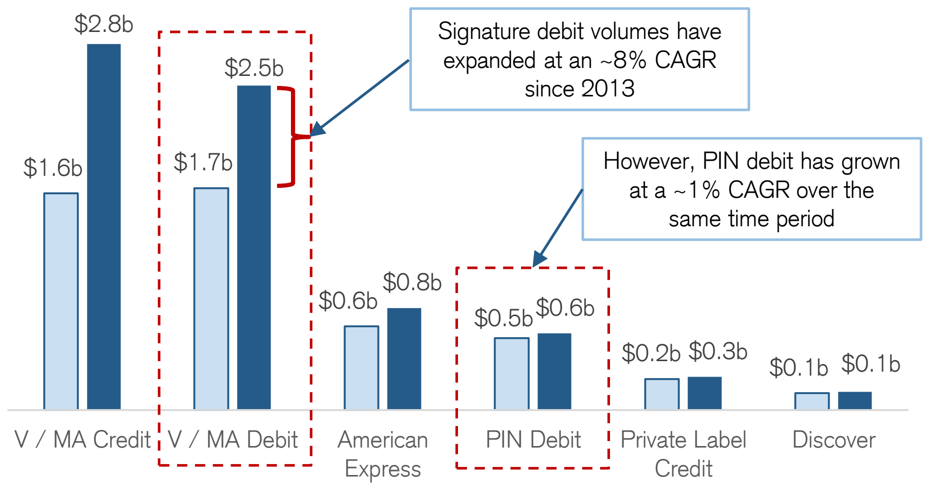
US general purpose purchase volume market share, showing Visa and Mastercard credit and debit as the lion's share of total volume



US PIN debit share leaders are Visa (Interlink) and Mastercard (Maestro), with STAR (Fiserv/First Data) a clear number three



US general purpose purchase volume ($b) suggests signature debit has grown at a much faster rate (2013-2018) vs. PIN debit



Source: Company reports, The Nilson Report (2018 Merchant volume), Mergermarket, Credit Suisse research

4. Debit card network mechanics
ACH vs. debit, key differences and use cases

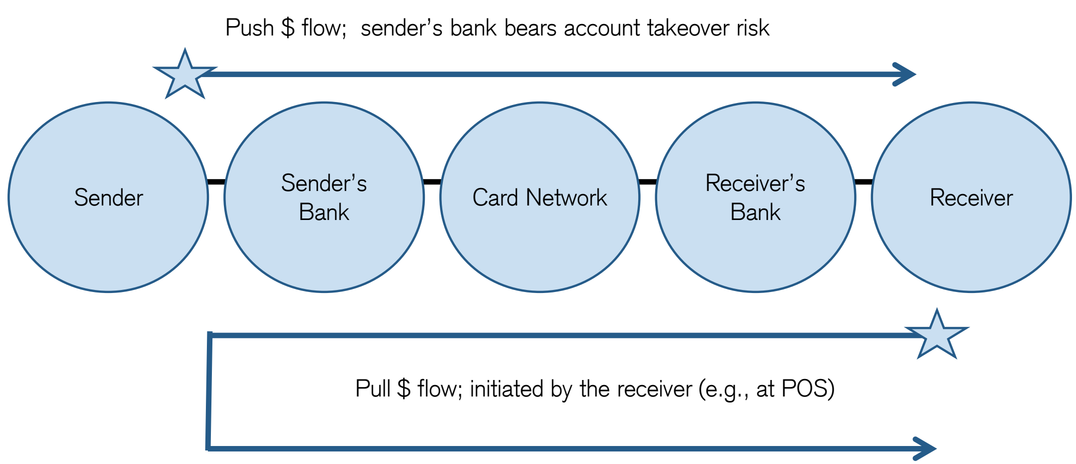
Aspect	Traditional debit (Visa, Mastercard, PIN debit networks)	ACH-based (including faster payments, ACH-like alternatives)
Costs to merchant	Interchange fees, network fees, and merchant acquiring fees; regulated interchange when card issued by bank with > $10b assets (21bps + $0.05), or Durbin-exempt, unregulated interchange when issued by smaller banks	Fees paid to NACHA (bank-owned association that makes the operating rules), fees paid to the operator: (1) EPN by The Clearing House (TCH) and (2) FedACH by the Federal Reserve, and fees paid to a third-party service provider to access ACH systems (e.g., Dovetail by Fiserv, UPP by FIS); priced on a cents per transaction basis (i.e., meaningfully lower cost than traditional debit)
Good funds	Immediate authorization and guarantee of good funds (debit cards will not authorize if funds are not in the account), although there is a risk of chargebacks; cannot bounce, as authorization is a binding commitment by the issuing bank per network rules	Good funds not guaranteed – risk of insufficient funds (2-day window where banks can pull back funds for insufficient funds, account closed, wrong account number, etc.); even on a same-day basis, ACH payments can bounce due to lag in authorization and settlement (can send more money than in account, which catches up upon settlement time)
Chargebacks and disputes	Chargebacks & dispute process: Card network rails come with processes around chargebacks & disputes; originating bank bears the risk when accounts are taken over; these processes generally add costs to the ecosystem	No chargebacks & disputes: ACH-based payments cannot be reversed due to issues with a product or service delivery (merchant failure); in practice, banks at times reimburse their customers, but only legal recourse is small claims court
Account take-over	Network rules protect for signature debit, Reg E protects for PIN debit and signature debit	Reg E protections only (out of scope of card network rules); the originating bank does assume risk when accounts are taken over (per Reg E)
Domestic vs. Global	Cross-border: Global by definition, with cross-border capabilities and access to ~3.5b cards and ~25k banks connected to Visa and Mastercard	Local (but evolving): ACH-based systems are (today) by definition local and often country-specific. Examples include: NPP in Australia, FPS in the UK, RTR in Canada, RTP provided by TCH in the US, and the pending FedNow system (potential launch in 2023/2024) in the US; that said, it is possible that over time modern ACH systems could become linked/interoperable for use in cross-border payments (i.e., many are using ISO 20022 standards, making connecting various systems more feasible over time)
Speed & availability	24/7 real-time: Card rails are always on	Modern systems are 24/7 (e.g., RTP in the US), legacy are not; legacy ACH systems use batch processing (i.e., all transactions end of day) and often operate under bank branch-like hours
Other	Long-standing, real-time capabilities consolidated into two known brands (Visa, Mastercard)	Numerous, more recently developed options; use cases typical for services that can be turned off by the merchant (e.g., phone bill, electric bill, college tuition)

Source: Visa, Glenbrook Partners, Credit Suisse research

4. Debit card network mechanics
Push vs. pull payments overview

- Pull Payments – Traditional card payments where the recipient (merchant) instructs their bank to pull funds out of the consumer's account
  - Traditional card payments are by definition debit pull payments, ACH debit pull (e.g., recurring utility bill debited from bank account)
- Push Payments – Sender instructs its bank to send (push) money to the recipient's bank
  - Traditional ACH credit push (e.g., direct deposit of payroll pushed from employer's account to employee)
  - Real-Time Payments from The Clearing House are exclusively credit push, although they have a request for payment feature
  - Other examples include: Visa Direct, Mastercard Send, and Zelle
  - Authorization message from sender's bank to receiver's bank (asking permission to send vs. granting permission to pull in a typical transaction)
  - Generally not reversible due to fraud or service issues (whereas pull payments can be disputed if not happy with the product or service)

Payment flows for push vs. pull payments

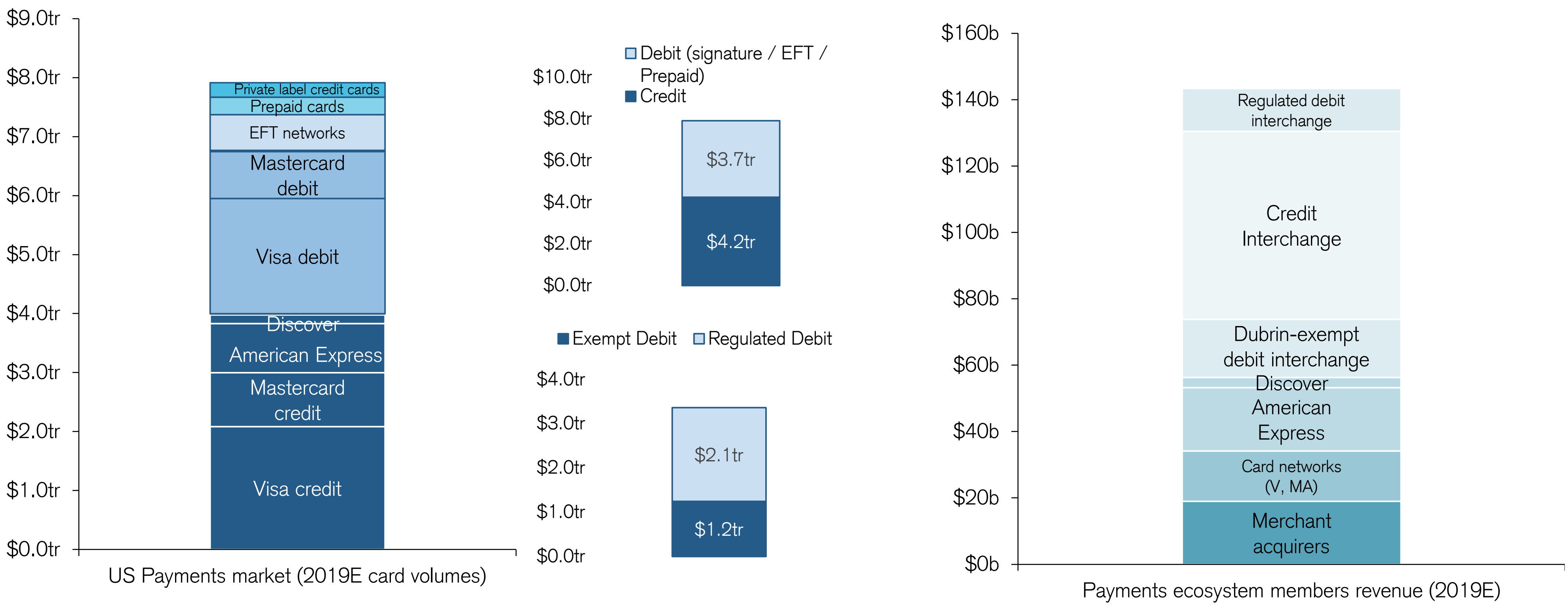


Source: Visa, Glenbrook Partners, Credit Suisse research

5. US Payments market revenue pools

Merchant discount rate components (opportunity for acquirers, networks, & issuers)

- US payment card volumes are approaching $8tr in total, with the vast majority touching Visa and/or Mastercard networks.
- Visa and Mastercard are not the largest revenue beneficiaries though – banks are (the card issuers themselves), with card issuers earning interchange on each transaction equivalent to ~130bps on average (vs. Visa and Mastercard earning network yields that total come to roughly ~26bps)



Source: Company reports, The Nilson Report (US Purchase Volume from The Nilson Report for 2018 base, and 2019E represents Credit Suisse estimates), The Federal Reserve, Credit Suisse estimates

Appendix

Framework for “at-a-glance” view of companies

Credit Suisse framework and snapshot

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
V	◕	◕	●	◑	◕	◑	◕	◕	●	◕	◕
MA	◕	●	●	◕	◕	◑	◕	◕	●	◕	◕
ADYEN	●	◕	◑	●	◔	◑	◑	◑	●	◕	◕
SQ	◕	◔	◕	●	●	●	◕	◑	◑	◕	◕
PYPL	●	◕	◕	◕	●	◕	◑	◕	◑	●	◑
FISV	◕	◕	◕	◑	◕	◕	◑	◕	◑	◑	◑
FIS	◕	◕	◕	◑	◕	◕	◑	◕	◑	◕	◑
GPN	◕	◕	◕	◑	◕	◑	◕	●	◕	◕	◕
FLT	◔	◕	◕	◕	◕	◑	◕	●	◕	◕	◕
WEX	◑	◑	◕	◕	◕	◑	◕	◕	◕	◕	◕
RPAY	●	◔	◕	◕	◑	◑	◑	●	◕	◕	◑
VRRM	◔	◑	◕	◕	◕	◑	◕	◕	◑	◑	◑
WU	◑	◕	◕	◔	◑	◑	◑	◔	◑	◑	◑
IMXI	◔	◑	◕	◑	◕	◑	◑	◑	◑	◕	◑

