

Payment Processing

Payments Market Share Handbook Sixth Edition

This report is a primer and overview of the payment processing and services ecosystem, summarizing the latest market share, growth and penetration trends for card-based payments worldwide. Specifically, the report includes:

- An overview of the payment processing services ecosystem and industry participants (i.e., who are the players and what services do they provide?) – a market sized by McKinsey to be at \$900B in revenues.
- A look at the payment processing and services value chain and economic model of various sub-sectors, including fund flow diagrams of card-based payment transaction.
- A look at historical volume growth trends and penetration measures for domestic and international card markets, highlighting (1) solid mid-to-high single-digit growth ahead in the more mature U.S. market, and (2) faster double-digit growth overseas fueled by low penetration rates for many years to come. We believe processors must expand overseas and embrace new distribution channels (like integrated payments) to sustain growth. Nationalism, or the desire for local banks and regulators to reduce dependency on the U.S. networks by overseeing their own payment schemes, remains the biggest risk to the industry's addressable market, in our view, aside from regulation.
- An analysis of the international "green field" opportunity, focusing on international markets that most resemble the U.S. (from a GDP per capita perspective) and the spread between mature and emerging market card-based penetration rates. We identified about a dozen key international countries that we think are the most immediate cash conversion opportunity.
- Market share breakdown of the payment networks, domestic acquirers, domestic credit and debit, domestic PIN-debit, prepaid, POS terminal providers and key issuers.
- A look at MasterCard and Visa's purchase volume by product and region.

Computer Services & IT Consulting

Tien-tsin Huang, CFA ^{AC}

(1-212) 622-6632

tien-tsin.huang@jpmorgan.com

Bloomberg JPMA HUANG <GO>

J.P. Morgan Securities LLC

Reginald L. Smith, CFA

(1-212) 622-6743

reginald.l.smith@jpmorgan.com

J.P. Morgan Securities LLC

Puneet Jain

(1-212) 622-1436

puneet.x.jain@jpmorgan.com

J.P. Morgan Securities LLC

Stephanie Davis, CFA

(1-212) 622-6591

stephanie.j.davis@jpmorgan.com

J.P. Morgan Securities LLC

Pankti Gandhi

(91-22) 6157 4110

pankti.b.gandhi@jpmorgan.com

J.P. Morgan India Private Limited

Specialty & Consumer Finance**Richard Shane**

(1-415) 315-6701

richard.b.shane@jpmorgan.com

J.P. Morgan Securities LLC

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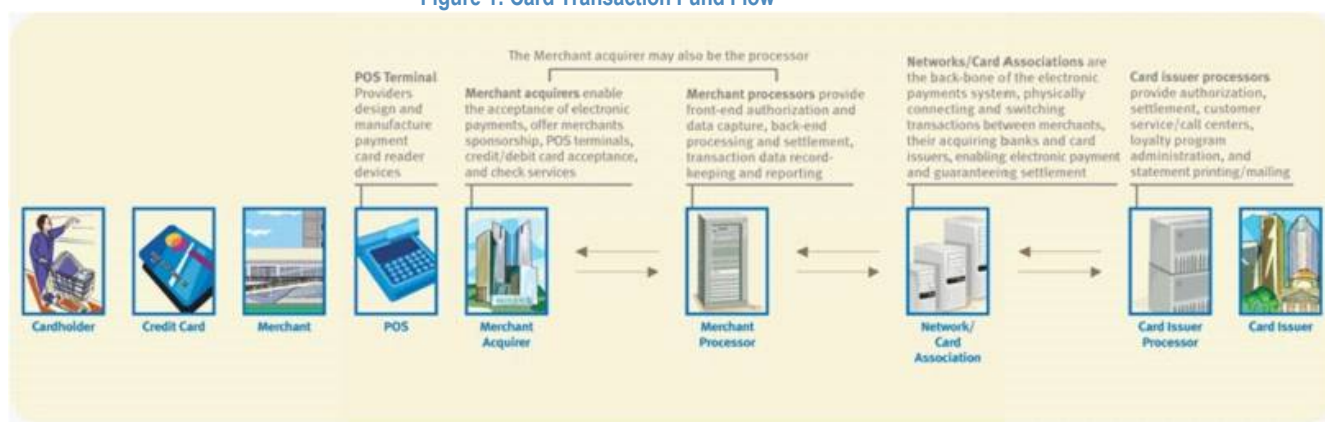
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Payment Services Overview

The payment processing and services industry provides the infrastructure and services that facilitate and enable electronic payments. Key industry participants include merchant acquirers and processors, payment networks, card issuer processors, card issuers, point-of-sale (POS) terminal manufacturers and gateway providers. The industry is characterized by recurring revenues, high operating leverage and robust free cash flow generation, driven by the continuing secular shift from paper to electronic forms of payment.

Figure 1: Card Transaction Fund Flow



Source: J.P. Morgan.

Industry Players

Merchant Acquirers

Merchant Acquirers are the “distribution and sales” arm of the payments industry. Acquirers sign merchants to card acceptance agreements and are typically the merchant’s first (and primary) point of contact, contracting directly with the merchant. Acquirers earn a gross “discount rate” of roughly 200bps of the sale amount, most of which is remitted to the card network and ultimately the card issuer as interchange income. Net acquiring revenues (net spread after subtracting interchange and payment network fees) are a fixed transaction fee (for larger merchants) and/or a percentage of the sale amount (for smaller merchants) and the amount of spread earned (by merchant acquirers) is inversely correlated with the size of the merchant. Publicly traded merchant acquirers include Global Payments, Heartland Payment Systems and Vantiv. Several large acquirers are owned by banks like Chase Paymentech, Bank of America Merchant Services and Elavon (U.S. Bank).

Merchant acquirers come in various forms and sizes, including bank subsidiaries, bank joint ventures, unaffiliated/independent direct sales firms, independent sales organizations (ISOs), VARs, etc. See **Table 31** for a list of the top 10 merchant acquirers in the U.S. **We note the top 10 merchant acquirers capture 79% of card-based purchase volume.**

Acquiring Is All About Distribution and Scale

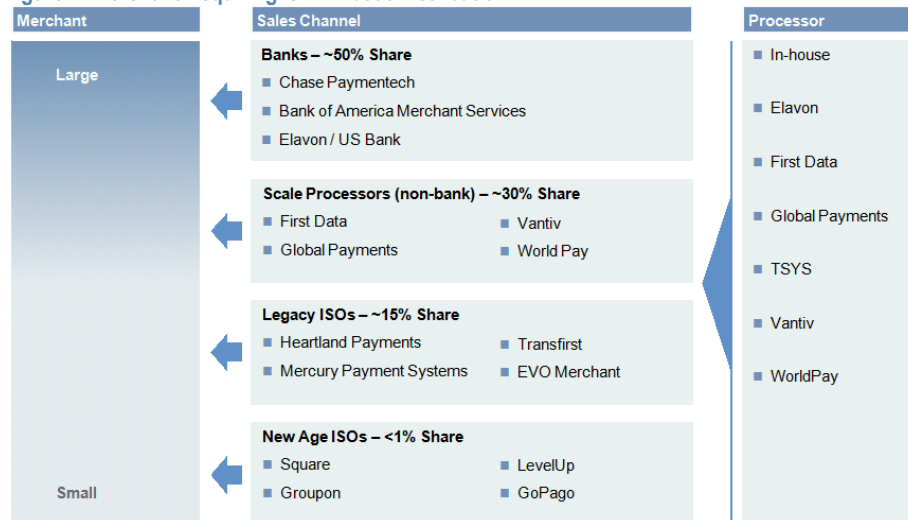
Merchant acquiring is differentiated by sales approach, as there are many channels to access the fragmented merchant market. Key sales channels include banks, non-bank

For market share summaries of key industry players, see Appendix

The terms “merchant acquirer” and “merchant processor” are often used synonymously, but they are in fact two distinct functions which, in some cases, are provided by the same entity, but can be provided by separate entities.

scale processors and ISOs. It is common for large retail banks (e.g., Wells Fargo, Citi, Bank of America, etc.) to have joint venture merchant acquiring partnerships with large processors. The joint venture structure allows banks to leverage/monetize their extensive branch network and small business banking/treasury relationships to reach and up-sell merchant acquiring contracts without the hassle or cost of building their own payment processing infrastructure. Bank acquirers claim about 53% of the market, demonstrating the strong sales reach a bank can provide. However, non-bank entities are growing faster, because they take a more proactive approach in adding merchants through feet on the street or via indirect sales channels like ISOs. Aggressive ISOs with a hungry commission-based sales structure can grow merchant bases upwards of 10-20+%. Visa lists over 3,700 registered ISOs as of April 20, 2015.

Figure 2: Merchant Acquiring is All About Distribution



Source: Company reports and J.P. Morgan estimates.

Integrated POS

There has been an increased focus on integrated POS, an area we are bullish on, as merchants are increasingly demanding (and benefiting from) IPOS systems, due to a number of trends, including (1) decreasing costs, (2) demand for more payment options, (3) specialized industry specific software embedded in such systems, (4) new security standards and (5) the proliferation of tablets. The winning distribution model for small and mid-sized merchants has shifted from “feet-on-the-street” sales to technology-led sales, evidenced by recent consolidation in space—GPN and VNTV have collectively spent over \$2.6bn in integrated payments acquisitions in the last two years (GPN buying PayPros, APT; Vantiv buying Element, Mercury).

Merchant Processors

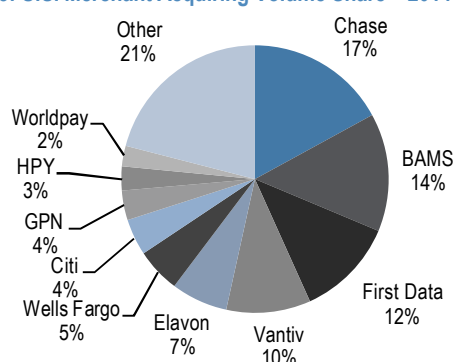
Merchant processors are the gateway to the payment networks, providing authorization, data transmission, data security and settlement functions as an outsourced service to merchant acquirers. Processing is a scale driven business, with only a handful of large players, and is often an outsourced service utilized by merchant acquirers. In other words, merchant processing is a cost of goods sold for merchant acquirers. Scale processors include: First Data, TSYS and Global Payments. Processors typically earn a flat fee per transaction processed and source their transactions from their own sales force, bank partners, VARs, and/or from

independent sales organizations (ISOs) who outsource their network gateway and processing/settlement needs.

Merchant Acquirers and Merchant Processors Not the Same Thing, But Can Be the Same Entity

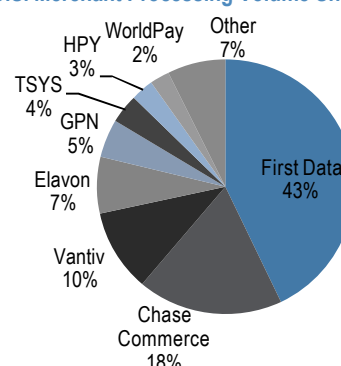
The terms “merchant acquirer” and “merchant processor” are often used synonymously, but they are in fact two distinct functions which, in some cases, are provided by the same entity, but can be provided by separate entities (see **Figure 3** and **Figure 4** below). The top three merchant processors ranked by volume are First Data, Chase Commerce Solutions and Vantiv.

Figure 3: U.S. Merchant Acquiring Volume Share – 2014



Source: The Nilson Report.

Figure 4: U.S. Merchant Processing Volume Share – 2014



Source: The Nilson Report, Company reports and J.P. Morgan estimates.

Table 1: Top U.S. Merchant Acquirers and Respective Processors- 2014

Acquirer	Bank Card Volume (\$bn)	Market Share	Processor
Chase Commerce Solutions	617	17%	In-house
Bank of America (BAMS)	518	14%	First Data
First Data	433	12%	First Data
Vantiv	370	10%	Vantiv
Elavon (U.S. Bank)	249	7%	In-house
Wells Fargo Merchant Services	193	5%	First Data
Citi Merchant Services	162	4%	First Data
Global Payments	130	4%	Global Payments
Heartland Payment Systems	104	3%	Heartland Payment Systems
Worldpay	90	2%	WorldPay/RBS

Source: Company reports and J.P. Morgan estimates.

Payment Networks

Payment networks are the backbone of the electronic payments system, connecting and switching transactions between acquiring banks and issuing banks, enabling electronic payment authorization, clearing and settlement. Network providers govern interchange rates for their respective issuers, set rules and compete on the basis of merchant acceptance, reliability, price and additional value-added services. Network operators earn transactional fees based on the number of transactions processed and in some cases a licensing or assessment fee based on the notional purchase amount. Notable network providers include: Visa, MasterCard, American Express, Discover/PULSE, Interlink (Visa), NYCE (FIS), Accel (FISV), UnionPay (China), Interac (Canada) and STAR (First Data).

Card Issuer Processors

Issuer processors provide outsourced authorization, settlement, customer service/call centers, loyalty program administration and statement printing and mailing services to the card issuing community. Notable players include: TSYS, First Data, FIS and Vantiv. Issuer processors have historically earned a nominal monthly service fee (per active account) from the card issuer, and in many cases a transaction fee, but can also sign licensing agreements with the largest card issuers interested in running this function in-house.

Card Issuers

Card issuers market card-based products to consumers, generating transaction fees (e.g. interchange), nuisance fees (e.g. late fees) and net interest margin in the case of revolving cards. U.S. card issuers earn interchange, ~180bps of the purchase amount for credit card transactions and ~23bps of the purchase amount for regulated debit transactions in the U.S. Card issuers typically pay the network a negotiated transaction fee and a royalty fee based on the purchase amount, which together run about 5bps to 10bps (JPM estimate) in the U.S.

Other Payment Service Providers

POS Terminal Providers

POS terminal providers design and manufacture payment card reader devices and systems. The industry has experienced consolidation over the past two years. VeriFone and Ingenico are the two scale global providers, holding ~49% global market share. Historically, terminal providers earned “one-time” hardware revenues from the sale of systems to acquirers, merchants and distributors, but terminal providers are increasingly branching out into service and maintenance areas (e.g., gateway management, data encryption, etc.), allowing them to earn recurring revenues. The real estate at the merchant is valuable, and highly complex, and terminal providers are increasingly looking to monetize this position. Moreover, replacement cycles are shrinking as security (e.g. EMV) and new technologies emerge. As such, new entrants leveraging mobile and tablet technology are attempting to disrupt the market, but must overcome significant compliance and distribution challenges.

Gateway Providers

Gateways are the digital equivalents of physical terminals and serve to capture transactions at the point-of-sale, translate transactions to the proper message format and distribute to the designated network. Gateway providers include retail gateways that connect e-commerce transactions to merchant acquirers, and also wholesale gateways that interface between merchants of record and merchant processors. Example gateways include Cybersource (Visa), adyen, Authorize.net, 2Checkout, PayPal, Intuit, GlobalCollect (Ingenico), and Stripe.

Increasing Focus on Security

The Payment Industry Moving to Close Security Gaps

According to The Nilson Report Data, thieves exploit vulnerabilities in the current payments ecosystem, to the tune of \$11bn in payment card fraud losses annually (roughly 5bps of total payment card volume). Most fraud losses are a result of stolen payment card information, which is later used to clone cards or make purchases online.