Source: Company reports, Credit Suisse research

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
PYPL	●	◕	◕	◕	●	◕	◑	◕	◑	●	◑
	- Clean pure-play on eCommerce, particularly on mobile (Braintree, core PayPal, Venmo), which makes up >40% of TPV and growing ~35-40%	- 45% of revenues ex-US, although about 1/4 of that exposure is UK-based (i.e., UK makes up ~11% of total company revenues); all other countries are < 10%	- 40+ partnership agreements since 2016, with the key early agreements coming with Visa and Mastercard; a more recent, notable partnership in Paymentus (opening the bill pay vertical)	- Venmo's attractive highly-engaged >40mm Millennial user base and social aspect (newsfeed) provides a direct engagement platform for merchants	Two-sided global payments platform with unrivaled scale, consisting of ~300mm consumers and ~24mm merchants	- POS software via iZettle (inventory management, invoicing, staffing tools, etc.), expanding PayPal's in-store TAM	- When viewed as a customer acquisition partner, suggests pricing upside remains (industry-leading conversion rates and ~300mm users); SMB eCommerce players enabled with tools of larger tech players	- $6b cash (post Honey acquisition in Q1 2020E), $5b debt, ample room for continued M&A, share repurchase and minority investments (e.g., $750mm invested in MercadoLibre, $500mm invested in Uber)	- Non-transaction expense base is largely fixed (~75%), and is guided to grow ~5-8% vs. revenue growth in the high-teens (3-5 year guidance)	- iZettle in offline payments and software for SMB (in 12 ex-US markets)	- Any capping (regulation) of interchange serves to lower funding costs (a positive for PayPal margins)
	- Approaching 20% of TPV from non-eBay, fast growing eCommerce marketplaces (e.g., Facebook, Instagram, AliExpress, Grubhub, Airbnb, etc.)	- MercadoLibre commercial agreement provides for added exposure to fast growth/low penetration Latin American payments and eCommerce (also Itau partnership in Brazil)	- In addition to V/MA, partnerships with large tech platforms (e.g., Google, Facebook), retailers (e.g., Walmart), banks (e.g.,. Citi, BofA, Itau), and others (e.g., FIS, América Móvil)	Smart checkout buttons (now re-tooled to not rely on browser cookies) and enables users to pay with issuer rewards points at PayPal's ~23mm merchants	Consumer reach extended to new geographies and contexts via partnerships. In-store (V/MA, Walmart), Facebook (contextual commerce on Instagram), MELI (230mm users in Latin America)	- PayPal Credit offerings for both consumers (via SYF in the US, on balance sheet ex-US) and merchants (PayPal Business Loans, PayPal Working Capital), benefiting from the Swift Financial acquisition	- Cross-border capabilities (global two-sided network) suggests ability to increase price in certain corridors over time (took a meaningful cross-border price in crease in 2017)	- Honey (close Q1 2020E, $4b in cash), has potential to move up PayPal to the beginning of the shopping experience from purely a checkout button at the end. iZettle (acquired 2018, $2.2b) benefits still to come	- Transaction expenses are variable and gross margin trajectory has been/will be down	- Venmo monetization and deepening relationships with millennials via Pay with Venmo, Venmo Card (Debit and Credit), and Instant Transfer	- Alternative checkout options such as the Secure Remote Commerce (SRC) "single button" from networks, which we expect to be supported by acquirers
	Industry leading checkout conversion rate of 89%, on average ~60% higher than other digital wallets and 80%+ higher than all other payments types (comScore study, April 2018)	- GoPay controlling stake acquisition (expected to close in Q4 2019) would make PayPal the first non-Chinese payments company licensed to provide online payment services in China. Potential to be material to longer-term growth (2021 and beyond)	- Minority investments (e.g., MercadoLibre, Uber, Acorns, Monese, Raisin, etc.) suggest potential for additional integration and/or partnering	Differentiated set of capabilities for marketplaces (PayPal Commerce Platform): expertise from powering eBay, OneTouch seller sign-up, relationships with existing sellers and consumers, trusted brand	- Partnership approach provides PayPal's merchants with access to north of 380mm additional consumers (150mm Baidu users and 230mm MELI users)	- Payout tools enhanced by Hyperwallet acquisition (important for marketplace customers)	- Approaching ~300mm users with increasing engagement makes it difficult for a merchant to opt out of PayPal acceptance	- 3-5 year guidance includes ~150bps growth contribution from acquisitions	- Top line growth drives margin expansion (due to fixed non-transaction costs, despite large and variable transaction expenses)	- Opportunity to provide consumer financial services to Under-banked (1.7b people globally and 70mm in the US); Xoom money remittances provides an inroad to consumers in emerging markets	- Additional efforts by large cap tech companies, namely Amazon, but also Google, Facebook, Samsung, Apple, etc. (although many are partners, reducing risk)

Source: Company reports, Credit Suisse research

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
SQ	◕	◔	◕	●	●	●	◕	◑	◑	◕	◕
	- Two broad buckets 1) First-party commerce enablement (Square Online Store (powered by Weebly) and Weebly; 2) Developer Platform-related efforts with Marketplaces, eCommerce enablement platforms, and a set of APIs and SDKs	- ~5% of revenues International although likely to move higher (more complete feature set rolling out globally, accompanied by brand campaigns)	- 80% of large sellers (and ~100% of micro merchants) self-onboard to Square's easy to use, intuitive platform. Leading cross-sell capabilities, which also reduces incremental CAC	- Continued new product innovation (> 50% of adjusted revenue from products launched in past 5 years)	- Crucial to the operations of its sellers and regular engagement drives cross-sell (i.e., daily usage and dependence via dashboard/analytics, CRM, inventory management, payroll, business debit card, etc.)	- > 50% of adjusted revenue from products launched in past 5 years outside of Square's core payments business, the highest amongst its merchant acquiring peers	- "Rack rate" pricing increased in September 2019, increase for a subset of its sellers (with those merchants that were still being charged a 2.75% flat rate moving to 2.60% + $0.10 per transaction)	- Not part of Square's strategy to acquire customers and seek cost synergies; focused on technology and talent acquisitions (e.g., Weebly, Zesty)	- Incremental margins (ex-investment) are in the ~50%+ range, making the longer term EBITDA margin target of 35-40% reasonable (previously communicated and potential to be updated at the March 2020 investor day)	- Additional financial services being added to the Cash app (consumer lending, asset management, insurance, etc.), along with additional Cash card adoption (unregulated debit interchange monetization)	- Intensifying competitive landscape from incumbents launching similar products and moving up market into larger merchants (FISV's Clover, GPN's Vital, PayPal's iZettle, etc.)
	- Developer Platform APIs and SDKs allow developers to use Square services (and access the full ecosystem) in a customized way, for websites, mobile apps, and in-store	- Japan business benefiting from government incentives in digitizing payments (longer term, and ahead of the 2020 Olympics), new product rollouts, and SMBC distribution partnership (bank branches)	- Square hardware available at 24k+ physical retail stores (including Apple, Amazon, Best Buy, Staples, Target, and Walmart)	- Unique ability to rollout and scale new products quickly (Instant Deposit, Cash App features, Square Capital, etc.), partially due to daily use of dashboard for merchants	- Direct relationship with >15mm Cash App users makes Square a two-sided network. Enhances value for both sides: drive Cash App users to Square Sellers and reward Cash App users for this (Boost)	- Installments product allows sellers to increase their sales by offering credit extension at the POS to their customers (via Square Capital); integrated into Square Invoices as well (larger ticket items)	- When viewed as "total take rate" vs. "net transaction take rate", revenue on a per unit of GPV basis increased from 1.4% in 2016 to 2.0% in 2019E (Instant Deposit, Square Capital, along with other services)	- Weebly acquisition meaningful in expanding on 2/3 strategic priorities (omnichannel and international, Weebly 40% of customers outside the US, learning ahead of any potential geographic expansion)	- Seller adjusted EBITDA margins of ~30% in 2019E up from -9% in 2015 reflect efficient seller payback periods of 3 quarters; Efficient payback economics are enabling Square to extend this to 4 quarters in 2020 to enhance reach	- Any further move into B2B payments, with Invoices and Square Card the first two products in this area (we expect more, including AR/AP software, card issuance potentially, etc.)	- Any capping (regulation) of interchange serves to lower funding costs (a positive for Square margins)
	- Weebly acquisition & Square Online Store (powered by Weebly) aligned with omnichannel strategy but still a di minimis portion of mix today (sellers never have to think about where customers are from, single platform across channels, etc.)	- While brand recognition may not be the same as in the US, Square has Net Promoter Scores ranging from 60-80 in the UK, Canada, and Australia	- Third-party developers through the developer platform (APIs, SDKs, Developer Platform)	- Order API provides integration with Postmates, DoorDash, and Chowly (reducing the "tablet farm" at restaurants)	- 80% of large sellers (~100% of micro merchants) self-onboard given high net promotor score and strong brand	- Automated chargeback dispute process (no chargeback rebuttal letters to author, no fees to handle disputes); previously offered $250 per month in chargeback protections, but recently ended program (accretive to margins)	- Demonstrated by Square's planned Feb. 2020 price increase of Instant Transfer to 1.5% from 1% after testing the increase before the broader rollout; likely afforded by the value of Square's product ecosystem	- $1.6b cash (post the ~$400mm cash incoming from the sale of Caviar), $0.9b in convertible debt; Provides room for continued bolt-on M&A and minority investments	- 2020 guidance calls for EBITDA margins to be down YoY due to investment behind marketing and additional operating expenses associated with the new Oakland office (this could prove conservative given recent pricing actions)	- Cash Boost (rewards) potential to turn from a cost center (marketing costs as Square funds the rewards) to a revenue generator (merchant funding of rewards and paying for positioning within Cash App)	- Local competition and lower awareness (relative to the US home market) in International markets

Source: Company reports, Credit Suisse estimates

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
GPN	◕	◕	◕	◑	◕	◑	◕	●	◕	◕	◕
	- Large eCommerce & Omni business, sized at ~$900mm (approaching $1b in 2020E, but ~$800mm ex-network fees), with an emphasis on SMB and multi-national merchants	- Combined business will have the majority of its revenue sourced via North America (~80-85% of total revenue), given both business had large US businesses and meaningful exposure to Canada (~7-9% each, historically)	- Sizeable (~3.5k person) direct salesforce, including ~3k from Global Payments and another ~500 from TSYS (vs. ~2-2.5k for large competitors FISV and FIS); combined team will enable cross-selling of Global Payments & TSYS merchant offerings	- 58 local/domestic acquiring licenses, "unrivaled" relative to competitors, which aids in Global Payments' ability to provide reduced interchange (for those on interchange plus pricing) and higher authorization rates for its merchant clients	- Via owned software and integrated payments (integrations into ISV software platforms), Global Payments is more central to the entire business operation, particularly in owned verticals	- Addition of Consumer Solutions (Netspend) provides for new/expanded opportunities in payroll (synergies of PayCard business with existing Global Payments Payroll offerings), as well as other B2B,B2C, & P2P payments	- Owned software approach provides for enhanced price protection, given payments are often delivered as part of a broader business/software solution (i.e., payments pricing can be rolled into software pricing)	- TSYS acquisition done purposefully as an all stock deal to allow for continued flexibility for investment and room for continued M&A; leverage ~2.5x pro-forma (vs. FIS at ~3.5x and FISV at ~3.9x following recent acquisitions)	- Merchant acquiring & issuer processing business both tend to have high incremental margins (ex-investments for growth); Global Payments had guided to ~75bps of margin expansion per year, while TSYS was expecting ~25-75bps	- Additional bank JV partnerships, above & beyond stated $100mm+ revenue synergies; previously challenging for Global Payments (acquiring only) & TSYS (merchant business was US only) to form bank JVs (formation can require upfront investment)	- Integrated payments (~12% revenue) could see competitive pressure on ISV commission (revenue share) levels (although GPN has a degree of protection given high levels of service and global reach); software-led (~10% of revenue) is insulated, via software ownership
	- Combination of merchant acquiring & issuer processing business will allow for increased authorization rates, particularly within eCommerce/CNP transactions (i.e., proprietary SCA, known issuer customers transacting)	- Addition of TSYS reduces revenue exposure to the UK, which had been ~9% (per 2018 10-K), and on a pro-forma basis will be ~4-5% of total company revenue	- With the addition of ~820k merchant location relationships from TSYS, Global Payments will have ~3.3mm+ (SMB-focused) merchants (2.5mm Global Payments pre-acquisition)	- The combination of issuer (at scale) & acquiring businesses allows for the replication of the benefits of owning a debit network (via technology) without owning a branded network. This allows for "on-us" routing (globally & cross-border)	- Integral to the operations of customers, particularly in owned software verticals (via AdvancedMD, Xenial, SICOM, Heartland Restaurant, ACTIVE, Gaming, education, universities, etc.)	- Xenial/SICOM provide enterprise SaaS for QSR & food service, with front of house POS, mobile ordering, back-office analytics, loyalty, payroll, scheduling, etc.; has 21 of top 40 QSR as clients (e.g., Burger King, Taco Bell, Wendy's)	- Integrated payments pricing (acquiring spreads) tend to be higher (can be ~2x a typical payments business on a like-for-like merchant size basis) given integration into software (ISVs), albeit with potential pressures on ISV revenue shares	- Future M&A possibilities are open to: 1) horizontal (along the lines of Heartland and TSYS); 2) vertical software (likely share leaders in fragmented markets, with a payments aspect); and 3) geographical expansion	- At least $300mm in cost synergies as part of the TSYS merger to be realized by year three (key areas being merchant business operations, tech infrastructure, corporate cost, scale efficiencies, etc.), with minimal execution risk	- Potential for enhancing the Vital POS & cross-selling it into the Global Payments/Heartland merchants, with ambitions to make the product more attractive than both Square and Clover; and potential to further reduce attrition	- eCommerce competitors are also focused on expanding local presence (Adyen pursuing mid-market, Stripe expanded domestic acceptance at 31 countries with plans to reach 40 by end 2019, Worldpay-FIS working on geo-expansion)
	- Have capabilities in hard-to-serve markets (e.g., Taiwan, Singapore, Malaysia, Brazil, China, etc.) where competitors in RFP processes are either more limited to just 1-2 players (likely Worldpay and Adyen) and/or local acquirers (e.g., Oct. 2019 Citi win)	- Leadership position in issuer processing in key markets outside the US (e.g., # 1 share in Canada, UK, Ireland, China, # 2 share in Western Europe)	- Global Payments previously had 500+ global financial institution relationships (largely in the form of merchant referrals), while TSYS more than doubles this with an additional 800+ (largely in the form of issuer processing)	- Netspend is a pioneer of prepaid and the 2nd largest US prepaid program manager. We expect Netspend to launch outside the US in late 2020, with added growth from new products (e.g., DDA, loyalty, co-brands, virtual accounts)	- Global Payments has benefited from attrition rates that have generally been at the low end of industry range (~10% overall, and at the industry low in the US vs. industry averages more in the ~10-20%+ range)	- Partner with 60+ lenders (connected via APIs) to provide merchant cash advance offerings to merchants (functioning similar to offerings from Square Capital, PayPal Credit, etc.); lending is not on balance sheet (i.e., no credit risk)	- Contactless card rollout in the US (beginning in 2H 2019, into 2020-2021) represents a meaningful revenue opportunity (i.e., ~640mm+ accounts on file, ~50% of issuer business in the US, ~$3-5 per contactless card)	- Successfully integrated 3 vertical software acquisitions in 2017-2018 (ACTIVE Network September 2017, AdvancedMD & SICOM September 2018), increasing the mix toward technology-enabled vs. relationship-based	-Increasing exposure to SaaS/software-based revenue (faster growth, higher margin, M&A focus) produces mix-shift based margin expansion, albeit with a preference to re-invest upside into future growth vs. all flowing into margin expansion	-Increased issuer processing clients via Global Payments' FI relationships; management noted early interest from bank partners, likely ex-US (given Global Payments uses bank partners in parts of Europe, Canada, & Asia)	- Local operating presence in ~38 countries (and 58 local/domestic acquiring licenses) necessitates additional oversight, compliance, and regulatory knowledge/costs vs. more focused providers

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
V	◕	◕	●	◑	◕	◑	◕	◕	●	◕	◕
	- eCommerce transactions come with meaningfully higher carded rates and represent a channel growing ~4x that of traditional off-line commerce (in-store); further, cross-border eCommerce is growing ~2x that of domestic, an added tailwind from a yield perspective	- Of the two large networks, V has greater debit volume mix (~45% for V vs. 35% for MA) and greater US volume mix (also ~45% for V vs. 35% for MA); said differently, V has great debit and US mix vs. MA	- Visa's strong distribution is bolstered by its leading position with the largest card issuers in developed markets (e.g., JPM, Bank of America). Visa extended its partnership with JPM through 2029, solidifying its position as the leading US network	- Sourced from both in house (e.g. Visa Direct, B2B Connect) and acquisitions (e.g. Earthport), recent example (June 2019) around installments (in beta, where issuers can offer installments to their Visa cardholders directly through merchants)	- By definition card issuance capabilities and the global acceptance network enabled by Visa/Mastercard enable their core customers (issuing banks) to earn money (via interchange directly, and via interest earning on outstanding credit balances indirectly)	- With the technical migration in Europe complete, Visa has begun to offer add-on services (e.g. risk services, loyalty solution) to European clients; we expect subtle (but positive) continued "pricing" (net yield) increases in Europe	- Contactless transactions skew lower ticket, implying higher yields (due to "cents per transaction" data processing fees), although we expect a meaningful portion of this increased yield to be paid-away via incentives to help ramp contactless adoption in the US	- Generating ~$12b in annual FCF (2019), allowing for consistent bolt-on acquisition to enhance technology and service offerings to banks & merchants/acquirers (e.g., Earthport, Verifi, Payworks, CardinalCommerce, amongst others)	- Incremental margins in theory in the ~90-100% range, although investment behind innovation, acquisition of technology & services, etc. have kept margin expansion in check (~57% 2010 vs. ~mid-high 60%s today)	- Visa Direct "push payment" expands the existing rails into new market opportunities, beyond C2B and into B2B, G2C, and P2P; Both offense (new payment flows opened up) & defense (race to scale before modern/fast ACH rails gain ubiquity)	- Interchange regulation risk (e.g., Australia, Europe, and the US [debit only] have capped interchange), although little credible evidence to suggest that interchange regulation has resulted in reduced network fees
	- Visa owns CyberSource, an eCommerce gateway connected to ~100 processors in 190+ countries (recently acquired PayWorks for in-store payments and will combine with CyberSource to form a fully integrated solution)	- Relative to Mastercard, Visa is more skewed towards developed markets with 10% larger mix in the US and the majority of Visa Europe volume from the UK, a primary driver of Visa's slower payments volume growth in recent history	- Visa Direct is the engine fueling many existing instant payout options such as P2P (Venmo, Zelle, PayPal), instant disbursements (Square, Worldpay), and bill payment (Paytm, banks in Singapore), but works with all on a white-labeled or partnership basis	- Visa has various in-house incubator environments (e.g., "Fintech Fast-track" program), where it partners with various players in the ecosystem to streamline partnerships for FinTechs (e.g., issuing bank partners, issuer processing services, program managers)	- Visa Direct (and Mastercard Send) as both offense (priced to expand card-able TAM into larger, interchange-sensitive payments) & defense (race to scale before modern/fast ACH rails gain ubiquity)	- CyberSource (and authorize.net) global eCommerce gateway and Payworks (former strategic partner, recently acquired), a provider of next-gen gateway software for in-store POS systems, will allow Visa to offer unified acceptance platform for merchants and acquirers	- Visa Europe yields were initially below those of Mastercard, although a combination of commercial agreements, additional product/service sales, and processing share gains have led to increasing European yields	- Both V & MA have ramped competition in faster payments via non-card assets that can handle B2B cross-border (Earthport acquired by Visa); Earthport will be a fit with Visa's B2B Connect (and is indicative of a willingness to capture non-card flows)	- Visa has the ability to evaluate and potentially reduce expenses in the event of a downturn, providing a degree of protection to EPS (we note that reduced volumes in a downturn also turn into reduced incentives, another balancing factor)	- Visa is working on B2B Connect, and the focus right now is building nodes in 60 countries that Visa has approvals to operate in. B2B Connect will handle the high-value low-volume B2B transactions of large enterprises	- Numerous potential/longer term risks to monitor, but none materializing near-medium term (e.g., regulatory [PSD2], national schemes, Alipay & WeChat [and CUP] expansion, added "super-app" platforms in EM, Amazon and other BigTech efforts, etc.)
	- SRC initiative aims to make the online checkout process more seamless; We expect the merchant acquiring community to support SRC (e.g., higher conversion, potential to capture economics on transactions otherwise lost to alternative methods/wallets)	- Tencent's announcement to allow international card schemes to be added to its mobile wallet for China inbound commerce is a positive for the card networks, along with other super-apps leveraging the global networks for broader/open-loop acceptance	- While Mastercard began earlier (and is advantaged as a result) vs. Visa in partnering with FinTechs (e.g., European Neo banks), Visa has more recently gained ground (e.g., Revolut global expansion partner)	- Visa and its issuer partners have started to roll out contactless cards in the U.S., which we expect to drive transaction growth and possibly be yield accretive longer term (and could compete with mobile tap-and-pay as the next form factor for payment)	- The Earthport acquisition doubles the number of accounts (to 3.5b) that can be reached via the Visa network by connecting Visa to various real-time payments and ACH networks (allowing it to connect directly to bank accounts, including those not connected to Visa network)	- Visa also operates and issuer processing businesses (Visa DPS, which provides services across debit, prepaid, and credit), which Mastercard does not offer	- Gross yields ~34bps vs. net yields ~27bps (with ~22% of gross revenue paid away as incentives); Yields had been higher (~29bps FY 2016) prior to the Visa Europe acquisition, which re-set total company averages in the mid-20%s	- Visa offers a small dividend (which has averages in the ~50bps range over the past years and grown ~20% over the past 5 years)	- Over the long term, we expect Visa to continue to benefit from operating leverage as more transactions run on largely fixed-cost infrastructure (and greater scale overall relative to Mastercard)	- We expect Visa to be an outsized beneficiary (vs. Mastercard) of the contactless rollout in the US given mix differences (45% of volume for Visa sourced in the US vs. 35% for MA, along with a skew to large issuers that are likely to be faster to re-issue contactless cards)	- Blockchain technology is a theoretical threat to the existing 4-party system (although a number of limitations lead us to believe use cases will be niche and outside core C2B over the medium term)