See Figure 29 on page 34 for
summary market share of POS
terminals

To address risks inherent in the current payment processing flows the leading payment networks are promoting a gradual migration to EMV, chip-enabled payment card technology, and the use of payment tokens and encryption.

Today, issuers largely absorb the cost of counterfeit fraud, but beginning October 2015 liability for domestic and cross-border counterfeit POS transactions will shift to whatever party hasn't adopted EMV, meaning retailers could be on the hook for fraud liability if they don't deploy EMV terminals.

EMV Technology and Protocol

EMV is a global standard for credit and debit payment cards and acceptance devices based on chip card technologies. EMV chip-embedded payment cards support dynamic authentication where as data on magnetic strips is static. Data from traditional magnetic stripe cards can be easily copied (skimmed) with fairly inexpensive card reading devices to produce counterfeit cards. EMV cards have issuer-specific keys and store payment information in a secure chip (rather than on a magnetic stripe), making it extremely hard and expensive to counterfeit.

Unfortunately, EMV is not a "silver bullet" solution, as it does little to prevent card data from being captured, stored and reproduced in card-not-present environments (where a cardholder typically has to key in their account number and CVV code). Fraud has migrated to card-not-present channels in regions where EMV has been adopted. Payment card tokenization, which substitutes payment card information with a random string of numbers, and payment data encryption, which scrambles payment card information, begins to address these gaps inherent in EMV while reducing the financial impact of a data breach and a merchant's PCI compliance cost.

Tokenization and Encryption Necessary to Supplement EMV

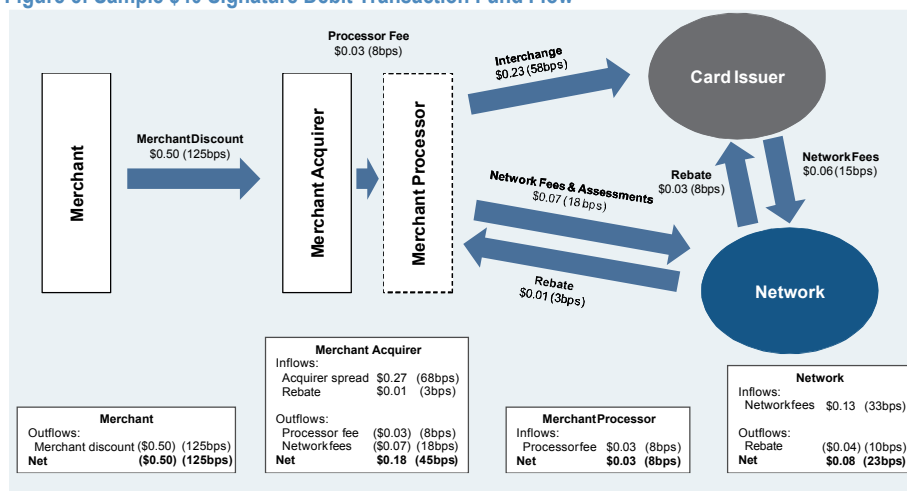
To combat the risk of higher online fraud, the industry is promoting tokenization to reinvent (and remove) the card number. A token is a randomly generated value used to replace sensitive information. Payment card tokenization protects card/account data by substituting the 13 to 19 digit number embossed on a payment card and encoded on its magnetic stripe, with a unique, randomly generated sequence of numbers or alphanumeric characters.

Encryption algorithms, on the other hand, encode plain text into a non-readable format that can only be decoded with specialized hardware operated by the upstream processor or the merchant's own IT organization. Encryption essentially scrambles payment card data, rendering it worthless to a fraudster. In our view, payment data encryption (both the PAN and other track data) is easiest and single most important measure a merchant can take to protect cardholder information, while also lessening the potential impact of a data breach.

Payment Processing Economics

Below, we summarize how each of the key payment players generate revenues.

Figure 5: Sample \$40 Signature Debit Transaction Fund Flow



Source: The Federal Reserve Board, J.P. Morgan estimates.

Note: Illustrative example.

Merchant Acquirer and Processor Economics

The merchant pays its merchant acquirer a discount (merchant discount rate or MDR) on all card-based transactions, which varies depending on several factors (e.g., merchant size, card present/not present, when services are delivered relative to payment, etc.). The merchant discount rate covers interchange (which goes to the issuer), network fees and assessments (which go to the payment network), and the merchant acquirer spread (or net revenue to the acquirer). Interchange has historically been the largest component of the merchant discount, followed by the merchant acquirer spread and network fees. The merchant discount for signature bank card purchases in the U.S. can run 2% - 3% of the transaction amount.

Heartland Payments (HPY/OW), the 9th-largest domestic merchant acquirer, breaks out the components of its discount rate on its quarterly income statement. We estimate HPY earned an all-in merchant discount rate (on credit and debit transactions) was ~2.61% in 2014, comprising interchange of 1.76%, network fees of 0.27% and an acquiring spread of 0.59%. This compares to an MDR of 2.66% and 2.68% in 2013 and 2012, respectively. Pricing is very competitive and acquirers can be quite creative in optimizing yield.

Pricing Varies Widely

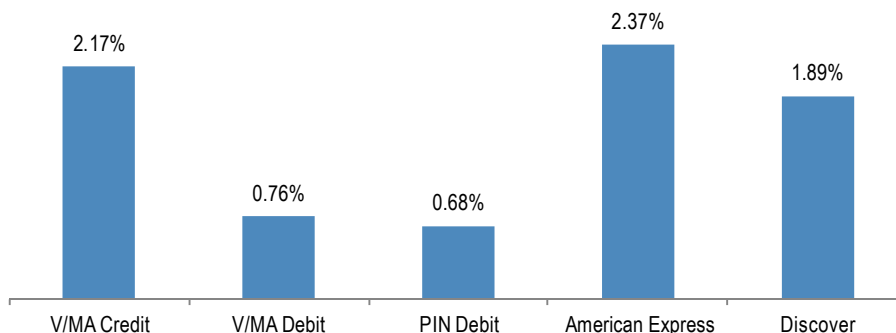
Pricing can also vary by product, as shown in **Figure 6** below. American Express commands a premium MDR pricing of 2.37%, while Visa and MasterCard credit average an MDR of 2.17%. Discover averages 1.89%. Debit is generally priced at a discount, with Visa and MasterCard signature debit priced at 0.76% vs. PIN debit at an 8bp discount of 0.68%.

Table 2: HPY Merchant Discount Rate Calculation

Interchange	1.76%
Network Fees	0.27%
Acquiring Spread	+ 0.59%
All-in MDR	2.61%

Source: Company reports and J.P. Morgan estimates.

Figure 6: Average Merchant Fees by Payment Type - 2013



Source: The Nilson Report and J.P. Morgan estimates.

Merchant Acquiring Pricing

The merchant discount rate is negotiated between the acquirer and the merchant and is generally priced one of two ways: (1) on an “all-in” blended basis, or (2) on a “cost plus” basis. However, other fees are common including PCI fees or downgrades (higher fee triggered by authorizing non-traditional cards). We estimate small and mid-sized merchants make up 30-35% of bank card purchase volume, but generate 65-75% of domestic acquiring spread revenues. In other words, pricing is more attractive to the acquirer when servicing smaller merchants.

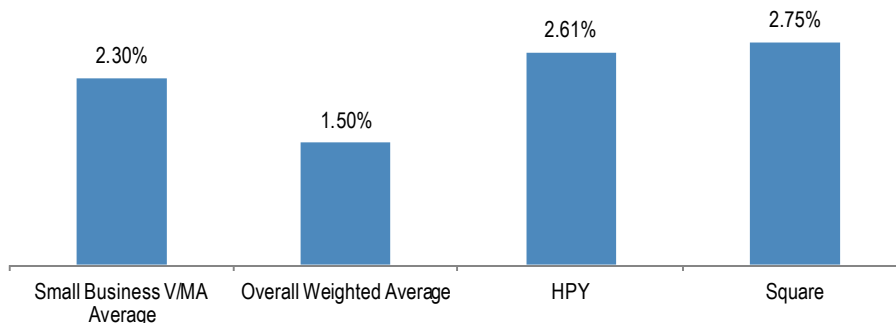
“All-In” or Blended Merchant Contracts

With an “all-in” contract or blended pricing, the merchant acquirer will quote the merchant a relatively fixed discount rate based on the anticipated mix of transactions (e.g., the mix of credit, signature debit and PIN-debit). For example, an acquirer may quote a merchant a 3% discount on all card-based transactions. With an “all-in” contract, an acquirer is essentially “short” interchange and network fees. Meaning its acquiring spread increases (decreases) if the average interchange rate and network fee is lower (higher) than anticipated. This is debit regulation, which cut interchange fees in half, drove higher profitability for merchant acquirers that priced on a blended basis. Small merchant contracts were historically priced on an “all-in” basis, but our checks suggest they are increasingly moving toward a “cost plus” basis.

“Cost-Plus” Merchant Contracts

With a “cost-plus” contract or unbundled pricing, the merchant discount is a fixed spread (or transaction fee) above interchange and network fees. For example, the merchant discount may be the sum of (1) interchange, (2) network fees and (3) a fixed transaction fee representing the acquirer spread. Under a “cost plus” contract, merchant acquirers are relatively indifferent to published network fees and interchange. Historically, only large merchant contracts were priced on a “cost-plus” basis, but our checks suggest small merchants are increasingly moving toward a “cost plus” basis as well. It is not uncommon for the largest merchants to pay a fixed acquirer spread of pennies per transaction or less than a penny per transaction.

Figure 7: Merchant Discount Rate Snapshot



Source: NFIB National Small Business Poll, The Nilson Report, Company Reports and J.P. Morgan estimates.

Merchant Processor Pricing

Merchant processor fees basically represent a cost of good sold to merchant acquirers for providing back-office merchant services processing. The fees are typically paid as a flat fee per transaction, or pennies per transaction. Merchant processors can also earn rebates or incentives from network brands for volume.

Payment Network Economics

Payment networks charge issuers and acquirers switch fees based on the number of transactions processed and an assessment (or licensing) fee based on the notional purchase amount. The fees vary by region and card type and are customized by client through tiered rebates and incentive agreements. Payment networks can also earn additional (non-transactional) fees for ancillary and consulting services.

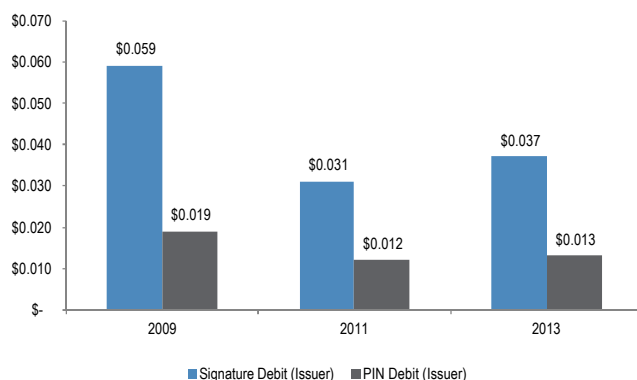
Historically, the largest card issuers were “price makers” and merchant acquirers were “price takers,” although the non-exclusivity provision contained within recent debit interchange regulation has given merchant acquirers more negotiating leverage. Collectively, we estimate the merchant acquirer and card issuer pay Visa and MasterCard roughly 15bps - 18bps of the transaction amount in the U.S. We believe the majority of Visa’s and MasterCard’s transactional revenues (net of rebates) come from merchant acquirers.

Network Fee Summary - 2009 vs 2013

Figure 8 and **Figure 9** below show average issuer and acquirer network fees (net of rebates) for signature and PIN-debit transactions in 2009, 2011 and 2013, respectively. On balance, net network fees paid by debit issuers are well below 2009 levels, but ticked up modestly between 2011 and 2013. Net fees paid by merchant acquirers are a mixed bag, net fees for signature debit transactions increased between 2009 and 2013, while net fees for PIN-debit transactions have declined.

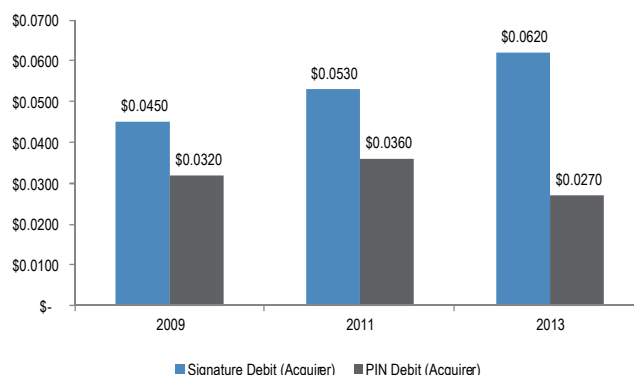
We estimate the merchant acquirer and card issuer pay Visa and MasterCard roughly 15bps - 18bps of the transaction amount in the U.S.

Figure 8: Average Debit Issuer Network Fees (Net of Rebates)



Source: The U.S. Federal Reserve Board

Figure 9: Average Merchant Acquirer Debit Network Fees (Net of Rebates)



Source: The U.S. Federal Reserve

Table 3 and Table 4, below, based on Fed data, summarize trends in issuer and acquirer network fees for both signature and PIN-debit.

Table 3: Debit Issuer and Acquirer Fees - 2009

Average Network Fee Per Transaction:			
Signature Debit			
	Gross	Rebate	Net
Issuer	\$0.083	(\$0.025)	\$0.058
Acquirer	\$0.056	(\$0.012)	\$0.044
PIN Debit			
	Gross	Rebate	Net
Issuer	\$0.025	(\$0.007)	\$0.018
Acquirer	\$0.038	(\$0.005)	\$0.033
Blended			
	Gross	Rebate	Net
Issuer	\$0.061	(\$0.019)	\$0.042
Acquirer	\$0.049	(\$0.009)	\$0.040
Total	\$0.110	(\$0.028)	\$0.082

Source: The Federal Reserve Board, J.P. Morgan calculations.

Table 4: Debit Issuer and Acquirer Fees - 2013

Average Network Fee Per Transaction:			
Signature Debit			
	Gross	Rebate	Net
Issuer	\$0.058	(\$0.021)	\$0.037
Acquirer	\$0.070	(\$0.008)	\$0.062
PIN Debit			
	Gross	Rebate	Net
Issuer	\$0.017	(\$0.004)	\$0.013
Acquirer	\$0.036	(\$0.009)	\$0.027
Blended			
	Gross	Rebate	Net
Issuer	\$0.044	(\$0.015)	\$0.029
Acquirer	\$0.058	(\$0.008)	\$0.050
Total	\$0.102	(\$0.023)	\$0.079

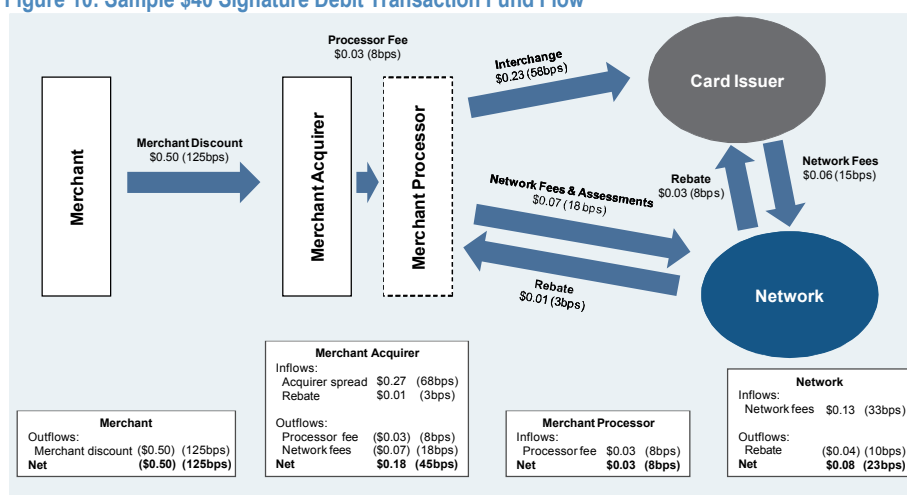
Source: The Federal Reserve Board, J.P. Morgan calculations.