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
MA	◕	●	●	◕	◕	◑	◕	◕	●	◕	◕
	- SRC initiative aims to make the online checkout process more seamless; We expect the merchant acquiring community to support SRC (e.g., higher conversion, potential to capture economics on transactions otherwise lost to alternative methods/wallets)	- Mastercard has greater credit volume mix (~65% for MA vs. 55% for MA) and greater International volume mix (also ~65% for MA vs. 55% for V) relative to Visa; said differently, Mastercard has greater credit and International mix vs. Visa	- Early start (and lead) vs. Visa in partnering with FinTechs (e.g., Neo banks, particularly in Europe/UK, issuing cards as part of their digital banking or other FinTech offerings); although Visa has more recently gained ground (e.g., Revolut global expansion partner)	- New products & innovation via in-house developments (e.g. Mastercard Send, Bill Pay Exchange, Mastercard Track) and acquisitions (e.g. Ethoca, Vyze, Transfast, Vocalink, Transactis, Nets, etc.)	- By definition card issuance capabilities and the global acceptance network enabled by Visa/Mastercard enable their core customers (issuing banks) to earn money (via interchange directly, and via interest earning on outstanding credit balances indirectly)	- Numerous investments to support security (Ethoca, Brighterion, NuData Security), innovation at the POS (Vyze POS financing platform), and additional value-added services (Mastercard Payment Gateway Services, Applied Predictive Technologies)	- Contactless transactions skew lower ticket, implying higher yields (due to "cents per transaction" data processing fees), although we expect a meaningful portion of this increased yield to be paid-away via incentives to help ramp contactless adoption in the US	- Generating ~$6.5b in annual FCF (2019), allowing for consistent bolt-on acquisition (e.g., Transfast, Transactis, Vyze, Brighterion, amongst others) and more meaningful acquisitions (e.g., Vocalink and Nets)	- Incremental margins in theory in the ~90-100% range, but investment behind innovation, acquisitions (e.g., Vocalink, Transfast, Nets, etc.), investment behind services, etc. have kept margin expansion in check (low ~50%s 2010 vs. ~mid-high 50%s today)	- B2B payments, particularly around Mastercard Track Business Payment System (expansion beyond the trade directory and B2B Hub services previously offered under the Mastercard Track brand)	- Interchange regulation risk (e.g., Australia, Europe, and the US [debit only] have capped interchange), although little credible evidence to suggest that interchange regulation has resulted in reduced network fees
	- eCommerce transactions come with meaningfully higher carded rates and represent a channel growing ~4x that of traditional off-line commerce (in-store); further, cross-border eCommerce is growing ~2x that of domestic, an added tailwind from a yield perspective	- Tencent's announcement to allow international card schemes to be added to its mobile wallet for China inbound commerce is a positive for the card networks, along with other super-apps leveraging the global networks for broader/open-loop acceptance	- Mastercard Send in the gig economy (workers preferring to be paid in real time); The service should also continue to see growth in corporate disbursement use cases (payroll, insurance claim) - partners Mastercard Send include Zelle, Google, Facebook, and others	- Mastercard has various in-house incubator environments, such as its Start Path and Accelerate program, which allowed for an early "first mover" advantage with FinTechs relative to Visa	- Mastercard Send (and Visa Direct) as both offense (priced to expand card-able TAM into larger, interchange-sensitive payments) & defense (race to scale before modern/fast ACH rails gain ubiquity)	- Mastercard Track Business Payments Service goes beyond payments rails, enabling rich data exchange, a directory of payments preferences for ~210mm entities, credit rating monitoring, supplier management, and various compliance applications	- New addressable payments volume likely comes at a reduced yield vs. current company average (i.e., B2B, P2P, G2C), with Visa Direct a recent example (lower yield than debit on average, although varies by use case, with the majority of fees priced as cents per transaction)	- During 2019, spent more than $350mm for minority stakes in two (at the time) pre-IPO companies, i.e. Network International & Jumia, and announced the acquisition of assets from Nets for ~$3.2b (largest acquisition on record)	- 2019-2021 guidance calls for "low-teens" revenue, EBIT margins of at least 50%, and an EPS CAGR of "high-teens" (off a $6.49 2018 base); Revenue growth algorithm of PCE (+4-5%) + penetration + services + mix + pricing + share	- While PSD2 is a potential threat, it is also an opportunity in consumer authentication (i.e., could provide a connectivity hub); Mastercard can also provide fraud monitoring services that help FinTechs and banks with compliance, amongst other Services offerings	- Numerous potential/longer term risks to monitor, but none materializing near-medium term (e.g., regulatory [PSD2], national schemes, Alipay & WeChat [and CUP] expansion, added "super-app" platforms in EM, Amazon and other BigTech efforts, etc.)
	- Identity Check (for merchants), which passes ~200 data elements to the issuing bank (vs. 8 data elements for SecureCode), allowing improved issuers risk assessment (resulting in more authorizations, citing +13% increase in approval rates in the early days)	- Mastercard is growing faster than Visa in developing markets like Latin America and Asia; these markets also tend to have a greater portion of cross-border volumes and more attractive underlying cash-to-card opportunities	- Mastercard extended their global agreement with Citi (largest issuer of Mastercard) for additional 5 years through 2029, and will remain Citi's exclusive global partner in consumer credit, debit and small business cards	- Mastercard and its issuer partners have started to roll out contactless cards in the U.S., which we expect to drive transaction growth and possibly be yield accretive longer term (and could compete with mobile tap-and-pay as the next form factor for payment)	- Transfast acquisition will help Mastercard increase worldwide reach in the account-to-account space (covers more than 125 countries with a proprietary network consisting of direct integration with 300+ banks)	- Mastercard's Bill Pay Exchange allows banks to offer a multi-rail bill-pay service to its underlying customers (with bills paid via ACH, card, real-time payments, etc.); currently ~135k billers with plans to expand meaningfully (supported by the Transactis)	- Gross yields ~50bps vs. net yields ~35bps (with ~33% of gross revenue paid away as incentives), with net pricing generally up ~3-7% over the past four years	- Mastercard offers a small dividend (which has averages in the ~50bps range over the past year and grown ~20-30% over the past 5 years)	- Mastercard has the ability to evaluate and potentially reduced expenses in the event of a downturn, providing a degree of protection to EPS (we note that reduced volumes in a downturn also turn into reduced incentives, another balancing factor)	- To the extent Mastercard is able to migrate clients and credential users to beyond just card payment and card services (e.g. new payment flows, new payment services, beyond payment services), MA will further the moat around its ecosystem	- Blockchain technology is a theoretical threat to the existing 4-party system (although a number of limitations lead us to believe use cases will be niche and outside core C2B over the medium term)

Source: Company reports, Credit Suisse research

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
FIS	◕	◕	◕	◑	◕	◕	◑	◕	◑	◕	◑
	- Leading eCommerce acquiring platform, accepting 300+ payment methods across, ~150 countries and serving 1mm+ merchants	- Combined company ~70% of revenue US-based (FIS was ~75% US, WP was ~67% US), with FIS local presence in Brazil, India, and certain parts of Asia to accelerate Worldpay EM-expansion	- Direct salesforce of 3k+ (local market presence), supported by relationships with 14k financial institutions (including 45 of the top 50 global institutions) and the ISV business partnerships (1k+ partners, 3k+ integrations)	- Early pioneer in integrated payments (bolstered by Vantiv's Mercury acquisition in 2014), with 3k+ integrations, taking a predominantly partnered approach (vs. hybrid partner + owned software approach used by Global Payments)	- Long-term, privileged relationships ~1.2k core banking customers in the US empowers FIS' to capture a majority of client wallet share and supports differentiation potential with increased access to underlying consumer account data	- Core bank technology business drives annual wallet share gains via additional product sales (e.g., laying on additional risk products, digital, payments, billing, etc.; 34 additional non-core products per bank at FIS vs. 16 at FISV)	- Legacy FIS offerings (e.g., core account processing) generally associated with long term contracts (~4-5 years) that include annual pricing escalators	- Transformative deal acquiring Worldpay increases organic growth profile from ~4% to ~6% immediately, with potential upside in the ~8-9% range (over a 3-year period) via cross-sell, revenue synergies, and mix shifts to faster growth areas	- Expectation for ~500bps of EBITDA margin expansion over a 3-year period as an output of the revenue and cost synergy program (~$500mm revenue, $400mm operating costs, along with another $100mm in non-operating, interest expense savings)	- Expansion of Worldpay's acquiring (and in particular, eCommerce) business into Brazil, India, and other EM where FIS has a local presence, relationships, knowledge, etc.	- Modern banking core and ancillary technology competitors emerging, with potential to take small portions of incremental share/growth, although di minimis concern near-medium term
	- Local acquiring in ~58 countries, allowing for reduced costs (for those on interchange ++ and for merchants with an entity in the foreign country) and improved authorization rates	- Global eCommerce acquiring allows for serving multi-nationals (e.g., Apple, Google, Expedia) and to benefit from merchants consolidating relationships to fewer, global providers (vs. ~10+ including regional players)	- Long-term, privileged relationships with ~1.2k core banking customers in the US combined with FIS' "mass enablement" cloud-based distribution for outsourced customers facilitates cross-sell efforts of ancillary services	- FIS Core on Demand allows financial institutions to quickly and cost-effectively launch a direct-to-consumer digital bank in as little as 90 days	- Legacy Worldpay's strong integrated payments business reduces churn and facilitates cross-sell of additional services (with similar ambitions to increased software revenue like Square)	- FIS sells core processing to financial institutions, then upsells ancillary services/products such as digital solutions (back office automation), fraud/risk mgmt, EFT & network services, issuer processing, bill-pay, corporate liquidity, etc.	- Legacy Worldpay Merchant Solutions business (~15% of FIS revenues) has meaningful exposure to US big box retail (low yield, low growth, albeit a unit that provides meaningful scale benefits to the overall platform) and slower growth UK retail	- Leverage somewhat elevated at ~3.5x post-deal, but with clear view toward getting back to targeted ~2.7x after 12-18 months (enabling future M&A and share buybacks)	- Legacy FIS data center consolidation (~$250mm run-rate savings, now just ~15 data centers vs. 53 in 2015) along with legacy WP/VNTV cost synergy efforts ($250mm program) that was ahead of schedule at time of FIS-WP deal	- Increased data (FIS issuer processing & banking relationships) to aid in increasing authorization rates (management expects ~200bps potential increase, from mid-80%s to high 80%s)	Consolidation trend of small banks (negative 4% CAGR, albeit with overall assets and accounts growing), potentially compounded by "barbell" pressures (large bank IT budgets at one end, FinTech challenge banks at the other)
	- Building repositories of data (via FIS financial institution data, along with Worldpay existing data) should enable differentiated eCommerce authorization rates (aiming toward ~2-5% better than the eComm global average of ~85%)	- In addition to each pre-merger company's global reach, the combined co. should see revenue synergies, by cross-selling merchant acquiring and core processing businesses into geographies where clients are not overlapping	- Worldpay became the first acquirer to partner with Amazon, adding the Amazon Pay button into its payments options (prior, merchants would have had to directly integrate with Amazon Pay, but now can simply enable via Worldpay)	- 80%+ of digital applications delivered via private cloud, allowing FIS to guarantee availability/downtime of less than 15 minutes (vs. industry standard ~24+ hours)	- Legacy Worldpay's eCommerce acquiring offering lacks direct consumer relationships via unbranded online checkout capabilities, leading to lower yield's relative to acquirers with consumer networks (e.g., PayPal, Square)	- Unique loyalty redemption program ("loyalty-as-a-currency"), with roots at gas stations, and recently expanded to retail and restaurants (with further expansion ahead via the Worldpay merchant relationships)	- Due to the overhaul required to upgrade/switch core processing systems (time, dollars, training of staff, etc.), banks rarely make full core transitions (we estimate ~1-2% turnover annually)	- Legacy FIS strategy also includes divestitures of non-core business, demonstrating this discipline with the sales of various solutions/geos (e.g., SunGard Public Sector, SunGard K-12 Education, CAPCO, Kingstar)	- Both legacy FIS and WP business characterized as high fixed-cost, high recurring revenue (e.g., ~80% combined across IFS, GFS in legacy FIS), high incremental margin businesses (ex-investment for future growth)	- Potential for a more meaningful contribution from B2B payments over time (combining Paymetric, which was acquired by Vantiv [Worldpay] in 2017, with FIS cash management and treasury services)	- Modern competitors in acquiring (Adyen, Stripe, Square) and issuer processing (Marqeta) gaining greater scale; unlikely to disrupt core business near-term, but on the margins takes away a portion of would-be growth opportunities

Source: Company reports, Credit Suisse estimates

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
FISV	◕	◕	◕	◑	◕	◕	◑	◕	◑	◑	◑
	- Underappreciated eCommerce business, operating with 50+ countries with 250+ payments methods accepted (including local license that allow for reduced interchange and improved authorization rates all else equal)	- Combined company ~85% of revenue North American-based (FISV was ~95% North America, while FDC was ~78%), with First Data having exposure to high-growth Latam and APAC regions	- First Data acquiring JVs with large banks (e.g., Citi, Wells Fargo, PNC, with BAMS terminating June 2020) along with ~1500 referral/distribution partners (e.g., TD Bank, SunTrust, KeyBank, BBVA Compass, etc.)	- Dedicated $500mm innovation investment pool (funded by $900mm in cost synergies), aimed at digital enablement, advanced risk management, eCommerce, next-gen merchant solutions, and data-focused solutions	- Long-term, privileged relationships ~4.5k bank customers in the US empowers Fiserv to capture a majority of client wallet share and supports differentiation potential with increased access to underlying consumer bank account data	- Bank technology business drives annual wallet share gains via additional product sales (e.g., laying on additional risk products, digital, payments, billing, etc.; 16 additional non-core products per bank at FISV vs. 34 at FIS)	- Fiserv traditional offerings (e.g., core account processing) generally associated with long term contracts (~4-5 years) that include annual pricing escalators (CPI-based and/or linked to CPI, although at times negotiable alongside rest of contract)	- Transformative deal acquiring First Data produces a platform with unrivaled scale within the broader Payments, Processors, & FinTech segment, with pro-forma revenues approaching ~$15b (vs. FIS-WP ~$13b)	- Guided to $900mm in annual run-rate cost savings (~$700mm technology and duplicative corporate costs) and $500mm in revenue synergies (including $200mm from merchant acquiring distribution enhancements) over a 5-year period	- More nascent, but fast growing ISV channel (via CardConnect & BluePay acquisitions); adding ~20 ISV partners per month, with $5b volumes & $50mm revenue (~100bps net take rate pre-commissions) as of 2018 investor day	- Modern competitors in acquiring (Adyen, Stripe, Square) and issuer processing (Marqeta) gaining greater scale; unlikely to disrupt core business near-term, but on the margin takes away a portion of would-be growth opportunities
	- Domestic acquiring in ~50 countries (last disclosed at First Data's 2016 investor day), allowing for reduced costs (for those on interchange ++ and for merchants with an entity in the foreign country) and improved authorization rates	- Dovetail (payments platform for allowing banks to handle various ACH, real-time, and wire-based money movement) has the potential to increase distribution more globally via First Data financial institution relationships	- Long-term, privileged relationships with ~4.5k core banking customers in the US facilitates cross-sell efforts of ancillary services (banking and now merchant acquiring)	- Clover POS platform combining hardware, software (including app-store populated by 3P developers), Clover Capital, etc.; $70b+ payment volume +45% in 2018 (vs. Square ~$85b, +30%); Expanding digital signup via clover.com and bank partner sites	- Clover's expansive integrated payments and business software ecosystem reduces churn and facilitates cross-sell of additional services	- Fiserv has many incremental "add-on" services it can offer banking clients, such as risk management, bill pay, wealth management, loan servicing, and others, allowing for opportunities to cross-sell and upsell its existing core banking clients	- Due to the overhaul required to upgrade/switch core processing systems (time, dollars, training of staff, etc.), banks rarely make full core transitions (we estimate ~1-2% turnover annually)	- Leverage at ~3.9x, with an aim toward returning to historical levels ~2.5x ~18-24 months post close (deal all stock, but took on $17b FDC debt); Share repurchase program not terminated (but suspended majority of 2019)	- Both Fiserv and First Data characterized as high fixed-cost, recurring revenue, and incremental margin businesses (ex-investment for future growth); although topline growth profile has been in the L-MSD, reducing ability to realize full benefits	- First Data acquiring business in Latin America has been achieving strong growth 2016 - 2018, with markets such as Brazil, Argentina, and others recently opening up their acquiring markets, supported by lower card penetration levels	- Announced its JV with BAMS would dissolve in June 2020, with clients being split according to the JV ownership (51% for First Data), noting minimal short-term impacts (and reduced BAMS-specific costs), but longer term EPS dilution
	- Potential for data residing within Fiserv's DDA base to better inform risk engines (i.e., improved authorization rates and reduced fraud, which is of particular importance in eCommerce acquiring)	- Argentinian acquiring opportunity expanded in 2019 with initial opening of the market, with PRISMA exclusivity for Visa fully ending 2022 (First Data ~44% POS share, but just ~15% acquiring share, a gap we expect to narrow)	- Clover POS distribution enhanced by digital onboarding initiatives in addition to referral partners and a direct website - is expected to contribute meaningfully to revenue synergies ($200mm+ via cross-selling into Fiserv's banking clients)	- Leader in P2P enablement for bank customers, via both Popmoney (Fiserv-owned account-to-account P2P capability) and Zelle implementations; acquired CashEdge in 2012 to accelerate P2P capabilities	- Portion of volumes are related to back-end processing only (e.g., PayPal, Stripe, JVs) where yields are lower and pricing considered to be more commoditized	- First Data brings the 3rd largest debit network in the US (STAR), which could be combined with Accel (Fiserv-owned) to form a more formidable competitor for debit volumes (PIN, PINless, and signature)	- Banking technology contracts (core account processing, issuer processing, etc.) tend to come with termination fees (often triggered by consolidation, i.e., ~4% CAGR for depository institutions in the US, although still ~10k+ remain)	- Combined company to generate ~$3.6b in pro-forma FCF (2018 including run-rate synergies), allowing for both debt pay down and continued M&A (technology assets would be preferred, e.g., Clover-like deals)	- Both legacy Fiserv and First Data business characterized as high fixed-cost, high recurring revenue, high incremental margin businesses (ex-investment for future growth)	- Fiserv traditionally skewed more toward smaller banks (community banks, credit unions) vs. FIS with greater exposure to larger banks (relationships with 45 top 50). Potential to move up-market, supported recent wins (e.g., NY Community Bank, $50b assets)	- Modern banking core and ancillary technology competitors emerging, with potential to take small portions of incremental share/growth, although di minimis concern near-medium term

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
FLT	◔	◕	◕	◕	◕	◑	◕	●	◕	◕	◕
	- Roughly 40-50% of sales come via or are originated from a digital channel (vs. 10 years ago 100% was via a direct salesforce); digital provides leads to salesforce	- The US makes up ~60% of revenue, with Brazil (~16%) and UK (~11%) the next largest exposures; Brazilian business is the Tolls segment (and "Beyond Toll")	- FleetCor's best-in-class distribution (SMB segment) is a key differentiator, helping the company build and scale new businesses, driving its 24% revenue CAGR from 2010-2018	- Beyond Fuel expands the use case of a traditional fuel card (e.g., supplies, maintenance, materials, etc.), while still providing analytics, cost controls, etc.	- Owning the network (closed loop) makes for direct contracting and relationships with accepting merchants (e.g., fuel stations, supply shops, etc.)	- Across all business units, a common theme, regardless of payment method or type, is to add software/services that help the client control spend, reporting, compliance, analytics, etc.	- Relatively high-degree of pricing power by serving SMBs with limited pricing leverage in niche payments markets (e.g., core Fuel segment >50% smaller fleets)	- FleetCor has acquired 75+ companies since 2002, having shaped FleetCor into the diversified B2B payments company it is today	-Fixed costs make up about 60% of the cost structure (when including corporate costs)	- Beyond fuel initiative in the US, already contributing ~100bps of growth with the potential to persist and/or increase over the coming 4-8 quarters	- Credit risk exists, but is minimal (i.e., bad debt runs in the 6-7bps of billed revenue); As purchasing capabilities expand in the core fuel card business ("beyond fuel"), focus is on existing customers where they are comfortable with creditworthiness
	- eCommerce enabled booking of hotels within the Lodging segment (recently refreshed the brand and mobile experience), with total segment contributing ~7-8% of revenue	- High relative exposure to fast growing, underpenetrated international fuel card markets (~33% of segment revenue) compared to WEX (~10% of Fleet segment revenue)	- Partnerships core to strategy, with emphasis on expanding the corporate payments business (e.g., AvidXchange, Bill.com), cross-selling opportunities, and geographic expansion (e.g., oil outsourcing portfolios)	- Built a differentiated corporate payments over ~5 years with an unmatched, comprehensive suite of products (domestic and international AP/AR) on all major payment rails	- Sem Parar tags are attached to automobile and essentially "on" whenever the car is in transit (for use at gas stations, parking lots, McDonald's and soon-to-be other fast-food outlets)	Beyond Fuel increases client wallet share from existing fleet customers by capturing spend in new areas related to business expenses (e.g., supplies, maintenance, materials, etc.)	- Owning the network (closed loop) means FleetCor is not subject to V/MA rules, and allows for their own contracts and terms with merchants (vs. taking interchange levels set by V/MA)	- Strategy focus M&A around tuck-in acquisitions, new categories of spend, and additional geographies (aim is to deploy $1b per year in M&A, further penetrating existing markets or entering new ones)	- Inherently higher fixed cost structure allows for continued margin expansion, although somewhat tempered by consistent M&A integration and re-investment for organic growth	- Beyond toll initiatives in Brazil (car rental, fast food, parking, gas stations), leveraging installed base of 5mm tag holders, and building the network effect/utility for existing tag holders and merchants	- Long-tailed risk related to Electronic Vehicles (EV), although one where FLT could adapt and/or provide management services across mixed fleets (consolidating spend, reporting, analytics, etc.)
	- In FleetCor's full AP automation efforts, the digital channel is used to drive traffic and set up appointments rather than closing deals	- FleetCor's mix (less US, less OTR) supported a more healthy SSS result vs. WEX (e.g., Q3 2019), in part due to strength in Mexico, Russia, Australia, etc. (Note: FLT vs. WEX SSS are not like-for-like, but even absent corporate, lodging, etc., FLT underlying trends are stronger)	- Operates as the partner (card processor) with many customers in Corporate Payments, although goes direct to merchants via Nvoicepay (full AP automation software); creates a degree of optical channel conflict	- Beyond Tolls, scaling a new vehicle tag-based payments network in Brazil with new use cases (fast-food, parking, fuel, car rentals, and car wash) with quick consumer adoption and partner interest to participate (e.g., McDonald's approached FleetCor)	- FleetCor's direct (and indirect) relationships with customers across all business units affords its best-in-class distribution capabilities	- Beyond toll initiatives in Brazil (car rental, fast food, parking, gas stations), leveraging installed base of 5mm tag holders, and building the network effect/utility for existing tag holders and merchants	- Purchasing power ($1.4b) within lodging segment allows for hotel discounts for members of the network, further bolstered by Travelliance (~25%+ boost to segment revenue, immediate revenue synergy of ~$10mm via virtual cards)	- Near-term (virtual card migration within Nvoicepay) and longer-term (opportunity to house all B2B assets under Nvoicepay) benefits from the 2019 acquisition, along with ongoing growth from prior deals (Comdata and Cambridge)	- The natural ~200-300bps of margin expansion accompanied by ~10% organic revenue growth can be higher or lower depending on M&A (i.e., integration costs and/or lower margins initially vs. synergies and increasing margins longer term)	- Addition of Nvoicepay opens the door for a full-service, full AP file corporate payments business, encompassing all payments types (virtual card, ACH, check, cross-border, etc.) via a cloud-based platform	- Two revenue sources are sensitive to fuel prices, discount revenue related to fuel (~14%) and revenue tied to fuel spreads (~5%) for a combined exposure to fuel of ~20%

Source: Company reports, Credit Suisse research

	Growth & Share Gains			Differentiation				Financial		Additional Factors	
	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
WEX											
	- Online travel virtual cards business (~15% of revenue), an underlying market generally growing at GDP+ along with gains in online penetration; leader in OTA virtual card business	- Mainly US-based business (i.e., less FX exposure), but also has business in Australia, Canada, New Zealand, Brazil (beginning to lap headwinds), and within Europe	- Contracts with 9 of the 10 major oil companies in the US (recently won Chevron from FleetCor); More recently announced Valero, which begins to contribute revenue Q2 2020	- Essentially created the virtual card market in the online travel industry, and has been deploying the tech/approach for ~20 years with its OTA clients (leader in the market)	- Fuel card controls and analytics crucial to daily operations and cost avoidance of Fleet segment customers (including EFS SecureFuel, Driver-Dash, and ClearView analytics)	- New digital fleet products contributing to contract wins (Chevron) and gaining wide adoption from customers (Clearview Snap analytics at 6k customers, Driver Dash pilot with large merchant)	- Relatively high-degree of pricing power by serving SMBs customers in niche payments markets (e.g., core Fuel segment ~50% smaller fleets), typically underserved by traditional banks (i.e., some banks lacking focus or expertise)	- Longer term revenue growth target is +10-15%, with an expectation of +8-12% organic growth (with the remaining 200-700bps via acquisitions)	- Longer term adjusted EPS target of +15-20% (vs. revenue of +10-15%) implies a degree of margin expansion (given buy backs are not a key component of cash deployments)	- Further expansion in the large B2B corporate payments market (less than 10% of revenues today) via continued M&A, partnerships, and a potential move further up-market (current focus is more SMB); potential to add cross-border capabilities longer term	- Long-tailed risk related to Electronic Vehicles (EV), although one where WEX could adapt and/or provide management services across mixed fleets (consolidating spend, reporting, analytics, etc.)
	- Online dashboard and analytics available to Fleet solutions customers (ClearView Analytics & Reporting), which contributed to recent success with Chevron and Shell	- Lower relative exposure to fast growing, underpenetrated international fuel card markets (~10% of Fleet segment revenue) compared to FleetCor (~33% of Fleet segment revenue)	- Go-to-market in all businesses typically involves both a direct approach (salesforce) and a partnership approach, which necessitates a degree of proactive channel management to avoid conflicts	- New digital fleet products contributing to contract wins (Chevron) and gaining wide adoption from customers (Clearview Snap analytics at 6k customers, Driver Dash pilot with large merchant)	- Direct relationship with over 28mm consumers on the WEX Health Cloud platform (mobile app and desktop)	- WEX Telematics for real-time vehicle conditions, fleet performance and GPS tracking	- Owning the network (closed loop) means WEX is not subject to V/MA rules, and allows for their own contracts and terms with merchants (vs. taking interchange levels set by V/MA)	- M&A has helped to drive fuel price senility down (~35% of our revenue non-Fleet, ~20% impacted by fuel prices vs. ~70% revenue exposed to fuel prices at time of IPO/2005)	- Inherently higher fixed cost structure allows for continued margin expansion, although somewhat tempered by consistent M&A integration and re-investment for organic growth	- Potential to expand card usage categories (MCC expansion), allowing a subset of core fuel card holders to spend in adjacent categories of business purchases (e.g., supplies, maintenance, etc.)	- ~20-25% of WEX revenue is sensitive to the price of fuel (every $0.10 move in fuel prices impacts revenue by about $14-$15mm, or ~$0.20 in EPS)
	- Suite of HSA-related online and mobile-based spend management tools (e.g., product eligibility check) for underlying consumers	- Does not hedge currency risk, but acknowledges that if the ex-US business were to increase in size they could consider changing course (i.e., investing in hedges)	- Digital distribution investments in marketing tools supporting growth in Fleet business (particularly in harder to reach smaller fleets)	- WEX Health Cloud (mobile app and desktop) provides a comprehensive consumer solution for managing healthcare related accounts and expenses	-WEX has benefited from attrition rates that have generally been at the low end of industry range (~3% overall, vs. FleetCor at ~8%)	- WEX Bank allows for lower cost of capital, issuing capabilities, etc.; WEX Bank is an Industrial Loan Company (ILC)	- Product innovation across all three segments supports pricing power	- Leverage target of 2.5x - 3.5x, but willing to take above these levels for right acquisition (i.e., through a lens of diversifying away from fuel price sensitivity, growth, de-risk, or technology that can reduce costs/in-source functions)	- Fuel sensitivity either creates (higher fuel prices) or eliminates (lower fuel prices) high incremental margin revenue (i.e., close to zero added cost for incremental transaction, but interchange impacted by fuel price)	- Potential to win fuel card portfolio outsourcing deals with European oil companies (still managed in-house)	- WEX Bank adds a degree of regulatory oversight (primary regulators are Utah DFI and the FDIC)