Sample Debit Fund Flows

Signature Debit Transaction Sample Fund Flow

Figure 10, below, is an illustrative example of the fee fund flow for a \$40 signature debit purchase transaction. In this example, the merchant pays a discount of \$0.50 (125bps), comprising interchange (\$0.23) and a merchant acquirer spread (\$0.27), which includes merchant network fees (\$0.07). The card issuer receives interchange of \$0.23 (58bps) and pays network fees of \$0.03 (after receiving a \$0.03 rebate). We note the merchant acquirer earns a net spread of \$0.18 (after receiving a \$0.01 rebate) in this example.

Figure 10: Sample \$40 Signature Debit Transaction Fund Flow



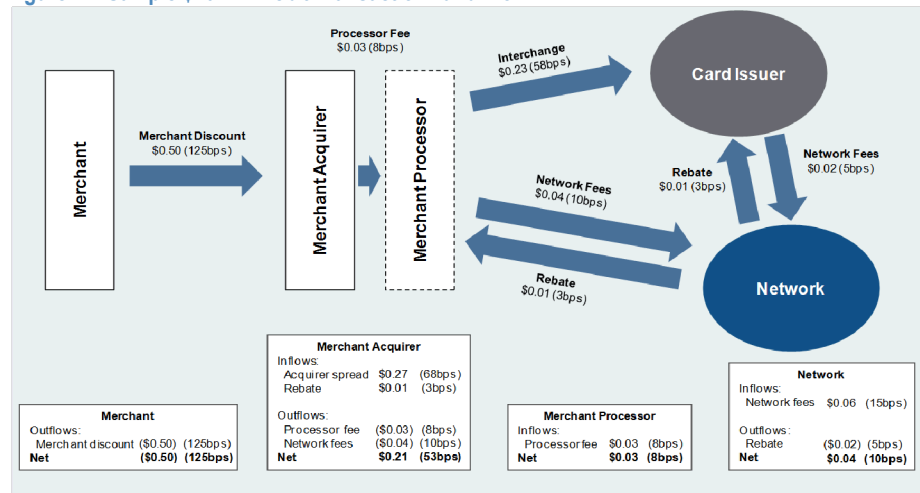
Source: The Federal Reserve Board, J.P. Morgan estimates.

Note: Illustrative example.

PIN-Debit Transaction Sample Fund Flow

Figure 11, below, is an illustrative example of the fee fund flow for a \$40 PIN debit purchase transaction. In this example, the merchant pays a discount of \$0.50 (125bps), comprising interchange (\$0.23) and a merchant acquirer spread (\$0.27), which includes merchant network fees (\$0.04). The card issuer receives interchange of \$0.23 (58bps) and pays network fees of \$0.01 (after receiving a \$0.01 rebate). We note the merchant acquirer earns a net spread of \$0.21 (after receiving a \$0.01 rebate) in this example.

Figure 11: Sample \$40 PIN Debit Transaction Fund Flow



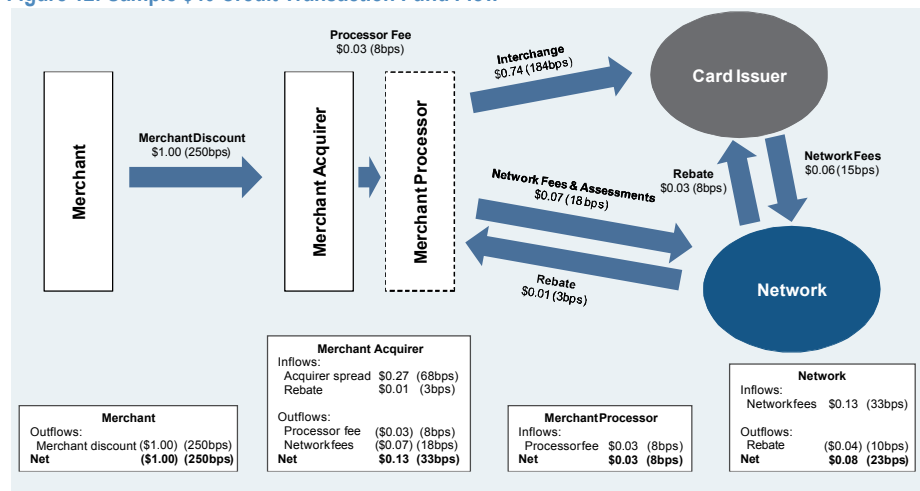
Source: The Federal Reserve Board, J.P. Morgan estimates.
Note: Illustrative example.

Sample Credit Fund Flows

Credit Transaction Sample Fund Flow

Figure 12, below, is an illustrative example of the fee fund flow for a \$40 credit purchase transaction. In this example, the merchant pays a discount of \$1.00 (250bps), comprising interchange (~\$0.74) and a merchant acquirer spread (~\$0.27), which includes merchant network fees (\$0.07). The card issuer receives interchange of \$0.74 (184bps) and pays network fees of \$0.03 (after receiving a \$0.03 rebate). We note the merchant acquirer earns a net spread of \$0.13 (after receiving a \$0.01 rebate) in this example.

Figure 12: Sample \$40 Credit Transaction Fund Flow



Source: The Federal Reserve Board, J.P. Morgan estimates.
Note: Illustrative example.

Domestic Card Market

A Look at the Rise of Electronic Payments

Domestic payment processing and service providers continue to benefit from the ongoing shift to electronic or card-based payments. **Table 4**, below, shows historical card-based payment trends and highlight the growing popularity of debit and prepaid cards, which have increased from 7% of total paper-based and card-based payments, in 2000, to roughly 31%, in 2013 according to The Nilson Report (see **Figure 13** below).

Table 4: Payment Medium Wallet Share

\$ in millions

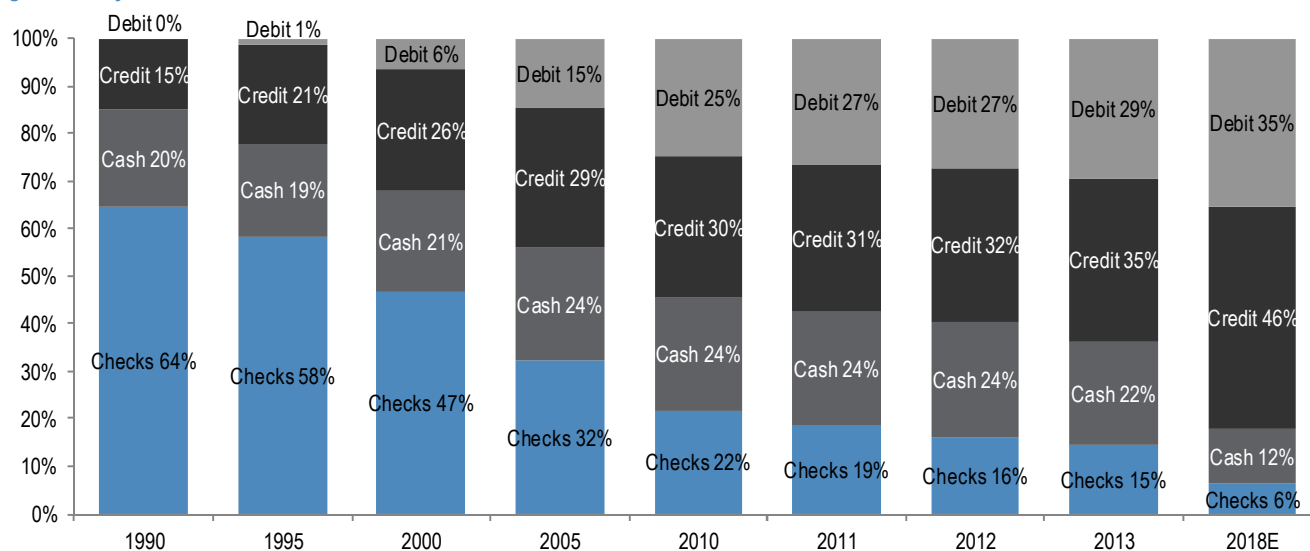
	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2018E	CAGR 13 - '18
Checks	2,111	2,270	1,885	1,807	1,699	1,609	1,522	1,434	1,288	1,162	1,053	566	-12%
Cash	704	1,018	1,403	1,439	1,545	1,635	1,574	1,539	1,638	1,742	1,557	1,030	-8%
Total Paper Based	2,964	3,409	3,406	3,365	3,361	3,356	3,203	3,086	3,026	2,999	2,699	1,653	-9%
% Change y/y		2.0%	-1.0%	-1.2%	-0.1%	-0.1%	-4.6%	-3.6%	-2.0%	-0.9%	-10.0%		
Credit	754	1,244	1,722	1,871	2,026	2,062	1,843	1,942	2,136	2,315	2,491	4,113	11%
Debit	46	311	858	1,010	1,168	1,330	1,430	1,630	1,827	1,957	2,111	3,142	8%
Prepaid	1	31	111	137	142	153	163	172	186	203	220	263	4%
Total Card Based	802	1,598	2,719	3,048	3,368	3,582	3,490	3,811	4,222	4,550	4,897	7,580	9%
% Change y/y		17.9%	13.2%	12.1%	10.5%	6.4%	-2.6%	9.2%	10.8%	7.8%	7.6%		
Total Electronic Based	63	218	649	751	847	902	989	1,022	1,095	1,136	1,349	2,170	10%
% Change y/y		31.3%	23.9%	15.7%	12.8%	6.5%	9.6%	3.4%	7.1%	3.8%	18.7%		
PCE	4,987	6,830	8,804	9,301	9,772	10,036	9,846	10,216	10,729	11,121	11,502	11,606	
% Change y/y			6.4%	5.7%	5.1%	2.7%	-1.9%	3.8%	5.0%	3.7%	3.2%		
Card and Electronic as % of PCE	17%	27%	38%	41%	43%	45%	45%	47%	50%	51%	54%	84%	

Source: The Nilson Report, U.S. Department of Commerce, JP Morgan calculations

The Evolution of Payments

Figure 13, below, shows the historical shift in purchase volume towards card-based payments. The data suggest credit and debit usage has grown primarily at the expense of checks, while cash usage has remained relatively stable (proportionately). We continue to believe deeper debit penetration in the smaller-ticket and everyday spend categories represent the greatest cash conversion opportunity.

Figure 13: Payment Medium Wallet Share



Source: The Nilson Report

Table 5 below compares the historical shift in purchase volume towards card-based payments in North America vs. other geographies.

Table 5: Payment Medium Wallet Share Shift by Geography

2008	NA	Europe	Mature APAC	LatAM	Emerging Asia	CEMEA
Checks	24.4%	7.8%	7.6%	13.1%	19.3%	0.3%
Credit Transfers	7.1%	27.1%	22.9%	39.7%	7.4%	35.0%
Direct Debits	10.6%	27.2%	9.2%	4.8%	2.9%	1.7%
Cards	57.9%	37.9%	60.3%	42.4%	70.4%	62.9%
2011	NA	Europe	Mature APAC	LatAM	Emerging Asia	CEMEA
Checks	17.1%	5.5%	3.4%	6.8%	11.3%	0.4%
Credit Transfers	7.4%	26.4%	19.8%	33.0%	8.1%	27.6%
Direct Debits	10.5%	26.1%	7.5%	14.3%	2.4%	4.2%
Cards	65.0%	42.0%	69.3%	45.9%	78.2%	67.8%
2012	NA	Europe	Mature APAC	LatAM	Emerging Asia	CEMEA
Checks	14.9%	4.8%	2.5%	5.6%	8.8%	0.3%
Credit Transfers	7.5%	26.0%	18.9%	32.0%	8.4%	23.4%
Direct Debits	10.8%	25.7%	7.3%	13.6%	2.2%	3.6%
Cards	66.8%	43.5%	71.3%	48.8%	80.7%	72.8%

Source: World Payments Report.

Domestic Market Should Continue to Grow at a Premium to Retail Sales

As we've written in the past, domestic card-based payment penetration rates are relatively high, but volume is still growing at a premium to retail sales as new merchant categories accept cards (e.g. taxicabs, vending machines, mobile merchants via firms like Square) and the previously un-banked embrace cards, evidenced by growth in prepaid.

Card-Based Payment Well Penetrated, But Growth Remains Solid

By our estimate, purchase volume on Visa/MasterCard cards was roughly 86% as large as the over \$4.2 trillion in non-auto retail sales in 2014, up from ~18% and

~48% in 1991 and 2001 respectively. In fairness, our estimates likely overstate actual penetration as U.S. Census non-auto sales exclude hotel lodging and airfare purchases, two verticals where payments are almost exclusively card-based. Despite fairly deep penetration and a mixed macro environment, domestic purchase volume growth remains in the high single-digit range.

Table 6 compares aggregate MasterCard/Visa domestic purchase volume and U.S. Census non-auto retail sales levels and trends. Since 2006, aggregate MasterCard and Visa purchase volume has grown at roughly a four point premium to retail sales, which we attribute to secular adoption. We estimate secular adoption contributes ~\$125bn and \$140bn in incremental purchase volume growth annually. Aggregate reported V/MA purchase volume grew at a one point discount to retail sales in 2012, but growth figures were negatively distorted by debit card regulation (discussed further in debit section below). We note card volume resumed its premium to retail sales in 2013 and 2014, growing at a six point premium in both years.

Table 6: U.S. Bank Card Purchase Volume Trends

\$ in billions

	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A
MasterCard	725	815	855	805	813	901	982	1,051	1,143
Visa	1,385	1,532	1,641	1,646	1,862	2,040	2,084	2,264	2,484
Total US Purchase Volume	2,110	2,347	2,496	2,451	2,675	2,941	3,066	3,315	3,627
% change (y/y)	14%	11%	6%	-2%	9%	10%	4%	8%	9%
Non-Auto Retail Sales	3,456	3,587	3,669	3,440	3,617	3,812	3,999	4,090	4,215
% change (y/y)		4%	2%	-6%	5%	5%	5%	2%	3%
Non- Auto Retail Penetration	61%	65%	68%	71%	74%	77%	77%	81%	86%

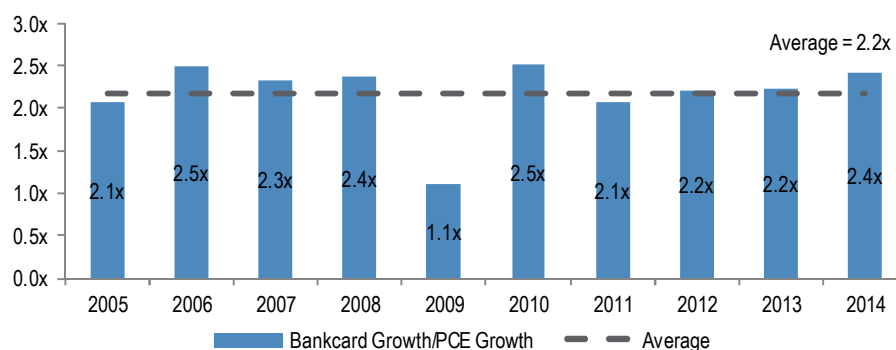
Source: Company reports, J.P. Morgan estimates and the U.S. Census Bureau.