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WU	◐	◕	◕	◔	◐	◐	◐	◔	◐	◐	◐
	- Online platform (westernunion.com) comprises ~13% of C2C revenues. Economics (currently) similar to retail at the gross profit level, but lower overall due to marketing, technology infrastructure (although there should be tech cost leverage over time)	- 200 plus countries/territories, 71 of which have outbound capabilities, serving 20k distinct corridors overall, a near ubiquitous operation	- Amazon partnership in certain EM countries will allow customers that normally would not have access to Amazon due to the currency they transact in, or the country they live in, to pay local currency via WU retail locations	- Ability to expand further into offering platform capabilities (leveraging scale, compliance, licenses, local knowledge, etc.), serving as a cross-border arm for many 3rd party platforms	- ~70%+ exclusive agent locations (e.g., US, Eastern Europe, but not regions like Middle East and Russia), with agent locations in 200+ countries	- White-labeling of the platform (leverage of fixed cost, compliance, licenses, knowledge, etc.). Western Union does not intend to pursue becoming a bank itself, but partnering with banks (albeit with reduced/shared economics) can provides access to an expanded TAM	- Pricing pressures vary by corridor - and given WU's breadth, there will always be corridors with pricing power (i.e., where WU is one of just a few providers) and others that are more competitive (where consumers are migrating to online - e.g., AsiaPac)	- Leverage ~2.4x (debt/EBITDA), with sufficient cash to do a tuck-in acquisition or potentially take on additional debt for a larger deal	- Scaled platform with EBITDA margins ~25% vs mid-high teens for Ria & Intermex, although with a relatively high fixed cost structure (~40% fixed in nature), WU would see ~100-150bps margin expansion on ~MSD revenue growth (vs. flat to LSD in recent past)	- We believe Western Union has ample opportunity for additional integrations/ partnerships with FinTechs, further leveraging its platform (fixed costs) and its ubiquity on a global basis (e.g. Sberbank, STC)	- Competitive industry, particularly with smaller players tending to be more willing to discount, select incumbents gaining share on a regional basis (i.e., Intermex in Mexico, ~7% in 2014 to ~18%, now second to WU), and FinTechs offering disruptive tech & pricing
	- High quality mobile applications extend the TAM to banked customers, allowing for transfers using bank accounts (account-based), debit card, credit card, and other local-payment methods (although more competitive online vs. FinTechs)	- Majority of volume is sent via North America and the EU & CIS regions (~70% in Q3 2019). US is the largest outbound remittance market by more than 2x ($71b), with Saudi Arabia ($33b) as the second largest	- White labeling with universities, banks, NGO's, non-profits, & others to facilitate cross-border transactions - can take numerous forms, e.g.., C2B payment (tuition), C2C payment (banking transactions), B2B payment (NGO's), etc.	- WU Connect initiative - integrate WU cross-border technology into digital platforms allowing for P2P transfer via card or bank account, and allows connection into social media and consumer messaging platforms	- Agent locations are often large retailers (e.g., 7-11, Walgreens, Albertsons, Dollar General) providing frequent touchpoints in high traffic retailers	- Still has some ability to increase send-market penetration (i.e., 71 countries outbound vs. 200 total); Management has communicated it intends to push for growth into additional send markets (although limited volume opportunity)	- Recently (Q2 2019) took meaningful (~10-15%) price increases on US domestic P2P (and following revenue going from ~10% of C2C in 2014 to 7% in 2018), helping to offset (short term) reduced volumes due to low cost (or free) offerings (e.g., Venmo, Cash App, PayPal)	- Attractive set of local asset (licenses, knowledge, infrastructure) for a potential large cap technology platform interested in expanding further into financial services (e.g., Ant Financial attempted to purchase MGI at ~11x EBITDA in 2017)	- WU Way initiative (completed in 2018) resulted in ~$70mm in cost savings (although largely re-invested in compliance, online, etc.); more recent savings initiative is targeting $150mm run-rate savings (including ~10% reduced headcount)	- WU partners and integrates with numerous businesses operating in different verticals (NGO, Bank, universities, etc.), and has the ability to increase penetration in these verticals, and the possibility to expand into additional verticals	- Threat of past and ongoing litigation impacting operations, have a past joint case settled in 2017 for $586mm (that has also spurred multiple class action lawsuits due to admission of guilt) and ongoing cases, pose significant legal threats to business operations
	- Mobile application install base 15mm+ and downloads have grown at a ~90% CAGR 2015-2018	- State and country-based licenses, knowledge of local rules & regulations, and even banking licenses in certain European countries (e.g., Ireland). Money transmitter licenses can be time consuming and in certain countries challenging to obtain	- Greater number of agent locations than the competition (550k vs. 370k for MGI, <6k for IMXI); 10% of WU's send agents (~55k) are located in the US; Top 40 agents have been with WU for an average of 20 years	- Implementation of dynamic pricing methods (from previous static, wholesale), able to utilize customer transaction data to adjust prices based on city, location density, day of the week, time of day, and customer service preference	- Multiple avenues for end-consumer interactions including agent locations, white-labelled products, mobile application, C2B payments, and bill-pay services	- Bill-pay services for consumers, allowing for handling of bill payments (e.g., utility, car, mortgage, electricity, etc.) either online, in person, or by phone	- Pricing pressure exists in certain corridors due to increased availability (and more scaled) offerings from FinTech platforms (e.g., Transferwise, Remitly), but has maintained industry leading take rates (gross and net of ~5.1% and 2.8% respectively), albeit in part due to mix	- WU has not been active in M&A recently (last two acquisitions were $25mm or less, in 2017 and 2014), other than the divestiture of two businesses in 2019 (Speedpay and Paymap)	- Compliance spend has increased at a ~12% CAGR since 2012 (and doubled from $100mm to $200mm); these costs are largely fixed in nature, and thus could contribute to margin upside in combination with MSD revenue growth	- Through WU Way and other cost cutting initiatives (announced at Investor Day) the company has committed to cutting overhead to bolster industry leading EBITDA margins (~$150mm annual savings going forward)	- Regulations around money-transfer: 1) Bank Secrecy Act regulated by FINCEN (KYC/AML); 2) Dodd-Frank regulated CFPB (disclosures); 3) additional requirements related ID (transactions over $3k), fraud prevention/ detection, etc.

Source: Company reports, Credit Suisse research

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	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
IMXI	◔	◑	◕	◑	◕	◑	◑	◑	◑	◕	◑
	- Predominantly an offline, in-store business, particularly given the focus on Mexico and Guatemalan markets (higher portion of under-banked consumers)	- Focused on the largest (~$33b in 2018 volumes vs. industry of ~$690b) and most profitable (~$5 gross profit per order) corridor in the industry, which is US into Mexico. Taking market share from incumbents in this corridor (~40% of incremental growth)	- Approximately ~6k sending agent locations in the US, selected based on location (high concentration of foreign born consumers) and ability to provide customer service	- On-site the remittance network accessed through an installed, Windows-based application (vs. a web-based interface); means less data loads per transaction (given the interface is local), resulting in faster speeds (~10-20 seconds vs. competitors > 1+ minutes)	- Source of revenue generation for sending agents both on a direct (commission levels competitive, i.e., ~64% of transaction fees vs. WU ~44% of total revenues) and indirect basis (driver of traffic into retail location)	- Launched a GPR / payroll card in 2019, with distribution through the company's 32 owned store locations (ability to offer lower fees vs. Green Dot, Netspend, etc. due to indirect monetization via additional Intermex wires)	- Intermex mix shift optically reduces overall profitability (any mix shift away from US -> Mexico is likely to be margin dilutive), though like-for-like pricing trends have been relatively stable (comments from both IMXI and WU management)	- Roughly neutral net debt position with ~$94mm in cash on balance sheet and ~$96mm in debt, providing flexibility to increase leverage to acquire and/or invest	- EBITDA margins guided to ~flattish over the near-medium term as mix shift to lower gross margin business (Africa, Canada, El Salvador, Honduras, CA/TX as send states) to be offset by non-transaction expense leverage (despite investment in new markets, GPR card, etc.)	- Growth states, where Intermex has ~10% share (vs. ~25-30% in more established, stronghold states), with growth rates that have been ~1.5x that of the core stronghold states (which also continue to growth above market rates)	- Generally a competitive industry, particularly around smaller competitors tending to be more willing to discount to attempt share gains (making maintaining a premium service integral to maintaining share)
	- Offers online & mobile transfers, although this makes up a di minimis portion of the business (if and when the demographic group served begins to desire an online product, Intermex will have available, albeit comes with added CAC)	- Receive capabilities in 17 Latin American countries and 4 African. Volume drivers are Mexico and Guatemala, but generally focused on highest volume corridors in any region (Nigeria is 90% of Sub-Saharan Africa volume)	- Does not attempt to gain ubiquity in terms of agent locations; focused approach provides for quality customer experience (interview agents, credit worthiness, provide with faster technology, etc.), with agents 4x as productive as industry average	- Emphasis on "time to live" in customer service, i.e., getting a live customer service representative fast, helping to decrease cancellation rates (currently stand at less than 1%, well below industry averages of ~mid-single digits %)	- Agent locations based in convenient, densely populated (foreign born) areas within targeted neighborhoods, with new agent locations driving ~half of growth (vs. ~half SSS)	- Began partnering with employers in Q3 2019 (working to bring workers to the US from Mexico and sponsor their visas); beneficial to the employer (reduce paper check cost) and the employee (saves check-cashing fees)	- Industry wide pricing compression more concentrated in online transactions, which typically appeal to banked customer sets and corridors (e.g., US -> India, where online would be a higher portion of the mix for highly skilled workers in the US)	- Prior to 2012, acquired Servimex, Americana, and Maniflo to extend their footprint to additional states (but has not made any acquisitions since)	- Focused approach allows for reduced overhead (vs. being in ~200 countries with a larger fixed cost base to maintain licenses, compliance, etc. in those markets); allows for additional focus and expertise on the customer, compliance, regulations of core markets	- Africa inbound (~$9-10b volume TAM, similar to Guatemala) and Canada outbound (~roughly the size of Texas) - both launched during 2019, with Canada enabling additional inbound markets due to its diversity (many equally split send geographies internationally)	- Any real or perceived threat related to taxation of remittances (i.e., into Mexico and Guatemala) at a national level, along with any efforts by states to introduce taxation (e.g., Oklahoma currently has a tax, Tennessee and Georgia have laws being proposed)
	- Mobile application only launched in July 2019 with ~4k downloads 1st four months (vs. WU had 1mm+ over the same period), partially explained by underbanked mix, but a trend to watch as underbanked get increasing access to financial services	- Targeted approach to send locations in the US through highly dense Latin-born population states / neighborhoods. In a similar light, key "growth" states have been identified (CA, TX, UT, AZ, etc.) for targeted expansion into highly dense foreign populated areas in those states	- Bank partner white labeling expands reach into banked customers (more typically users of online, where CAC is high - but not a concern in a white-label deal); typically ~$2-$3 net per wire (not too dissimilar from ex-Mexico/Guatemala wires)	- Sizable amount of capex investment ("millions of dollars on capex for our technology") in and also maintenance of highly operational call centers (1 in Mexico, 1 in Guatemala); supports ~8-second answer time (live service) operating extended hours (until midnight)	- GPR / payroll card increases stickiness of customer relationship (i.e., increased engagement, more daily usage when used as primary card/account), in addition to the Interpuntos loyalty program (drives ~1/3rd of volumes)	- Interpuntos loyalty program (began 2014) allows customers to earn points for transacting with Intermex. Points can be redeemed for discounted fees. Program members transact 3x non-members, with 85% of cards actively transacting	- Continued share gains (e.g., historically ~40-50%+ of volume growth in Mexico and Guatemala, and impressive but lower ~30-40% YTD 2019) supportive of the brand and potential leverage with customers and/or agents (i.e., traffic driver for retail locations)	- Public company with equity as a currency for M&A increases choice in deal funding relative its previous private status	- Agent startup cost synergies from expansion / increased focus into geographies that have agent overlap (both send & receive side). On the send side, agent start-up costs are ~$2.5k per location, and take 2-3 years to ramp (which can be avoided using existing agents)	- White labelling of the platform, leveraging additional capacity and expanding reach (i.e., into a more banked consumer base, via bank partnerships); large bank partner established with ~3.5mm Guatemalan customers in the US	- Regulations around money-transfer: 1) Bank Secrecy Act regulated by FINCEN (KYC/AML); 2) Dodd-Frank regulated CFPB (disclosures); 3) additional requirements related ID (transactions over $3k), fraud prevention/ detection, etc.

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RPAY	●	◔	◕	◕	◑	◑	◑	●	◕	◕	◑
	- Focus on digital and/or ease of interaction (e.g., mobile, online, text message, voice) to simplify and shorten the process of making loan payments for consumers, using proprietary technology	- REPAY is a US focused business (close to ~100% of revenue pre 2019 in the US), with direct sales and ISV relationships with SMB's in certain niche verticals	-Roughly 50% of REPAY's business comes from ISV partnerships, where the ISV (software providers) integrates REPAY payments solutions into their software offerings	- Bringing debit card acceptance to markets that are dominated by checks & ACH, with debit cards making up just 12%, 40%, and 41% of payment volumes within the personal loans, auto loans, & receivables management verticals, respectively	- Consumer-friendly payment channels provided by REPAY allow for an accelerated payment cycle (and thus, the merchant has increased ability to lend more/faster)	- Back-end processing capabilities acquired through TriSource (formerly a partner, now insourced), which will serve to decrease processing costs (i.e., removal of margin paid to TriSource, largely fixed cost base of platform); also maintains non REPAY client base	- REPAY typically pays away ~11% of net revenue to ISV partners (ISV commission), which is meaningfully lower than other integrated payments verticals, where ISV commissions can be in the ~20-70%+ of net revenue range	- Plans to grow both organically and via acquisition, either on additional capabilities (e.g., back-end processing acquired via TriSource), penetration into existing markets, or expansion into new verticals; TriSource improves margin profile by bringing costs in-house	- Automotive loan take rates are ~10-15bps lower vs. other REPAY verticals, mostly due to higher principal (i.e., car payments tend to be higher vs. personal loans or receivables payments), but volumes are growing faster (~+400 bps vs. other REPAY verticals)	- New vertical expansion focus around healthcare (where REPAY has already gained some traction, but not reported separately), specifically Revenue Cycle Management (RCM) which manages billing for healthcare providers and practitioners; TAM is ~$100bn in volumes	- Risk that ISV partners (that make up ~50% of the business) push for a larger revenue share (i.e., paid as a percentage of net revenue, typically defined as MDR less interchange, network fees, & possibly other costs) as competitors approach ISV partners over time
	- REPAY's gateway is its own proprietary technology built on the cloud, and provides added functionality for merchants (e.g., tokenization/ security boost, recurring billing, account billing, reporting, web hooks, PCI DSS compliance, card vault, etc.)	- Entered Canada market in 2019, given existing overlap between certain receivables merchants that were already clients in the US; partnered with Visa to accelerate debit acceptance in Canada, along with use of Visa Direct (for instant funding)	- Another roughly 50% of the business is sourced via REPAY's direct sales channel. Merchants approached by the direct sales team tend to be larger ($1-$5mm+ monthly volume) and could operate their own in-house software (vs. working with an ISV)	- Provides tokenization of payments, transferring data protection risk (a liability) away from the merchant by providing_Payment Card Industry Security Standards Council (PCI DSS) compliance for the merchants	- REPAY fully underwrites each of its merchants, operating as an Independent Sales Organization (ISO); prefer to risk manage in-house, given their indirect liability to the merchant bank through facilitating CNP transactions	- Sales support team staffed to aid in the merchant onboarding process, helping to simplify and guide through the merchant application and initial set-up processes	- REPAY, over time, could see increasing pressure on ISV commission levels (although not experienced to date), as merchants in their verticals are approached with more attractive revenue share agreements from competitors	- Made four significant acquisitions since 2016 (e.g., Sigma ~$6mm in auto loans, Paymaxx ~$34mm in auto loans, PaidSuite ~$5mm in consumer receivables, and TriSource ~$65mm in back-end processing)	- Gross margin expansion ahead as front-end processing & bank sponsor fees are likely renegotiated lower, along with TriSource related leverage on back-end processing	- Credit Union (CU) vertical (recently announced integration with Jack Henry's Symitar platform), with a focus on credit union auto lending, solving a need, particularly in non-member lending where payment collection is more difficult	- Longer term risk that some ISVs (mostly larger ISVs) consider the PayFac model (PayFacs own more responsibilities, and keep a greater share of economics); lower risk in REPAY verticals given merchant onboarding complexity in lending
	- Proprietary underwriting software for onboarding merchants (although final onboarding decision made by acquiring bank partner, given REPAY operates as an ISO, not a PayFac), along with monitoring for early indications of financial difficulties	- REPAY operates in niche verticals in two countries (US, Canada) and is currently integrated into five verticals (receivables, personal loans, and auto loans, and more recently Healthcare and B2B) vs. Global Payments operating in ~70 verticals and ~100+ countries	- Recently signed partnership with Jack Henry's Symitar offering (allows the JKHY customers using Symitar to access/use RPAY in a more seamless, integrated way), targeting expansion to the Credit Union vertical	- Differentiated payments technology, with a gateway that can be leveraged cross-vertical, and software additions specifically tailored by vertical to meet industry specific needs for merchants and ISV partners	- The payments solution integrates into merchants' ERP system (either home grown via an ISV), reducing complexity for merchants (integrated into loan/deal management systems, reduced manual check-cashing, etc.)	- REPAY has the ability to move further into parallel verticals, offering the same type of enhanced payment services (with potential additions targeted in healthcare, credit union auto loans, and B2B payments)	- Any mix shift toward ACH (vs. debit) could optically pressure pricing (as a percentage of volumes) given only di minimis "cents per transaction" fees earned when customers pay via ACH (currently ~1-2% of revenue)	- Tri-Source has bolstered M&A synergy possibilities given its back-end processing capabilities (that REPAY did not have previously); ~$50mm in cash and ~$200mm in debt capacity to pursue smaller acquisition targets in the near term	- Operating leverage inherent in core platform (as is typical in the merchant acquiring industry, i.e., high incremental margins), which forms a base that can be modified to fit clients specific needs	- B2B payments is a new vertical of focus for REPAY, in which REPAY is focused on accounting software partnerships (e.g., platforms like Sage Intacct) and on A/R (payments acceptance); with first steps to expansion kick-started by the recent acquisition of APS for $60mm)	- Any increased competition from larger payments platforms (e.g., ACI (including Speedpay, acquired via WU), Billing Tree, Global Payments, and others) - which has been historically lower given larger players typically do not process payments for lending merchants

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	eCommerce & Software exposure	Geographic Mix & Scale	Partnerships & Distribution	Product & Innovation	Proximity to Customer	Additional Services	Pricing Power	Benfitting from M&A/Cash	Operating Leverage	Emerging Areas of Upside	Threats (Competitive, Regulatory)
VRRM	◔	◑	◕	◕	◕	◑	◕	◕	◑	◑	◑
	- While rental cars are commonly booked online (53% in the US, 44% in Europe), the add-on purchase of the tolling product is largely done in-person at the rental car location (not a discrete add-on option on most rental car websites)	- Business is predominantly US, outside the of the recently acquired EPC and Pagatelia businesses in Europe (we expect European business to grow over time as tolling business begins to monetize)	- Unlikely that other competitors (none are yet to exist on a nationwide basis - with a fully outsourced management program for RAC) would be able to do the one-by-one legwork required	- Core tolling product in and of itself is an innovation past the traditional processes, and required (requires) detailed, one-by-one, working with and integrating to various tolling authorities (meaningful barrier to entry)	- Deeply integrated into the operations of tolling authorities and core RAC customers (in terms of infrastructure, program management, employee training, customer service, billing & reconciliation, etc.)	- Title and registration services provided to existing RAC and FMC customers (through acquisition of Sunshine) which allows bulk processing of registration on a fully outsourced basis	- Only nationwide provider for the core tolling product (i.e., meaningful barriers to entry given decade long efforts to integrate with various state-based tolling authorities), but customer acquisition is provided by RACs (car rentals), so pricing upside is capped to an extent	- M&A has been (Sunshine for title & registration) and will be used to provide added services to existing customers, in part due to an "ask" from these customers, along with other deals that add optionality (smart tech related to connected cars, autonomous driving, etc.)	- Lower margin (~35-40%, relative to Commercial at 60%+) Government business has a higher fixed cost structure (e.g., people costs related to analyzing camera data, incidence reports, etc.); currently working against VRRM given Texas business loss	- Tolling in Europe, with the EPC and Pagatelia acquisitions overall (tolling & violations in Europe) representing a $350mm revenue TAM opportunity (vs. $440mm of 2019 revenue for VRMM as a whole)	- Downward pressure/sentiment around red light cameras (e.g., Texas, Miami recent revenue headwinds); 21 states have photo enforcement vs. upside around school zone speed (e.g., Georgia, NYC) and work zone speeding (e.g., Pennsylvania)
	- To the extent the Peasy system gains traction, this is a mobile-first platform that can be used both in mobile phones or in other mobile OS (e.g., OEM in-dash OS)	- Within Europe, France, Spain, and Portugal make up the bulk of the opportunity, and are all operated by a single tolling authority located in France (France is the single largest tolling country in Europe)	- Long term contacts with the three large RAC companies in the US (Avis Budget Group, Enterprise, Hertz), although this brings meaningful customer concentration (~80%+ of Commercial revenues)	- Peasy example by innovating off the core tolling platform (leveraging the assets built for the RAC and FMC customer base, and repurposing the technology and connectivity to tolling authorities in the form of a consumer product)	- Acts as a partner in helping government and law enforcement clients promote public safety (e.g., in school zones, at bus stops, in work zones), with potential for additional surveillance camera usage (e.g., for detectives)	- Government Solutions segment includes the installation of cameras for any camera-programs (either traditional where VRRM owns the camera, or in New York where VRRM actually sells - product revenue - the camera, but still handles the installation)	- Revenue generator for partners in both businesses, i.e., RAC earn a revenue share from deploying VRMM tolling products and government/law enforcement citations	- Leverage at ~2.9x (vs. no formal target), but a combination of EBITDA growth and debt pay down should bring debt down below covenant at 3.2x (i.e., must pay 25% of Adj. FCF if above 3.2x, 50% if leverage is above 3.7x)	- Higher mix of variable costs (lower fixed costs) in the high margin (60%+ EBITDA margin) Commercial business, although could be somewhat pressured (or at least margin expansion limited) due to investment required to build a business in Europe	- Peasy consumer tolling, mobile app-based coverage across most toll roads in the US (opportunity to add white labeled additional services to the app, and also to white label the core Peasy service into 3rd party apps - e.g. OEMs infotainment systems)	- Redflex competitor in red light business (Government segment) plans to transition efforts/assets from red light cameras to traffic congestion (provides a near-term share gain opportunity in red light business, although a negative market signal)
	- After acquiring their title & registration business in 2016 (streamlining vehicle registration and tracking for customers - including RACs), software integrations into the DMVs themselves were required for matching cars to registrations	- Additional European upside would come from a second leg of tolling & violations penetration (i.e., into the Nordic countries)	- Agreed to a partnership with Arrive (branded and white-label tool for parking, i.e., identifying, booking, paying for parking spots)	- Adapting focus, with more of an emphasis on "purpose-built speed enforcement" with specific use cases such as school zone speeding, bus stop arm cameras, and work zone speed enforcement	- Aligned with government clients' safety goal, with a combination of fixed (dollars per month per camera, regardless of activity) and variable (revenue share per citation or dollar amount per citation) contracts; uses data to model the variable contracts to maturity	- Additional business such as ATS Live (real-time visual intelligence and post incidence analysis for law enforcement) and ATS Street Safe (handheld speeding cameras equipped with mobile citation issuance)	- Recent strength has been a combination of volume (i.e., number of billable days, number of tolling activities) vs. price / mix shift (e.g. shift to leisure, over corporate travel driving increases) with wholesale pricing done on a longer term contractual basis	- Recently hired Mike McMillin as VP of Corporate Development and Strategy to build out a larger and more formal acquisition funnel and screening process	- Leveraging a decade of "heavy lifting" for the core US business, now beginning to add focus on bolt-on M&A (hiring of VP of Corporate Development and Strategy), new markets (Europe), and other new areas/call options (Peasy, ATS Live, ATS Street Safe, etc.)	- Congestion pricing (more common in Europe), and likely becoming a service that VRRM will be able to support (more of a ~5-10 year opportunity); US opportunities in Philadelphia, NYC, Washington DC, and others	- Highway tolling is regulated on a state level, and certain states will never approve expansion of tolling (negative sentiment, not enough volume to generate $). Expansion of toll roads or building new toll roads can take years and is subject to govt bureaucracy