Note: 2012 card volume growth is understated due to PIN Debit market share losses by Visa. MasterCard GDV data excludes debit transactions on Maestro and Cirrus-branded cards, Mondex transactions and transactions involving brands other than MasterCard.

Card Volume Growth Outpaces PCE Growth in U.S.

Figure 14, below, shows the historical relationship between growth in card-based payments and PCE and highlights the defensive characteristic of payment processing. Growth in card-based payment has historically outpaced PCE growth by a factor of 2.2 times. We believe the trend of outperformance will continue for the next few years.

Figure 14: Bank Card Volume Growth to U.S. PCE Growth Multiplier



Source: U.S. Department of Commerce and JPMorgan calculations.

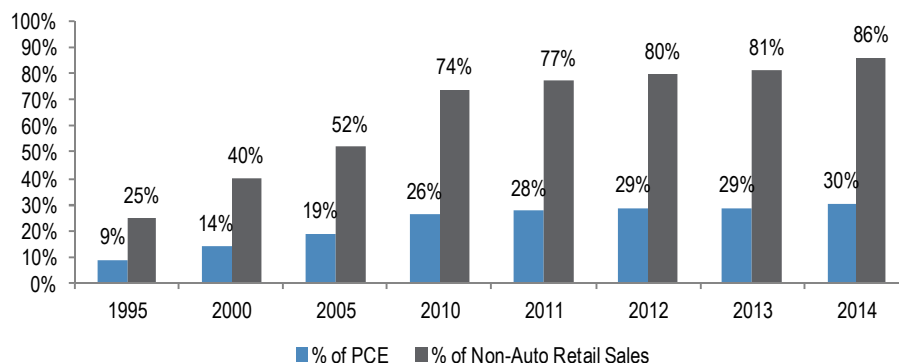
Note: PCE = Personal Consumption Expenditure, Multiplier = Card-based purchase volume growth/ U.S. PCE Growth

Note: 2012 Bank Card Volume Growth is JPM assuming PIN debit share shift from Visa to MasterCard that is unreported.

PCE and Non-Auto Retail Sales Penetration

Figure 15, below, shows U.S. bank card (Visa, MasterCard) volume as a percentage of PCE and U.S. Census non-auto retail sales. Payments have increased from 9% and 25% of PCE and non-auto retail sales, respectively, in 1995, to 30% and 86%, in 2014, by our estimate. We note this analysis excludes credit card purchase volume on alternative networks (e.g., American Express and Discover) and most PIN-debit volume. We note U.S. Census non-auto sales exclude hotel lodging and airfare purchases, two verticals where payments are almost exclusively card-based.

Figure 15: U.S. Card Penetration Rates (as % of PCE and Non-Auto Retail Sales)



Source: Company reports, U.S. Census Bureau and J.P. Morgan calculations.

Note: Reflects Visa and MasterCard bank card purchase volume only. PCE defined as personal consumption expenditure. Non-Auto Retail Sales as provided by the U.S. Census Bureau.

Note: 2012 Bank Card Volume Growth is JPMc assuming PIN debit share shift from Visa to MasterCard that is unreported.

The Path to Further Penetration; Small Ticket and the Micro/Mobile Merchant

Historically most of the growth in card-based payments has come at the expense of check, which has seen its wallet share of PCE decline, according to The Nilson Report (see **Figure 13**), from the high 40% range to the mid-teen range over the past ten years (about two to three percentage points annually in recent years).

Interestingly, the proportion of cash-based purchases has remained in the 20% range for the past ten years. We think card-based payments can continue to take a few points of market share from check over the next few years (albeit at a slightly slower pace) and gradually chip away at mix of cash-based purchases through deeper penetration of smaller ticket merchant verticals and prepaid (i.e., capturing the previously un-banked).

There are up to 20 million casual merchants in the U.S. that do not accept card-based payments but could by converting a mobile phone or tablet into a card reader or cloud based payments. In other words, mobile phone and tablet card readers could do to the physical world what PayPal did to the online space over 15 years ago, by allowing casual merchants that previously couldn't afford to maintain a merchant account with a cost effective means of taking credit or debit cards. Square invented this market, and many players have followed suit. This is a large revenue opportunity for merchant acquirers and networks alike. Providers include Square, Intuit, PayPal, PayAnywhere, as well as wholesales like mPowa and Roam Data (Ingenico) while cloud-based payment enablers include Uber, Pay2Ride. Supplementing this growth is the rising popularity of integrated payments, whereby cheaper and customized hardware/software make it increasingly affordable for SMEs to enjoy big merchant POS systems.

Credit Growth Stable to Up

As shown below, credit card spending trends have recovered from the recession and accelerated this past year following years of 8% annual growth. **Table 7** below shows MasterCard and Visa credit spending trends. We note credit spending declined 9%, in 2009, but increased 4%, in 2010 and trended in the 8% from 2011 to 2013. Credit growth accelerated to 11% in 2014, helped by pent up demand, an increased appetite among issuers for risk and growth in cards outstanding.

Table 7: Bank Card Credit Purchase Volume

\$ in billions

	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A
MasterCard	508	548	547	477	479	508	533	560	608
Visa	742	806	824	764	809	888	981	1,078	1,212
Total	1,250	1,354	1,371	1,241	1,288	1,396	1,514	1,638	1,820
% change (y/y)	9%	8%	1%	-9%	4%	8%	8%	8%	11%

Source: Company reports. MasterCard GDV data excludes debit transactions on Maestro and Cirrus-branded cards, Mondex transactions and transactions involving brands other than MasterCard.

Debit Growth Distorted by Durbin Impact and Reporting Methodology

Debit growth has been fairly resilient through the economic cycle but appears to be moderating to the high single-digit range. We note aggregate MasterCard and Visa debit purchase volume showed essentially no growth in 2012, which we attribute to the way volume is reported. Specifically, Visa doesn't report PIN-debit volume (on Visa branded cards) processed on competitor networks, which increased considerably due to Fed regulation requiring debit card issuers to enable at least one competing PIN-debit network on all cards (i.e., Visa PIN-debit volume processed on competitor PIN networks is excluded from the total). Moreover, MasterCard does not report Maestro PIN-debit volume in its reported data. Adjusting for this, we believe debit purchase volume on MasterCard and Visa branded debit cards increased 9% in 2012, down slightly from the 11% growth reported in 2011. We believe debit growth trends will remain solid as consumers continue to prefer the convenience of debit and debit-like products (e.g., prepaid) over cash and card acceptance expands to micro merchants.

MasterCard excludes debit transactions on Maestro and Cirrus-branded cards, Mondex transactions and transactions involving brands other than MasterCard.

Table 8, below, shows MasterCard and Visa debit spending trends. We note reported debit spending growth moderated during the recession in 2009, but rebounded strongly in 2010. 2011 saw volume growth moderate again, which we attribute to the law of large numbers and looming debit regulation. MasterCard and Visa reported flat aggregate purchase volumes in 2012, but we think the actual number was closer to 9%, when you adjust for the aforementioned volume reporting anomalies. 2013 and 2014 saw a continuation of this trend, with 8% y/y volume growth.

Table 8: Aggregate Visa, MasterCard Reported Debit Purchase Volume

\$ in millions

	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A
MasterCard	216	269	309	329	333	392	448	491	535
Visa	642	726	817	883	1,053	1,153	1,103	1,186	1,270
Total	858	995	1,126	1,212	1,386	1,545	1,551	1,677	1,805
% change (y/y)	23%	16%	13%	8%	14%	11%	0%	8%	8%

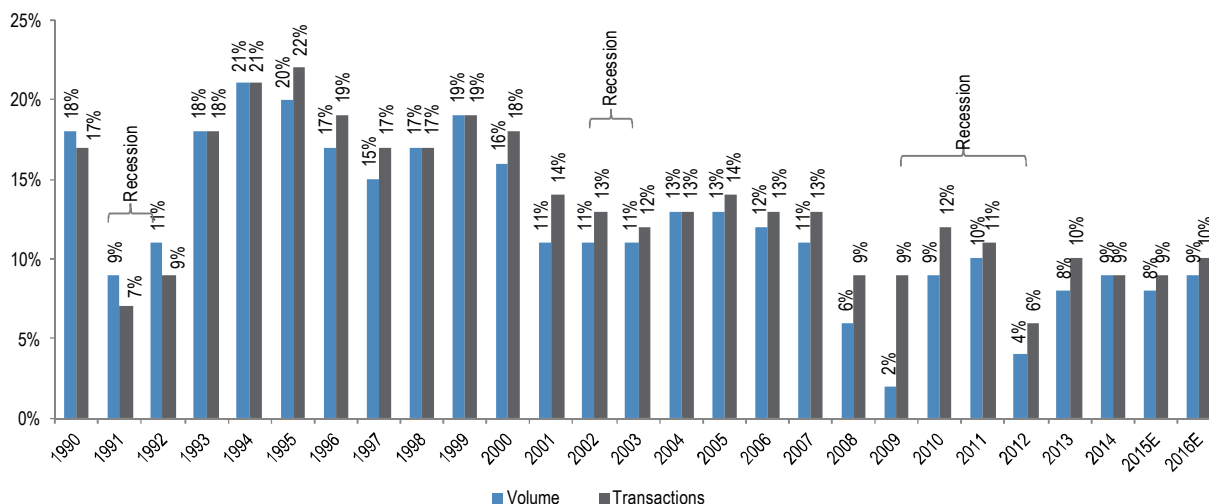
Source: Company reports.

Note: 2012 volume growth is understated due to PIN Debit market share losses by Visa. Normalizing for this, we estimate 2012 growth was roughly 9%.

Bottom Line – Domestic Bankcard Volume Continues to Grow at a Premium to Broader Retail Sales

As shown in **Figure 16**, below, domestic bankcard volume/transaction growth is resilient but moderating (due to high penetration rates). The double-digit growth rates enjoyed over the last 20 years have moderated to the high single-digit range, but purchase volume growth still exceeds GDP and retail sales. Purchase volume growth decelerated materially during the last recession in 2008 and 2009, posting 6% and 2% growth, versus a mid single-digit decline in GDP, but rebounded to the high single-digit/low double digit range in 2010 and 2011. Reported purchase volume growth decelerated in 2012, which we attribute MasterCard and Visa's volume reporting methodology that excludes PIN-debit purchase volume processed on non-affiliated networks. Reported purchase volume growth accelerated to the high single-digit range in 2013 and has remained in that range since. We are forecasting high single-digit/low double-digit volume and transaction growth in 2015 and 2016, respectively.

Figure 16: U.S. Bankcard Purchase Growth



Source: Company reports and J.P. Morgan estimates.

Note: CY12 and CY13 volume and transaction metrics are distorted by regulation requiring debit card issuers to enable at least one non-affiliated PIN debit network on all cards. We note debit transactions/volume routed over non-affiliated PIN debit networks is not reflected in the above diagram.

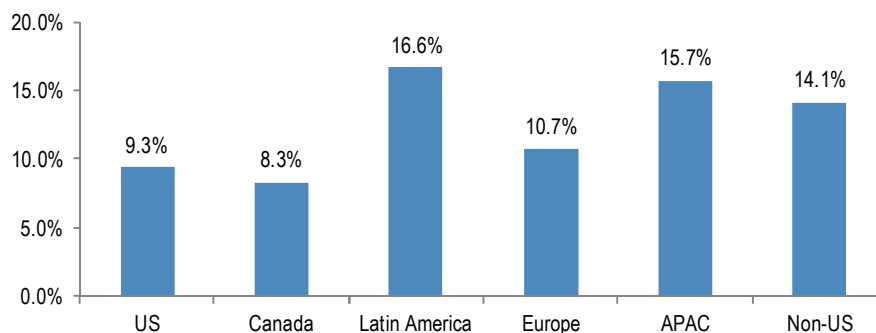
International Card Market

Rest of world growth continues to grow at a healthy premium to U.S. growth rates, given lower penetration of electronic payments. We expect this premium to persist for many years to come. Nationalism, or the desire for local banks and regulators reduce dependent on the U.S. networks by overseeing their own payment schemes, remains the biggest risk to the industry's addressable market, in our view.

International Growth Remains Strong

Figure 17, below, shows aggregate Visa/MasterCard constant currency purchase volume growth rates by region. Purchase card volume growth remains strongest in the emerging Latin America and Asia Pacific regions, versus mid to high single-digit growth in the U.S. and Canada, and low double digit growth in Europe.

Figure 17: Bankcard Regional Purchase Volume Growth Rates - 2014



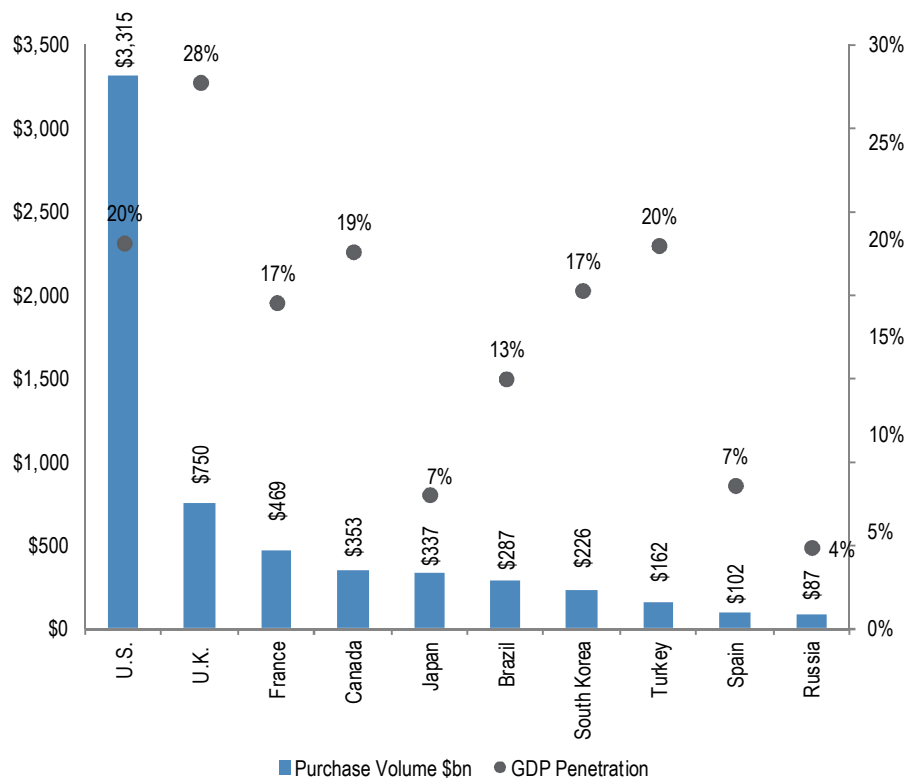
Source: Company reports and J.P. Morgan estimates.

Bank Card Penetration Rates by Region

Figure 18 shows bank card purchase volume as a percentage of GDP for key countries. We found that bank card purchase volume represents 19% - 28% of GDP in mature markets like the U.S., U.K., France and Canada, but only 4% - 20% of GDP in other markets like Japan, Brazil, Russia, Turkey and Spain. Turkey's volume as a percentage of GDP has experienced the most significant growth in the group, with GDP penetration jumping from 7% to 20% since 2008.

Figure 18: Bank Card Purchase Volume Penetration Rates (GDP by Region)

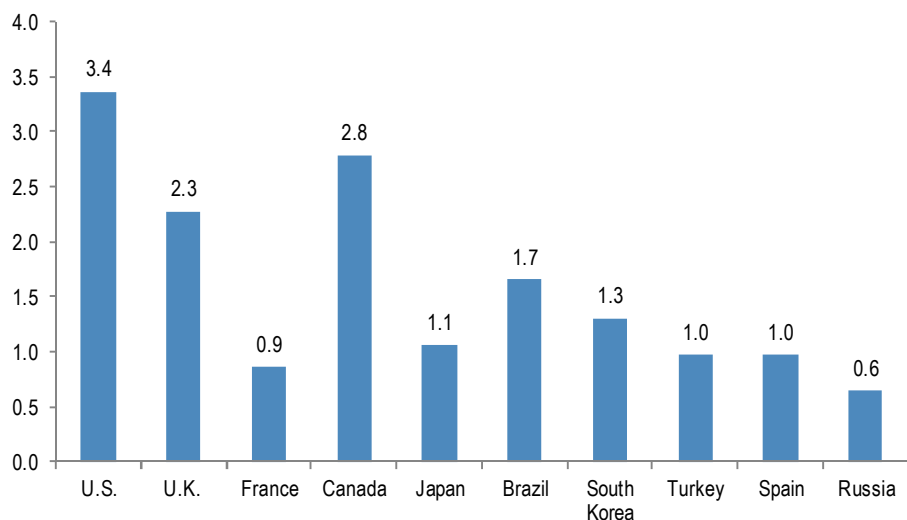
\$ in billions



Source: Company reports, The Nilson Report, The World Bank and J.P. Morgan calculations.

Figure 19 below shows the bank card per capita ratio across various regions and paints a similar picture. Again, the emerging markets are far less penetrated than the United States, suggesting a long runway for growth ahead.

Figure 19: Bank Cards per Capita (by Region)

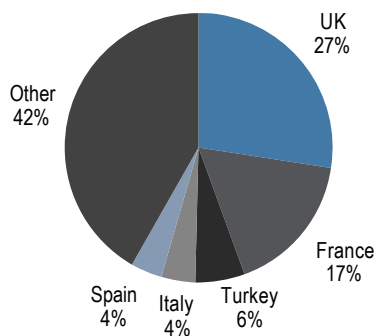


Source: Company reports, The Nilson Report, The World Bank and J.P. Morgan calculations.

A Handful of Key Countries Drive International Volume

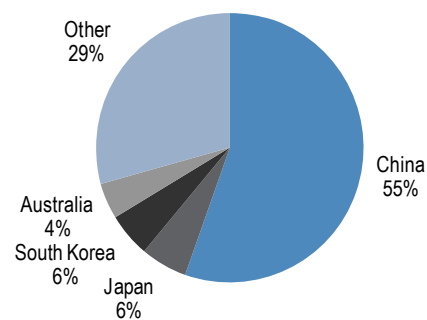
The bulk of bank card payment volume, particularly in emerging markets, is concentrated within a few countries. Within Europe, the United Kingdom and France account for nearly half of the region's bankcard purchase volume. In the Asia Pacific region, Japan, China, South Korea and Australia account for over 70% of bankcard purchase volume. In Latin America, Brazil, Mexico, Venezuela and Argentina account for nearly 80% of bankcard purchase volume. In the Middle East South Africa, Israel and Saudi Arabia account for approximately 80% of all bankcard purchase volume.

Figure 20: Europe Bank Card Purchase Volume 2013



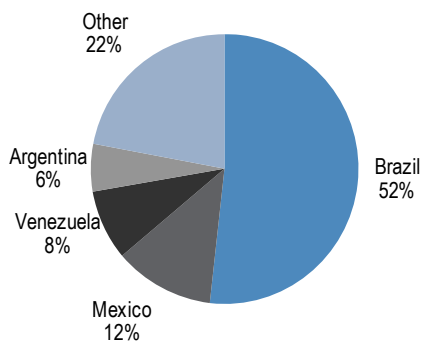
Source: The Nilson Report and J.P. Morgan calculations

Figure 21: Asia Pacific Bank Card Purchase Volume - 2013



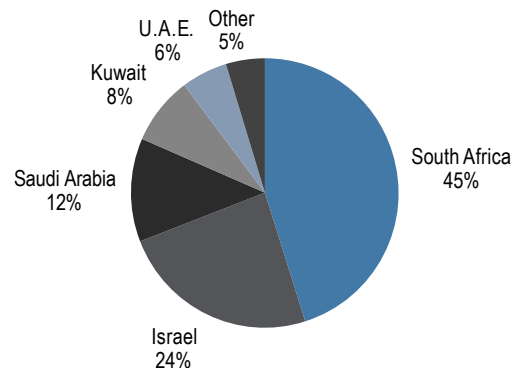
Source: The Nilson Report, J.P. Morgan calculations

Figure 22: Latin America Bank Card Purchase Volume – 2013



Source: The Nilson Report, and J.P. Morgan calculations.

Figure 23: Middle East/Africa Bank Card Purchase Volume - 2013



Source: The Nilson Report, J.P. Morgan calculations

Domestic Schemes on the Rise?

We've long believed a key long-term threat to V/MA was the emergence of domestic schemes (overseas), fueled by the desire for local banks and regulators to control governance and economics of domestic card payments. Value creation could be a

motivation as well, given the large market capitalizations assigned to V/MA and the \$3.1B acquisition of Nets (payment network to Danish, Norwegian and Finnish cardholders) by Advent/Bain. Examples of local schemes include China's UnionPay, Canada's Interac, India's RuPay, UAE's Mercury and Puerto Rico's ATH Network (owned by Evertec).

We believe interest in developing local schemes is on the rise, evidenced by Network International's growth in the Middle East, and recent press around Russia's interest in developing a domestic network (we estimate Russia accounts for < 2% of V/MA's global volume). However, the inverse is happening in China as regulators plan to open up the market for bankcard clearing to foreign firms as early as June 2015.

We don't see this nationalism theme impacting our three-year model for V/MA, but it could reduce the global TAM ten years out (MasterCard currently excludes domestic China in its TAM) should local schemes become successful in gaining wallet share in local markets.

Table 9: Select International Network Scheme Summary

Network	Country	Total Volume (B)	Transactions (M)	Cards (M)
UnionPay	China	\$3,778	11,715	3,534
Interac	Canada	\$173	4,357	NA
RuPay	India	NA	NA	14
EFTPOS	Australia/New Zealand	\$125	2,399	16
ATH	Puerto Rico	\$12	656	NA
Girocard	Germany	\$178	2,296	90
CB	France	\$534	8,100	61
JCB	Japan	\$177	NA	79

Source: Company reports and J.P. Morgan estimates.

China Embracing Foreign Processors

In May 2015, China announced it will allow foreign firms to switch and clear domestic bankcard volume (currently handled by UnionPay, the national network). Regulation rules are pending and will be announced at an undisclosed date, but the China card market, with nearly \$6 trillion in purchase volume on China Union Pay cards last year, according to The Nilson Report, is a large opportunity. Assuming MasterCard and Visa are granted licenses, they will need to establish a local presence and woo clients, which will be difficult given UnionPay and Alipay have a significant head start. We do not expect meaningful revenue accretion for several years, but acknowledge the opportunity is large. MasterCard says that after rules are established, it could start switching transactions as early as late 2016.

Domestic Market Case Studies

Russian National Card Payment

In response to financial sanctions that disrupted certain MasterCard/Visa payment functions, Russian President Vladimir Putin pushed to establish a national card payment system in May 2014. MasterCard/Visa will be allowed to process payments, but will need to meet certain operational (they must process locally) and financial (deposit requirements) The networks are still haggling over the deposit requirements, but expect to begin processing transactions in the near future. Both companies expect to generate significantly less revenues in Russia given their reduced role.

ELO Brazil: Low-Cost Alternative Network

In Brazil, large players are creating proprietary brands (like ELO) and focusing on alternative solutions to lower card acceptance costs. JPMC LatAm Financial analyst, Domingos Falavina, estimates Brazilian issuers paid MasterCard and Visa \$1bn - \$2bn in branding fees in 2014. The ELO network, which has about 9% market share today and gaining share, offers issuers lower acceptance costs and branding fees, but appears to be starting as a low-end network.

RuPay: India's MasterCard/Visa Alternative

RuPay was launched by the National Payments Corporation of India to consolidate the various payment systems in India, while being an alternative to MasterCard and Visa. As with other domestic schemes, RuPay carries lower transaction costs than MasterCard and Visa. MasterCard and Visa remain the dominate brands in India today, but RuPay is growing faster and gaining share (albeit from an extremely small base).

Mercury: Middle East Network Alternative

Network International, the largest merchant and card processor in the UAE, has developed a new low-cost network branded as Mercury that is building acceptance of ATM and POS devices starting in the UAE. Mercury has a bilateral partnership agreement with Discover to build out its acceptance. Features remittance and prepaid capabilities to serve the underserved.

Sizing the International Opportunity

The Largest and Most Developed Economies

Table 10, below, ranks 20 of the largest economies in the world (based on GDP). We note these countries generate approximately 80% of global GDP and represent 60% of the world's population.

Within this subset, we used per capita GDP to identify the most developed nations (>\$30k per year). We identified 10 “developed” countries (shaded in gray) that in aggregate generate 50% of global GDP and represent ~11% of the world's population. We believe these “developed” countries represent the most tangible and immediate cash conversion opportunity for MasterCard and Visa.

Table 10: Largest Economies Based on GDP

Rank	Country	GDP (billions USD)	Household Cons. (% GDP)	Population (millions)	GDP per Capita	V/MA Volume (billions)	Cards (millions)	Cards per Capita	Payment Penetration (GDP)	Payment Penetration (Consumption)
1	United States	\$16,768	68%	316	\$53,042	\$3,315	1,065	3.4	20%	29%
2	China	\$9,240	36%	1,357	\$6,807	\$455	129	0.1	5%	14%
3	Japan	\$4,920	61%	127	\$38,634	\$337	135	1.1	7%	11%
4	Germany	\$3,730	56%	81	\$46,251	\$15	1	0.0	0%	1%
5	France	\$2,806	55%	66	\$42,560	\$469	57	0.9	17%	30%
6	United Kingdom	\$2,678	65%	64	\$41,781	\$750	146	2.3	28%	43%
7	Brazil	\$2,246	62%	200	\$11,208	\$287	331	1.7	13%	21%
8	Italy	\$2,149	60%	60	\$35,686	\$95	53	0.9	4%	7%
9	Russia	\$2,097	52%	143	\$14,612	\$87	93	0.6	4%	8%
10	India	\$1,875	59%	1,252	\$1,498	\$10	22	0.0	1%	1%
11	Canada	\$1,827	56%	35	\$51,964	\$353	98	2.8	19%	35%
12	Australia	\$1,560	55%	23	\$67,463	\$265	265	11.5	17%	31%
13	Spain	\$1,393	58%	47	\$29,882	\$102	45	1.0	7%	13%
14	South Korea	\$1,305	51%	50	\$25,977	\$226	65	1.3	17%	34%
15	Mexico	\$1,261	69%	122	\$10,307	\$80	81	0.7	6%	9%
16	Indonesia	\$868	56%	250	\$3,475	\$2	1	0.0	0%	0%
17	Netherlands	\$854	45%	17	\$50,793	\$15	13	0.8	2%	4%
18	Turkey	\$822	71%	75	\$10,972	\$162	73	1.0	20%	28%
19	Saudi Arabia	\$748	30%	29	\$25,962	\$36	13	0.5	5%	16%
20	Switzerland	\$685	53%	8	\$84,748	\$16	3	0.3	2%	4%
Total		\$59,834	57%	4,324	\$13,838	\$7,078	2,690	0.6	12%	21%
World		\$75,622	57%	7,125	\$10,613	\$8,951	3,698	0.5	12%	21%

Source: The Nilson Report, World DataBank, Visa/MasterCard company reports and J.P. Morgan estimates.

Note: Payment penetration is defined as V/MA Volume / GDP. Payment penetration (consumption) is defined as V/MA Volume / Household Consumption Expenditures.

Household Consumption is the market value of all goods and services, including durable products, as defined by the World Bank.

Identifying “Under-Penetrated” Developed Economies

We took our analysis one step further by identifying developed countries with the lowest payment penetration rates in **Table 11** below. We identified five “under-penetrated” countries (Switzerland, Netherlands, Germany, Japan and Italy) which generate ~\$12.3 trillion in aggregate GDP (~74% the size of the United States), and ~\$480 billion in annual Visa/MasterCard purchase volume (aggregate payment penetration rate of only 4%). Using the United States as a proxy, where Visa/MasterCard purchase volume represent 15-20% of GDP, we believe these five “under-penetrated” countries could represent a nearly \$2 trillion incremental purchase volume opportunity for Visa and MasterCard, which about one-fourth of MasterCard and Visa's 20134 global purchase volume figure.

Table 11: Payment Penetration Rates in Developed Countries

Country	GDP per Capita	Household Consumption (% GDP)	2013 GDP (billions USD)	Population (millions)	V/MA Volume (billions)	Cards (millions)	Cards per Capita	Payment Penetration (GDP)	Payment Penetration (Consumption)
United States	\$53,042	68%	\$16,768	316	\$3,315	1,065	3.4	20%	29%
Switzerland	\$84,748	53%	\$685	8	\$16	3	0.3	2%	4%
Australia	\$67,463	55%	\$1,560	23	\$265	265	11.5	17%	31%
Canada	\$51,964	56%	\$1,827	35	\$353	98	2.8	19%	35%
Netherlands	\$50,793	45%	\$854	17	\$15	13	0.8	2%	4%
Germany	\$46,251	56%	\$3,730	81	\$15	1	0.0	0%	1%
France	\$42,560	55%	\$2,806	66	\$469	57	0.9	17%	30%
United Kingdom	\$41,781	65%	\$2,678	64	\$750	146	2.3	28%	43%
Japan	\$38,634	61%	\$4,920	127	\$337	135	1.1	7%	11%
Italy	\$35,686	60%	\$2,149	60	\$95	53	0.9	4%	7%

Source: The Nilson Report, World DataBank, Visa/MasterCard company reports and J.P. Morgan estimates.