Source: Company reports, Credit Suisse research

1. Credit Suisse Equity Strategy
US recession indicators

Start of Recession	Yield Curve	Mfg.	Inflation	Jobs	Housing Activity	Credit Perform	Earnings
Nov-73	↓	↓	↓	↓	↓	--	↓
Jan-80	↓	↓	↓	↓	↓	--	↓
Jul-81	↓	↓	↑	↑	↓	--	↓
Jul-90	↓	↓	↓	↓	↓	↓	↓
Mar-01	↓	↓	↓	↓	↔	↓	↓
Dec-07	↓	↓	↓	↔	↓	↓	↓
Present	↔	↓	↑	↑	↑	↑	↔

Key: ↓ Recessionary ↑ Expansionary ↔ Neutral

A collection of noteworthy insights and callouts

Industry and company-specific items that stand out

Item	Callout of note
1	Square guided margins down ~200bps YoY (like-for-like ex-Caviar) due to incremental marketing spend (~$37.5m via advertising, sales personnel, hardware discounts) and operational expense associated with the new Oakland office (~$50mm). On February 7th, Square pricing for Instant Deposit (Instant Transfer) for sellers will increase by 50bps. On $20b in volumes (aligned with our estimate), this change alone would equate to ~$100mm in high margin revenue.
2	Stripe has become a much more meaningful competitor, for both SMB and larger multi-nationals (now ~40 countries of local acquiring, 25+ unique forms of payment acceptance [aiming toward 50 in 2020], 100+ payout countries by 2020). Payments volume has reached "hundreds of billions", headcount is at ~2.5k, and valuation most recently $35b – all indicative of a more scaled competitor. Our industry discussions suggest that Stripe has been appearing in and winning more RFPs, armed with its more fulsome global capabilities, ease of integration, and access via a single API. Innovation cadence resulting in numerous new offerings (e.g., Stripe Issuing, Stripe Corporate Cards, chargeback protection, Stripe Capital, Stripe Terminal for omnichannel merchants, etc.). Leading marketplaces offering in Stripe Connect.
3	WEX called out ~550bps of revenue growth benefit to the Fleet segment from its Chevron and Shell wins during Q2 2019, with the programs ramping more fully in Q3 2019 (approaching their ~$60-70mm annual run-rate). At ~$15-17mm per quarter, these two programs are driving ~600-700bps of growth (for a segment growing high-single digits). This laps in Q2 2020, and the Valero contract will make up for a portion of this (~200bps worth).
4	Global Payments has local acquiring capabilities in 58 countries, with on the ground local expertise (in-store acquiring) in 33 countries (which we expect to head toward 38 countries over the medium term) – this serves as a competitive advantage in winning the business of multi-nationals (e.g., recently awarded Citi contract). Worldpay has similar local acquiring capabilities from an eCommerce perspective, but currently process in-store for domestic merchants in a more limited number of countries (US, UK, Canada, Brazil, and a few other European markets). We expect Worldpay to meaningfully expand its in-store acquiring presence globally, a revenue synergy not included in stated targets (meaningful given ~90% of commerce remains in-store).
5	Cash App's average revenue per user (ARPU) is at least ~3x higher than Venmo's despite having around ~80% overlap in monetization sources (e.g., card interchange and instant transfer using Visa Direct or Mastercard Send). In our view, this clearly demonstrates that Cash App's users are using the app more as a banking alternative vs. ~60-65% of Venmo's users only currently only using the App for P2P (non-monetized), aligned with Cash App's feature set (e.g., direct deposit). In our view, this is largely because of PayPal's dependence on banks for gaining share in their large global eCommerce TAM and the conflict of interest of turning Venmo into a competing Neobank. We also learned the gross margin on push payments is very high for both services at current prices (1.5% of Cash App and 1% for Venmo), likely in the 60-80% range depending on the transaction size. This is supported by PayPal mentioning that their version of Instant Deposit for P2P yielded a "nice margin" at a $0.25 fixed fee.

Source: FactSet, the BLOOMBERG PROFESSIONAL™ service, Credit Suisse research

What do we like in a payments stock?

Large TAM + share gains/mix + unit economics + “call options”

We prefer companies that show	We do not prefer companies with
▪ Aforementioned sector-specific factors such as meaningful exposure and/or best-in-class capabilities in Software-led payments, eCommerce payments, and/or SMB exposure ▪ Large total addressable markets (of which almost all payments companies have, by definition) ▪ Unit or volume share gains, either currently or expected over the near to medium term (either due to lack of competition or a more attractive/sticky offering relative to competitors) ▪ Unit economics, either via stable pricing (and high incremental margins) or mildly reduced pricing (i.e., tiered volume discounts) successfully driving growth ▪ “Call options” or areas of upside not properly valued or understood by the market (e.g., new business, new product launch, partnership potential) ▪ Management teams with strong track records of meeting and/or exceeding guidance and expectations ▪ Valuation that is reasonable on a growth-persistence-adjusted basis (typically expressed by a ~2- to 3-year forward CAGRs)	▪ Lesser exposure or upside related to software and/or eCommerce-based growth ▪ Decreasing unit or volume share metrics, either currently or expected over the medium term (either due to increasing competition, elevated customer attrition, or a less relevant offering vs. alternatives) ▪ Deteriorating unit economics, either due to pricing pressure or an elevated need to invest in customer acquisition, particularly when competitors with willfully lower margins are willing to drive up CAC in key channels ▪ Lack of new business and/or product launch cadence (i.e., lower levels of innovation) ▪ Less consistency in meeting targets and expectations ▪ Valuation that appears stretched relative to expectations for growth persistence

Source: Credit Suisse research

Credit Suisse Payments Innovation Event Series
Upcoming events

Date	Event and Description
February 7th	**Neocova CEO & Co-founder Conference Call** – next-gen core banking platform (first AI-based, API driven platform designed specifically to support banks and credit unions)
February 10th	**Brad Greene (former Visa, former MindBody, experience overseeing merchant acquirer RFPs, etc.) Dinner – San Francisco** – discussion ranging from the intersection of payments + software, merchant acquiring, and the card networks (night before Visa's investor day) – co-hosted with Moshe Orenbuch, Credit Suisse Consumer Specialty Finance Analyst
March 13th	**Glenbrook Partners Expert Conference Call - "Demystifying Faster Payments"** – discussion around Real Time Payments by The Clearing House, traditional ACH, debit cards, use cases, and economics – co-hosted with Moshe Orenbuch, Credit Suisse Consumer Specialty Finance Analyst
TBD	**Finix Payments dinner – San Francisco** - platform reducing time & costs for SaaS businesses, ISVs, and marketplaces bringing payments in-house – i.e., ISV transition to Payment Facilitator
March 24th	**PayFi CEO Dinner (including former member of The Federal Reserve Faster Payments Task Force) – New York** – provides processors, banks, & mobile providers the ability to make instant or real-time payments between accounts - co-hosted with Moshe Orenbuch, Credit Suisse Consumer Specialty Finance Analyst
March 26th	**Payrix CEO dinner – New York** – technology platform for ISVs and Payment Facilitators – i.e., ISV transition to Payments Facilitator - co-hosted with Brad Zelnick, Credit Suisse Software Analyst
April 3rd	**Paragon Payments CEO Conference Call** – discussion on trends in the integrated payments/merchant acquiring market, competition, etc.; CEO founded and sold Element to Vantiv in 2013
TBD	**Ingo Money CEO Dinner – New York** - Ingo Money enables businesses, banks, and government agencies to instantly disburse safe-to-spend funds to almost any debit, credit or online wallet account (~4.5b accounts). INGO is a SaaS platform that employs a multi-rail approach, including its own proprietary/direct connections into networks along with numerous other rails and/or partners to reach accounts (Visa Direct, Mastercard Send, STAR, Pulse, PayPal, American Express, Amazon, Real-time Payments by The Clearing House, Zelle, ACH, etc.), with 26 different options in total - co-hosted with Moshe Orenbuch, Credit Suisse Consumer Specialty Finance Analyst
May 6th	**3rd Annual Credit Suisse FinTech Conference – New York** - co-hosted with Moshe Orenbuch, Credit Suisse Consumer Specialty Finance Analyst
November 30th – December 3rd	**24th Annual Credit Suisse Technology Conference - Arizona**

Source: Company reports, Credit Suisse

Companies Mentioned *(Price as of 17-Jan-2020)*

ACI Worldwide Inc (ACIW.OQ, $37.3)
Adyen (ADYEN.AS, €777.8)
Amazon com Inc. (AMZN.OQ, $1864.72)
Bank of America Corp. (BAC.N, $34.71)
Bill.Com Hldg (BILL.N, $43.7)
Bottomline Tech (EPAY.OQ, $54.05)
Citigroup Inc. (C.N, $81.12)
EVO Payments (EVOP.OQ, $28.385)
Euronet Worldwid (EEFT.OQ, $164.31)
Facebook Inc. (FB.OQ, $222.14)
Fidelity National Information Services Inc (FIS.N, $147.09)
Fiserv (FISV.OQ, $120.68)
FleetCor Technologies, Inc. (FLT.N, $310.04)
Global Payments (GPN.N, $198.62)
Green Dot Corporation (GDOT.N, $26.4)
International Money Express (IMXI.OQ, $12.26)
JPMorgan Chase & Co. (JPM.N, $138.2)
Jack Henry & Associates (JKHY.OQ, $149.47)
Macy's Inc. (M.N, $17.57)
MasterCard Inc. (MA.N, $323.66)
MoneyGram International Inc (MGI.OQ, $2.65)
PayPal Hldg (PYPL.OQ, $116.04)
Q2 Holdings (QTWO.N, $87.7)
Repay Holdings (RPAY.OQ, $15.97)
Square (SQ.N, $69.38)
Uber (UBER.N, $35.13)
Verra Mobility (VRRM.OQ, $15.25)
Visa Inc. (V.N, $204.7)
WEX (WEX.N, $225.89)
Walmart Inc. (WMT.N, $114.96)
Wells Fargo & Company (WFC.N, $49.18)
Western Union (WU.N, $27.77)

Disclosure Appendix

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