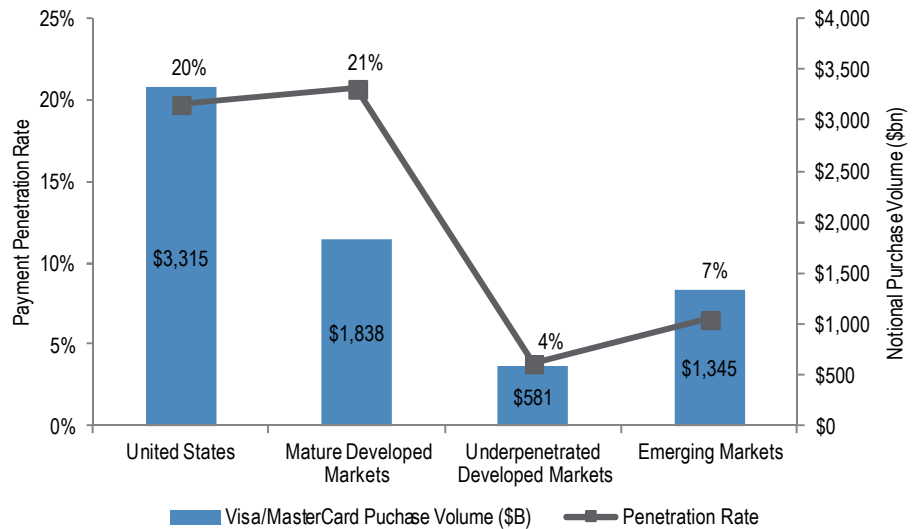
Note: Payment penetration is defined as V/MA Volume / GDP. Payment penetration (consumption) is defined as V/MA Volume / Household Consumption Expenditures.

Under-Penetrated and Emerging Markets Could Represent a \$3 Trillion Purchase Opportunity

Figure 24, below, shows Visa/MasterCard purchase volume and penetration rates by market classification. We define mature developed markets as those with >15% GDP penetration and ~\$30k GDP per capita. We define under-penetrated developed markets as those with <15% GDP penetration and ~\$30k GDP per capita. We define everything else as emerging markets.

In 2013, the United States generated over \$3.3 trillion in purchase volume, or roughly 20% of GDP. Other mature developed markets generated approximately \$1.8 trillion in purchase volume, or roughly 21% of their GDP. U.S. purchase volume reached \$3.6 trillion in 2014, or roughly 21% of GDP. Both categories have seen approximately a five point increase in payment penetration since 2007. Under-penetrated developed markets, where we think MasterCard/Visa have the most immediate cash conversion opportunity, generated \$581 billion in purchase volume, or roughly 4% of their GDP. Finally, emerging markets, where MasterCard/Visa likely have the largest, but a more gradual, cash conversion opportunity, generated \$1.3 trillion in purchase volume, or roughly 7% of their GDP. We size the “green field” purchase volume opportunity in under-penetrated developed and emerging markets at \$1.5 trillion and \$1.7 trillion, respectively, assuming a 15% terminal penetration rate.

Figure 24: Visa/MasterCard Purchase Volume and Penetration Rates by Category - 2013



Source: The Nilson Report, Company reports and J.P. Morgan estimates.

Caveat: Emerging Market GDP Is Less Consumption Driven

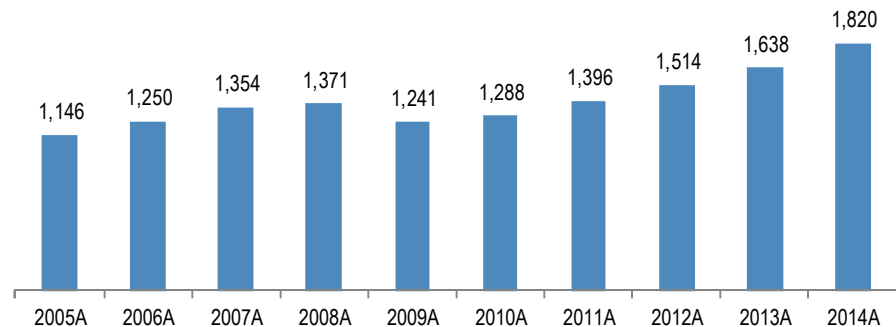
The obvious shortcoming in our analysis is that it implicitly assumes emerging market economies are as consumer driven as the United States. In other words, the proportion of GDP driven by domestic consumption is consistent across various countries, which likely overstates the cash conversion opportunity in emerging markets (less so for mature and under-penetrated developed markets). As shown in **Table 10** within this section (see page 25), consumption as a percent of GDP in developed markets averages ~60%, while emerging markets average 48% in this metric. This metric has been narrowing, with emerging markets seeing on average 40% of consumption as a percent of GDP in 2011.

U.S. Credit Snapshot

Figure 25, below, shows historical domestic Visa/MasterCard credit card purchase volume. Purchase volume growth decelerated rapidly towards the end of 2008, and declined 9% in 2009, as issuer appetite for consumer credit waned and retail sales, particularly in the home furnishings and electronics categories, plunged. Credit card purchase volume trends have since stabilized (posting 4% growth in 2010, 8% in 2011, 2012 and 2013) and are beginning to exceed pre-recession growth levels (11% in 2014).

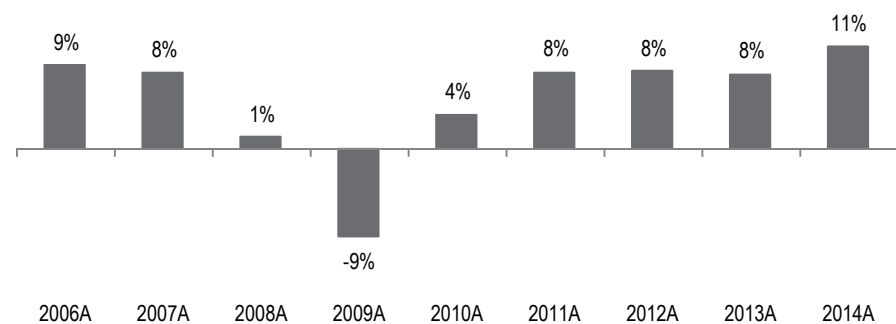
Figure 25: MasterCard/Visa Credit Card Purchase Volume

\$ in billions



Source: Company reports and J.P. Morgan estimates.

Figure 26: MasterCard/Visa Credit Card Purchase Volume Growth Rates

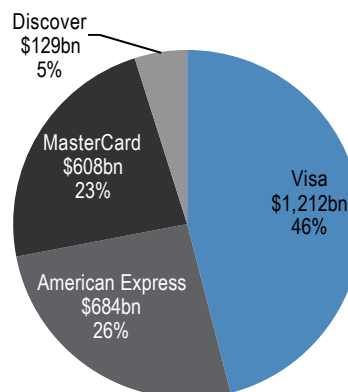


Source: Company reports and J.P. Morgan estimates.

Figure 27, below, shows domestic credit card purchase volume share among the largest card brands. Although Visa has maintained the leading market share, American Express overtook MasterCard in 2011 as the second leading network by domestic credit card purchase volume. We note that this trend is not new, as American Express has seen its market share increase over the past few years, primarily at the expense of MasterCard (recall in 2006 MA had market share of 29% vs. AMEX at 23%). However, American Express still lags in acceptance locations—the company has 6.9M locations, below Visa and MasterCard at 9.5M each and Discover with 9.3M locations.

Figure 27: U.S. Credit Purchase Volume Share – 2014

\$ in millions



Source: Company reports.

Table 12, below, summarizes the top credit card issuers based on purchase volume and cards outstanding. We note the top 10 credit card issuers account for more than 80% of Visa/MasterCard's credit card purchase volume. We also list the primary network brand of each bank, but acknowledge that all use both brands in some capacity.

The top 10 credit card issuers account for more than 80% of Visa/MasterCard's credit card purchase volume

Table 12: Top 10 U.S. Visa & MasterCard Credit Card Issuers - 2014

Issuer	Purchase Volume (\$bn)	Market Share	Receivables Outstanding (\$bn)	Cards Outstanding (mm)	Primary Retail Brand
JPMorgan Chase	\$510	28%	\$130	96	Visa
Bank of America	\$271	15%	\$96	47	Visa
Citibank	\$209	11%	\$80	51	V/MA
Capital One	\$176	10%	\$73	82	V/MA
U.S. Bancorp	\$102	6%	\$33	18	Visa
Wells Fargo	\$97	5%	\$35	17	Visa
Barclays	\$58	3%	\$21	14	V/MA
USAA Savings	\$34	2%	\$16	6	V/MA/AmEx
PNC Bank	\$25	1%	\$6	4	Visa
Cabela's	\$20	1%	\$4	3	Visa
Total Top 10	\$1,501	82%			
Total Bankcard Volume	\$1,820	100%			

Source: J.P. Morgan estimates for primary brand, otherwise The Nilson Report.

Airline Co-Branding Evolving to a More Level Playing Field

In credit, co-branding and rewards can go a long way to drive customer acquisition, evidenced by the success of co-branded airline credit cards. **Table 13** and **Table 14** below summarize network co-brand partners for the top ten airlines in North America in 2012 and 2015.

Visa had the majority share in 2012, with partnerships with 5 of the top 10 airlines, including 3 of the top 5. This compared to MasterCard, which was aligned with only three of the top 10 airlines, with its largest partner being US Airways (5th largest in North America in merger agreement with American Airlines).

Since then, M&A has changed the mix of the top 10 domestic airlines. Visa has 4 of the top 10 airlines, and has an even mix of the top five with American Express. MasterCard is partnered with American Airlines as well as two other airlines in the top ten (WestJet and Spirit).

We think it is unlikely that any of these partnerships will open up (absent M&A), and believe it will be difficult for new entrants to gain share through airline partnerships. However, innovative strategies to gain access to merchants (witness Chase Merchant Services) could allow issuers to offer differentiated rewards that rival those offered by three-party systems like American Express.

Table 13: Top 10 North American Airlines and Brand Affiliation - 2012

Airline	Credit Card Issuer	Primary Network
Delta	American Express	American Express
United	Chase	Visa
Southwest	Chase	Visa
American	Citi	Visa
US Airways	Barclaycard	MasterCard
Air Canada	American Express/CIBC	American Express/Visa
JetBlue	American Express	American Express
Alaska	Bank of America	Visa
WestJet	RBC	MasterCard
Frontier	Barclaycard	MasterCard

Source: Company reports and J.P. Morgan estimates.
Note: Airlines ranked by number of passengers

Table 14: Top 10 North American Airlines and Brand Affiliation - 2015

Airline	Credit Card Issuer	Primary Network
American	Citi	MasterCard
Delta	American Express	American Express
Southwest	Chase	Visa
United	Chase	Visa
Air Canada	American Express	American Express
JetBlue	American Express	American Express
Alaska	Bank of America	Visa
WestJet	RBC	MasterCard
Aeroméxico	US Bank	Visa
Spirit Airlines	Bank of America	MasterCard

Source: Company reports and J.P. Morgan estimates.
Note: Airlines ranked by number of passengers

Recent Issuer and Co-Brand wins.

Competition for U.S. credit card issuer relationships has heated up over the past few years, as MasterCard aims to revitalize its credit card portfolio. MasterCard has announced a number of smaller wins (mostly retail co-brands, the largest being Target, which generates about \$9bn in purchase volume annually) and renewals over the past year or so, but Visa has announced larger wins and renewals, highlighted by the Chase (from MasterCard) and Costco co-brand (from American Express) wins, which could be worth \$40bn and \$80bn in annualized purchase volume according to company data and The Nilson Report. Table 15, below, summarizes notable wins and expansion agreements.

Table 15: Notable Wins and Expansion Agreements

MasterCard			Visa		
Issuer		Win/Renewal	Issuer		Win/Renewal
American Airlines (co-brand)		Renewal	Costco (co-brand)		Won (from AMEX)
Hawaiian Airlines (co-brand)		Win	Chase (consumer credit)		Renewal Expansion
Sam's Club (co-brand)		Won (from Visa)	BofA		Renewal Expansion
Walmart (co-brand)		Won (from Visa)	Southwest Airlines		Renewal
BJ's Wholesale (co-brand)		Won (from Visa)	Hyatt Hotel and Resorts		Renewal
Target (co-brand)		Won (from Visa)			
BofA (commercial credit)		Renewal Expansion			
HSBC (consumer credit)		Renewal Expansion			

Source: Company reports.

U.S. Debit Snapshot

Table 15 below summarizes the top debit card issuers based on purchase volume and cards outstanding. We observe the top 10 debit card issuers account for over 50% of Visa/MasterCard's debit card purchase volume. We also list the primary network brand of each bank, but acknowledge that most use both brands in some capacity. **Table 16** ranks the top 10 domestic PIN debit issuers; we note that this ranking differs from top overall debit issuers.

Table 15: Top U.S. Debit Card Issuers – 2013

\$ in billions

Issuer	Total Debit Volume (\$bn)	Market Share	Signature Volume (\$bn)	Cards Outstanding (mm)	Primary Brand
Bank of America	\$274	15%	\$154	44	Visa
Wells Fargo	\$247	14%	\$146	53	Visa
JPMorgan Chase	\$183	10%	\$112	40	Visa
PNC Bank	\$54	3%	\$35	12	Visa
U.S. Bancorp	\$52	3%	\$33	41	Visa
The Bancorp Bank	\$40	2%	\$10	60	Visa
USAA Savings	\$39	2%	\$24	7	MasterCard
TD Bank	\$32	2%	\$20	7	Visa
Regions Bank	\$31	2%	\$17	5	Visa
SunTrust	\$31	2%	\$19	6	MasterCard
Citibank	\$29	2%	\$16	27	MasterCard
BB&T	\$26	1%	\$15	4	Visa
Capital One	\$26	1%	\$19	5	MasterCard
Fifth Third	\$24	1%	\$19	6	MasterCard
Navy FCU	\$22	1%	\$16	5	Visa
Total Top 15	\$1,112	62%			
Total Debit Volume	\$1,805	100%			

Source: The Nilson Report.

Table 16: Top U.S. PIN Debit Card Issuers - 2013

Debit Card Issuer	Primary Signature Brand	PIN Brands	PIN Volume (\$bn)	PIN Transactions (mm)
Bank of America	Visa	• Pulse, Maestro, Interlink, STAR	\$115	2,767
Wells Fargo	Visa	• Accel, Interlink, Jeanie, Maestro, NYCE, Pulse, Time, Shazam, STAR	\$98	2,480
JPMorgan Chase	Visa	• Pulse, Interlink, Maestro	\$60	1,499
PNC Bank	Visa	• Interlink, STAR	\$18	464
U.S. Bancorp	Visa	• Interlink, NYCE, Pulse	\$16	389
USAA Savings	MasterCard	• Maestro, NYCE	\$15	351
Regions Bank	Visa	• Interlink, STAR	\$14	355
TD Bank	Visa	• NYCE, Interlink	\$12	286
SunTrust	MasterCard	• Maestro, STAR, Interlink	\$12	300
BB&T	Visa	• Interlink, STAR	\$11	268

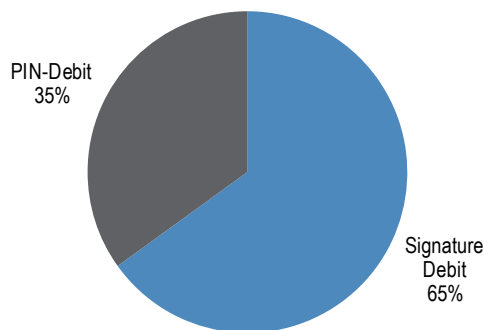
Source: The Nilson Report and J.P. Morgan estimates.

PIN vs. Signature

Debit cards can be authenticated in two distinct ways: PIN or signature. Authentication method should not be mistaken with “PIN” and “signature” networks. PIN networks, also known as EFT networks, originated as ATM networks that evolved to include point-of-sale acceptance in the 1990s. PIN networks employ single message authentication, whereby all data necessary for the authorization,

clearing and settlement of a transaction are sent across the network. Signature networks employ dual message transaction, whereby an initial message is sent to request authorization, later a separate second message is sent for clearing and settlement of the same transaction. The dual-message transaction is optimal for environments where an initial authorization is required, with a second message to close it out - examples include restaurants (to accommodate tips after the card is authorized, hotel stays, car rentals and gas purchases). In 2014, roughly 65% of debit transactions were processed via signature (i.e., dual message), with the remaining 35% processed over PIN (i.e., single message) networks. This ratio has generally held steady the last few years.

Figure 28: U.S. Debit PIN vs Signature Transaction Share



Source: The U.S. Federal Reserve

EMV Creating Chip & PIN vs. Chip & Choice Debate

Since the United States is one of the last to convert to chip technology after decades of mag-stripe swipe and signature authentication, it is reasonable to expect some consumer confusion as chip cards are deployed. To minimize confusion, Visa is promoting chip-and-choice, allowing consumers to authenticate a chip-card with a signature (instead of mandating PIN). However, certain merchants like Walmart strongly prefer chip-and-PIN as a stronger authentication type (hard to steal someone's PIN) to 1) minimize fraud and 2) lower network fees since PIN authentication has a more level playing field for EFT/ATM debit networks to compete for debit business via price. The benefit of chip-and-choice is that it minimizes the culture shock of having consumers punch in PINs and merchants having to change their checkout workflow to accommodate PIN (e.g. restaurants, hotels).

Durbin 101

In June of 2011, the Federal Reserve released its final debit interchange regulation guidelines, which capped debit interchange rates (for banks with more than \$10bn in assets) at \$0.21 plus 5bps per transaction (~50% reduction) and required debit issuers to enable at least one non-affiliated PIN-debit network (essentially a PIN network **not** owned by the brand on the front of the card) on all debit cards. The net effect was (1) reduced debit interchange income for card issuers, (2) lower total acceptance

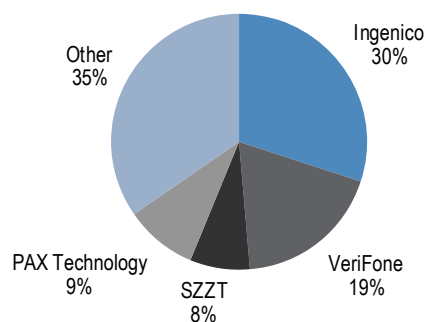
costs for merchants and (3) in some cases wider spreads/profits for merchant acquirers that pocketed a portion of the interchange reduction, (4) decreased pricing power to the payment networks, who increasingly offered merchants and acquirers rebates to attract PIN-debit volume, and (5) share shift away from Visa Interlink towards other PIN-debit networks (most notably MasterCard Maestro). We note smaller banks (those with less than \$10bn in assets) were exempt from these rules and continue to earn PIN-debit interchange rates, which still exceed 100bps of the purchase amount in some cases.

Debit regulation disrupted the competitive balance in the payments space, as the large payment networks, which previously had considerable pricing powers over merchants and acquirers, were forced to compete more aggressively (in the form of rebates and incentives) for transaction volume. The interchange reduction and new routing requirements went in effect October 1, 2011 and April 1, 2012, respectively. The merchants did sue the Federal Reserve after the rules went into effect seeking more favorable rules, and won an initial ruling, but later lost in the Circuit Court of Appeals.

POS Terminal Provider Snapshot

The POS terminal space is dominated by two providers following VeriFone's 2011 acquisition of Hypercom. As shown in **Figure 29** below, Ingenico holds the largest market share with 30%, while VeriFone holds a 19% share. According to The Nilson Report, global POS terminal shipments grew 11% to ~22 million units in 2013, driven by high 20% unit growth in emerging markets (like Asia Pacific and Middle East/Africa) and single-digit declines in more developed markets. Canada saw flat unit growth while the US saw a 3% decline in terminal shipments in 2013. **Figure 30**, below, shows the number of units shipped by region. We note the emerging markets, which we define as Asia Pacific, Latin America and the Middle East accounted for ~71% of all terminal shipments in 2013, and have progressively been becoming a greater driver of overall global shipments (compare to 30% in 2005).

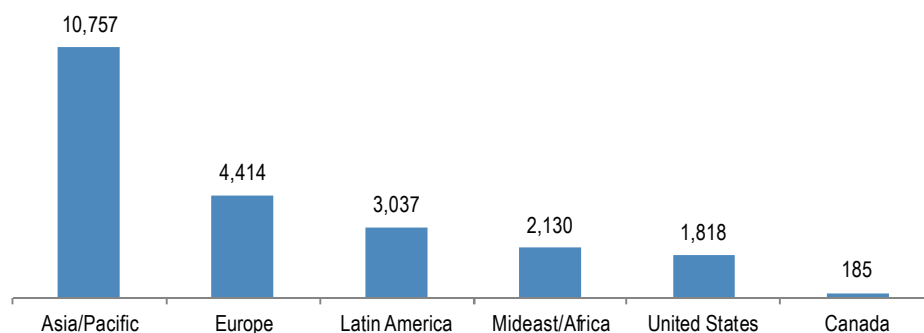
Figure 29: POS Terminal Global Market Share - 2013



Source: The Nilson Report and J.P. Morgan calculations.

Figure 30: POS Terminal Shipments by Region - 2013

POS Shipments in thousands



Source: The Nilson Report

EMV Penetration

Roughly 90% of terminals sold in the U.S. were EMV compliant, included 66% in the SMB, which is expected to increase to 80% in FY15, according to VeriFone Management. VeriFone estimates the U.S. is currently 35% penetrated and expects the market to be 50-55% penetrated by the EMV deadline in October 2015. Drilling deeper, tier 1 merchants are roughly 70% penetrated and should reach 90% by year

end. Tier 2-3 merchants are 35% penetrated, and should reach 55% by year end. SMB penetration is only 22% and should double by year end, according to Management.

Table 17: US Merchant EMV Penetration

	# of Lanes	# of Terminals	EMV Penetration	Proj. 2015 Penetration
Tier 1 (Top 200)	1,800,000	1,800,000	70%	90%
Tier 2 (201-1000)	600,000	460,000	37%	60%
SMB	9,100,000	6,800,000	22%	40%

Source: Company reports.

Table 18, below, shows EMV card penetration and terminal attachment rates across various regions.

Table 18: EMV Global Adoption 2013

Region	EMV Cards (M)	Adoption rate %	EMV Terminals (M)	Adoption rate %
Canada LatAM and Carribean	471	54.20%	7.1	84.70%
Asia Pacific	942	17.40%	15.6	71.70%
Africa and Middle East	77	38.90%	699	86.30%
Europe Zone 1	794	81.60%	12.2	99.90%
Europe Zone 2	84	24.40%	1.4	91.20%

Source: EMVCo, figures as of 4Q 2013.

Table 19, below, shows EMV authentication rates across various regions.

Table 19: Percent of Card Present Transactions that are EMV

Region	%
Canada LatAM and Carribean	83.33%
Asia Pacific	19.42%
Africa and Middle East	75.90%
Europe Zone 1	96.33%
Europe Zone 2	50.47%
The US	0.03%

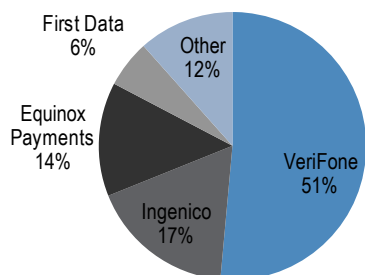
Source: EMVCo, figures as of 4Q 2013.

Geographical Market Shares

Below we summarize regional market share for leading POS terminal providers. We note Ingenico and VeriFone have a dominant share in every region except Asia and Mideast/Africa. We attribute their relatively small share in Asia (~29%) to two factors 1) an abundance of local low-cost POS terminal vendors in the region and 2) the fact that most payment volume is processed over domestic payment schemes (rather than Visa or MasterCard). In Mideast/Africa, local providers has created greater POS competition.

Figure 31: United States POS Market Share - 2013

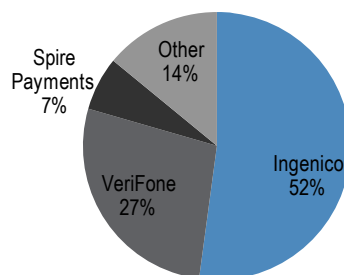
Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

Figure 32: Europe POS Market Share - 2013

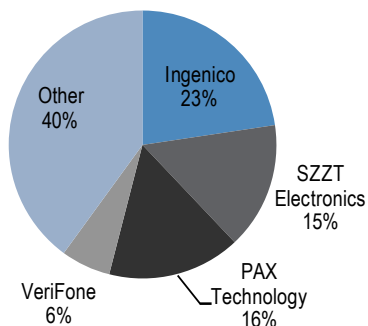
Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

Figure 33: Asia Pacific POS Market Share - 2013

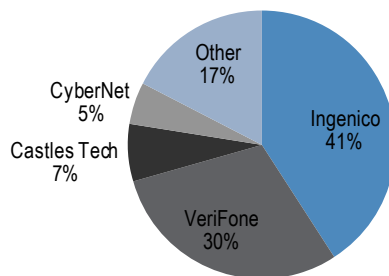
Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

Figure 34: Latin America POS Market Share - 2013

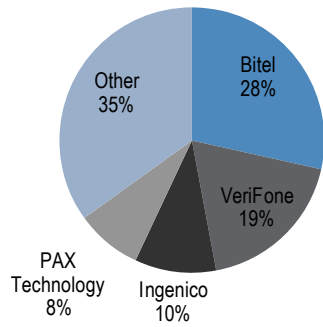
Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

Figure 35: Middle East/Africa POS Market Share - 2013

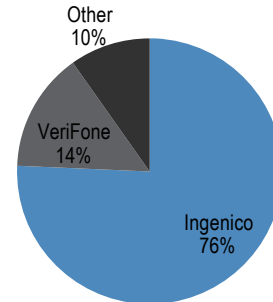
Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

Figure 36: Canada POS Market Share – 2013

Based on units shipped



Source: The Nilson Report and J.P. Morgan estimates.

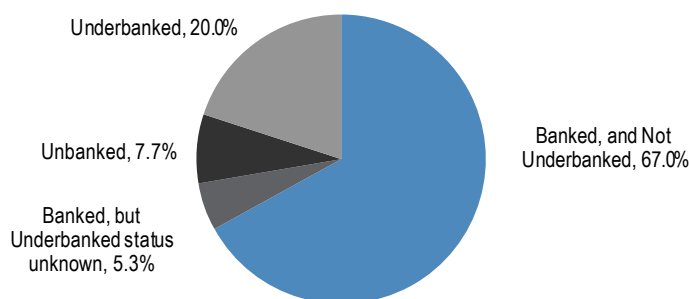
The Prepaid Card Market

What is prepaid?

We define prepaid as General Purpose Reloadable (GPR) debit cards. GPR prepaid debit cards are designed for general spending and can be used anywhere the brand (e.g. Visa/MasterCard/American Express) is accepted, including online, for bill payments, as well as at traditional point-of-sale and ATM locations. GPR prepaid cards can be reloaded for ongoing long-term use, whereas gift cards cannot, and require more rigorous identification verification requirements. GPR prepaid cards are an ideal cash substitute, enabling card-based payments for the unbanked population and providing an effective budgeting tool for traditionally banked consumers.

We size the target market for prepaid at 68 million U.S. adults (vs. 60 million in 2010), comprised of (1) underbanked individuals (~51M) and (2) unbanked individuals (~17M). The target market could be stretched to cover more adults that might use the card for special situations (e.g., extended account for children or nanny) or for security/privacy reasons or consumers disenfranchised by banks. We consider this market to include adults in households that earn less than \$75k in annual income and have bank accounts (~100M).

Figure 37: Banking Status of U.S. Households - 2013



Source: FDIC National Survey of Unbanked and Underbanked Households.
Note: Based on 41M U.S. households.

The prepaid market remains modest, but is poised to grow

Prepaid is still in its infancy, with penetration at only 12% in the U.S. according to an October 2014 FDIC study. As shown in **Table 20** below, this is up from 10% in 2009, with stronger growth among unbanked (27% vs. 12% in 2009) and underbanked (20% vs. 16% in 2009) households.

Table 20: Prepaid Usage Across U.S. Households

	2009	2011	2014
Unbanked	12.2%	17.8%	27.1%
Underbanked	16.0%	16.0%	19.6%
Fully Banked	8.1%	7.3%	8.8%
Total Households	9.9%	10.1%	12.0%

Source: FDIC National Survey of Unbanked and Underbanked Households.

Prepaid is still in its infancy, with penetration at 12% in the U.S. and 27% among the unbanked

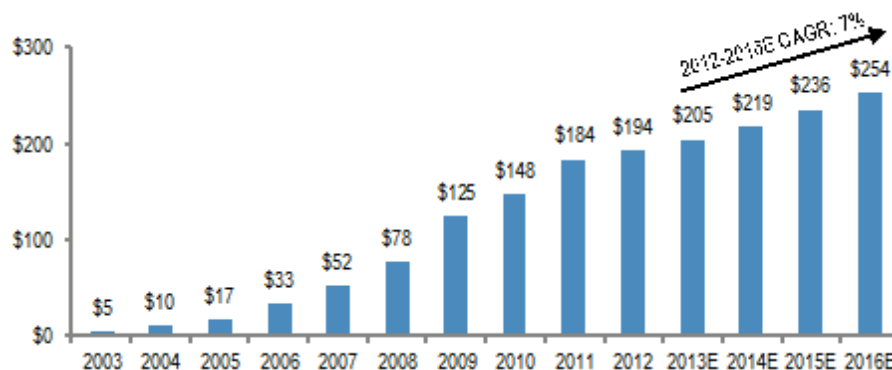
There are several market forces at work driving demand for general purpose reloadable (GPR) prepaid debit cards, ranging from the theme of financial inclusion (i.e., empowering the underserved), to backlash from rising bank fees (making prepaid more attractive for consumers), to prepaid being carved out from financial reform (resulting in unregulated secular growth)—underpinned by the pervasive secular growth in card-based payments.

Figure 38 below illustrates industry consultant prepaid industry projections from 2013. The Mercator Advisor Group estimates total load on open loop prepaid cards, which includes GPR prepaid, will increase from ~\$194 billion in 2012 to ~\$254 billion by 2016, representing 7% compound annual growth.

We believe actual prepaid industry growth has lagged the Mercator projections, with GDOT growing organic GDV load at a 1-2 point discount from this projection. We note that the below projection from 2013 was moderated from Mercator's prior 20% CAGR due to regulatory fears and government defunding of public programs that disburse funds via prepaid instruments.

Figure 38: U.S. Open Loop Prepaid Card Load: 2003-2016E

\$ in billions



Source: Mercator Advisory Group.

Players in the Prepaid Value Chain

Figure 39 below outlines the different key industry players throughout the prepaid industry. The industry players are similar to that of card payments with the addition of a program manager that advertises and markets the card program. Key prepaid players include bank issuers (U.S. Bancorp, MetaBank, Synovus, etc), program managers (Green Dot, NetSpend/TSYS, Western Union, etc), networks (Visa, MasterCard, American Express) and processors (FIS, First Data, MasterCard, TSYS, Visa).

Figure 39: Players in the Prepaid Value Chain

Bank Issuer	<ul style="list-style-type: none"> ■ Card issued by a bank ■ Funds reside at the bank; takes fraud risk, earns float ■ Bank sets fees and handles cardholder registration process / compliance ■ Examples: GE Money, MetaBank, Synovus, Chase, U.S. Bancorp
Program Manager	<ul style="list-style-type: none"> ■ Builds the card programs on bank processing platform ■ Markets the programs leveraging consumer insight, brand and distribution channels ■ Pays and manages advertising, card production, card processing, call center expenses ■ Examples: Green Dot, NetSpend, Western Union, AccountNow, Incomm, Blackhawk
Network	<ul style="list-style-type: none"> ■ Card transactions go through the networks' platforms ■ Manage relationship between issuer and merchant acquirer; sets interchange ■ Manage ATM networks and provide zero liability and zero floor limit policies ■ Examples: American Express, MasterCard, Visa
Processor	<ul style="list-style-type: none"> ■ Processors contract directly with the bank issuer ■ Hold balance of record and process all prepaid card transactions ■ Provide card functionality ■ Examples: FIS, First Data, TSYS, Visa

Source: Company reports and J.P. Morgan estimates.

Prepaid Sources of Revenue

Prepaid providers earn revenue from a mix of transaction and maintenance fees paid by cardholders that buy and use the provider's cards.

Cardholder fees vary by the provider and the prepaid program, but generally can include a mix of the following: activation fees, monthly maintenance fees, out of network ATM fees, card replacement fees, money transfer load fees and penalty fees. **Table 21** below summarizes the fee schedules of some of the major domestic prepaid providers. We note that fee disclosure within the industry has improved over the past few years, partially due to the Center for Financial Services Innovation's (CFSI) 2012 proposal for a standardized fee disclosure box.

Providers also earn interchange fees paid by retailers on purchases made using the cards, which is based on spending volume. This can vary depending on usage activity of the prepaid provider's consumer base. For example, Green Dot (GDOT), one of the largest domestic prepaid card providers, earns approximately 30% of its revenues through interchange fees, with the remaining 70% coming from cardholder fees.

Additional sources of revenue include float income on the load volume held by the prepaid provider, and reload network revenue from prepaid card managers that own their own reload network.

Table 21: Prepaid Fee Schedule

Card		Activation Fee	Monthly Fees	Inactivity Fee	Deposit/Reload Fees	Purchase Fees	ATM Withdrawal	ATM Declined	New Card
Green Dot		None	\$5.95	None	Up to \$4.95	None	\$2.50 (none in network)	\$0.50 (none in network)	\$4.95
Walmart Money Card		Up to \$4.00	\$3.00	None	Up to \$4.95	None	\$2.00 (none in network)	\$2.00 (none in network)	\$3.00
	Pay as You Go	None	None	\$5.95/month	Up to \$4.95	\$1 Signature \$2 PIN	\$2.50	\$1.00	\$3.95
NetSpend Visa	FeeAdvantage	None	\$9.95	\$5.95/month	Up to \$4.95	None	\$2.50	\$1.00	\$3.95
	Premier	None	\$5.00	\$5.95/month	Up to \$4.95	None	\$2.50	\$1.00	\$3.95
	FeeAdvantage								
Emerald Card		None	None	\$4.95/month	Up to \$4.95	None	\$2.50	\$1.50	None
	Pay as You Go	None	None	\$5.95/month	Up to \$4.95	\$1 Signature \$2 PIN	\$2.50	\$1.00	\$3.95
Western Union NetSpend Prepaid	Monthly	None	\$9.95	\$5.95/month	Up to \$4.95	None	\$2.50	\$1.00	\$3.95
	FeeAdvantage	None	\$5.00	\$5.95/month	Up to \$4.95	None	\$2.50	\$1.00	\$3.95
	Premier								
	FeeAdvantage								
AmEx Serve		None	\$1.00	None	Up to \$3.95	None	\$2.50 (none in network)	\$2.50 (none in network)	None
AmEx Bluebird		None	None	None	Up to \$4.95	None	\$2.50 (none in network)	\$2.50 (none in network)	None
	Pay as You Go	\$3.95-\$9.95	None	\$1.95/month	Up to \$4.95	\$1	\$2.50 (none in network)	None	\$4.95
Rush Card	Unlimited	\$3.95-\$9.95	\$7.95	None	Up to \$4.95	None	\$2.50 (none in network)	None	\$4.95
AccountNow	Gold	None	\$9.95	None	Up to \$4.95	None	\$2.50	\$1.00	\$10.00
	Classic	\$4.95	None	None	Up to \$4.95	\$1	\$2.50	\$1.00	\$10.00

Source: Company reports and J.P. Morgan estimates.

Note: Inactivity fees generally charged after 3 months of inactivity.

Prepaid Competitive Landscape

Table 22, below, provides a current snapshot of the domestic GPR prepaid card landscape. We note that the prepaid market remains nascent, with new players (both banks and independent providers) continuing to enter the space.

Table 22: GPR Prepaid Card Market Share (by Active Accounts)

Prepaid Card Provider	% Share of Active Accounts
Green Dot	30% - 40%
NetSpend (TSYS)	20% - 30%
H&R Block	10% - 20%
Bluebird (American Express)	~5%
Serve (American Express)	~5%
InComm	<5%
RushCard	<5%

Source: Company reports and J.P. Morgan estimates.

- Green Dot is currently the largest prepaid provider in the US, with approximately 30%-40% market share of active prepaid accounts by our estimate. GDOT's dominant market share has been aided by its previously exclusive retail relationship with Walmart, which provided an unparalleled distribution network. Recent M&A has added to the company's account total, including AccountNow and AchieveCard.
- NetSpend is the second largest prepaid provider by active accounts, with a market share of 20% - 30%. The company has grown its account base through a distribution network comprised primarily of check cashers (notably ACE Cash Express), alternative financial solutions outlets and some retail locations. In addition, NTSP serves as the exclusive program and distribution manager for

PayPal's prepaid GPR card offering and serves as the Western Union prepaid program manager. NetSpend has operated as a subsidiary of TSYS since the July 2013 acquisition.

- H&R Block's Emerald Card sources its account base from tax refunds. We believe the Emerald Card's market share can fluctuate from 10%-20% based on seasonality.
- American Express's two GPR prepaid card offerings are Bluebird and Serve. We believe both Bluebird and Serve have approximately 5% market share each,. American Express introduced Serve in 2011 as a digital payments platform with affiliated prepaid card. Both cards are offered in Walmart locations, with Bluebird launched at WMT in late 2012 and Serve added to WMT's prepaid offerings in April 2014.
- We believe both the RushCard and InComm's OneVanilla prepaid cards have a market share of less than 5%. RushCard recently entered the retail market through a partnership with Green Dot.

Mobile Payments Snapshot

This section includes contributions from J.P. Morgan Internet Analyst Doug Anmuth and his team.

We define mobile payments to include mobile acceptance, mobile wallets and mobile commerce, all of which go beyond payments to emphasize rewards and offers

Excitement surrounding mobile payments remains high, evidenced by the glut of mobile payment products and vendors chasing a nascent, but promising growth market. To date, we believe the majority of mobile payment volume generated is new and not coming at the expense of card-based payments, as cannibalization is likely a longer-term threat. We define mobile payments to include mobile acceptance, mobile wallets and mobile commerce, all of which go beyond payments to emphasize rewards, offers and enhanced checkout experiences. We view mobile as a multi-year journey, and see a faster growth opportunity than e-commerce, recognizing adoption could be slow as e-commerce still represents less than 10% of retail sales today and mobile-commerce representing only 12% penetration of e-commerce spend.

Mobile Is a Positive Theme in Facilitating Secular Growth in Payments – Incumbents Well Positioned

Overall, we view mobile payments to be a positive theme for the sector, representing a natural extension of the secular shift towards electronic payments. While mobile could create a more level playing field and introduce more disruptors into the ecosystem, we believe scale still matters most and incumbents remain vital to the mobile evolution, assuming they can adapt.

We see minimal incremental innovation or cost savings potential in reinventing the authorization, clearing and settlement (ACS) of a transaction. Visa/MasterCard (as networks) have developed/governed ACS over the last five decades at scale, moving \$8 trillion annually with a dial-tone quality and earned trust of consumers that will be difficult to replicate with over 30 million accepting merchant locations worldwide. Thus, we see limited network disintermediation risk, and believe the vast majority of mobile payments will ride the rails of existing payment network infrastructure like Visa, MasterCard, American Express and Discover in the foreseeable future. Network disintermediation risk is low in our view, unless a trusted tech entity can convince consumers to grant them direct access to their money/bank accounts, which is very difficult given the complexity of money movement. The more likely outcome, in our view, is that new vendors/providers will partner with the networks to piggy back off the ubiquity of cards and insert themselves in the payment food chain (most likely in front of consumers) similar to Apple Pay.

Disruption Risk Is Greatest at Edge of Network

Where we see the most disruption risk is at the edge of the network, notably tech vendors that serve merchants and consumers, especially those that do not underwrite settlement risk. Examples of vendors at risk of disintermediation include POS tech vendors (e.g. VeriFone, Ingenico, electronic cash registers) and sub-scale merchant acquirers. This shouldn't be surprising, as the rising popularity of social networks, self-service apps and smartphones/tablets and the convergence of the online and brick-and-mortar worlds have increased consumer demand for more dynamic ways to consummate payments and forced merchants to develop omnichannel retailing and payment platforms. What technology wins out is unclear, but winners should be those that can socialize payments or accelerate commerce for the benefit of both consumers and merchants.

Socializing Payments = Accelerated Commerce => Bigger than Just Mobile

We see continued focus on socializing payments in 2015 or the concept of marrying intelligent search, loyalty, personalized offers/campaigns, analytics and expedited

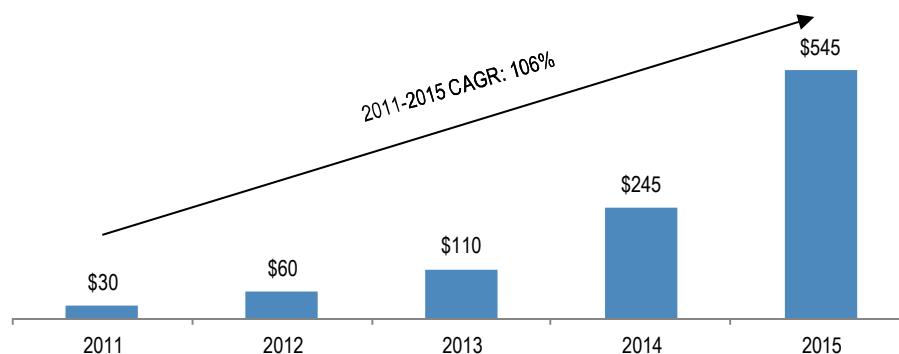
checkout to a payment transaction for the benefit of (1) a better customer experience and (2) greater sales to merchants. A key learning from mobile payments so far is that old fashioned swiping of mag-stripe cards is hard to beat for its convenience and familiarity. To convince consumers and merchants to try something different, there must be a clear benefit to all parties, and the benefit does not necessarily need to be forced into a mobile phone factor. However, elements of the mobile phone such as geo-fencing, unique user authentication and push notifications of personalized offers can be powerful tools to accelerate commerce conducted by increasingly intelligent consumers. Look for acquirers, networks and processors to embed more socialized digital solutions into their core offerings to drive up consumer and merchant loyalty and fees. An example would be Chase's deal with Visa to enable JPM's ChaseNet.

Rapid Projected Growth in Mobile Payments

Industry analysts have projected rapid growth in mobile payments. As shown in Figure 40 below, McKinsey projected a 106% CAGR for worldwide mobile payments volume from 2011 through 2015. Figure 41

Figure 40: Projected Worldwide Mobile Payments Volume

\$ in billions



Source: McKinsey & Company, IE Market Research.

Mobile Likely to Be Card Friendly in Foreseeable Future

With the exception of PayPal and upstarts like Dwolla and MCX, we believe the vast majority of mobile payment solutions are card-based or leverage the existing card networks like Visa, MasterCard, Discover and Amex. In other words, we see very few retail payment players building business models focused on ACH funding (instead of card funding) where the vendor taps directly into a consumer's checking account via the ACH network. We believe this is the case because payment processing is a scale business, especially authorizing, clearing and settlement of transactions, and the existing networks command formidable scale and trust to deliver low cost payment acceptance. Moreover, we see considerable inertia for consumers to try new forms of payments, since cash and cards are tough to beat in terms of ubiquitous acceptance and trust/security. While mobile can level the playing field in terms of building consumer adoption, we believe payment applications need to be card friendly to gain broad adoption, because the alternative would require consumers to trust a disruptor enough to grant them access to their checking accounts, which is a challenge.

Defining Mobile Payments

We categorize mobile payments into three broad categories: mobile acceptance, mobile wallets and mobile commerce.

In a Motorola Solutions survey of retailers, 71% said better customer service would be the primary goal for using mobile POS

- **Mobile Acceptance.** Defined as enabling a merchant to accept card-based payments by converting a mobile device into a POS system.
- **Mobile Wallets.** Defined as an application resident in a mobile device that serves as a digital substitute for a leather wallet – use your mobile device in lieu of swiping a card.
- **Mobile Commerce.** Defined as e-commerce conducted over a mobile device, mobile commerce (or m-commerce) covers all facets of facilitating a purchase over a mobile device.

Mobile Acceptance

We consider mobile acceptance to be the most immediate opportunity across the three mobile payments sub-segments. We define mobile acceptance as the conversion of a mobile device into a point-of-sale terminal or system. This market includes 1) dongles aimed at casual or micro merchants, (2) mobile checkout or line-busting whereby a merchant salesperson uses a mobile device to checkout paying customers away from the cash register, and (3) mobile POS where a feature rich mobile device or tablet replaces a POS system entirely.

Dongles. There's an estimated 20+ million casual merchants in the U.S. that currently do not accept card-based payments but could by converting a mobile phone or tablet into a card reader via a dongle. In other words, mobile phone and tablet card readers could do to the physical world what PayPal did to the online space over 10 years ago, by allowing casual merchants that previously couldn't afford to maintain a merchant account with a cost effective means of taking credit or debit cards. Square invented this market, and many have since followed suit. This is a large revenue opportunity for merchant acquirers and networks alike, since it fuels cash conversion to cardable sales. Dongle providers include Square, Intuit, PayPal, PayAnywhere as well as wholesales like mPowa and Roam Data.

Mobile checkout or line-busting. High-touch retailers such as Apple and Nordstrom are embracing mobile checkout as a customer service to expedite checkout, increase throughput and increase square footage productivity (by reducing reliance on traditional checkout lanes). In most cases, mobile checkout is a supplement to existing point-of-sale systems, including bar code readers. Retailers that have embraced mobile checkout include Apple, FootAction, JCPenney, Nordstrom and Urban Outfitters. Sample vendors include Infinite Peripherals, Magtek, Symbol, VeriFone.

Mobile/Tablet/Cloud-Based POS. A budding area of mobile acceptance can also be found in mobile POS or next generation cash register solutions leveraging tablets and proprietary software (e.g. ERP for merchants including inventory management) to replace legacy POS systems. Specifically, the strategy here includes bundling a tablet, a secure card reader, a cash drawer and a printer to serve as the primary point-of-sale system for a merchant. The system would be driven by proprietary software or a virtual cash register application that can include complex ERP or order management functions like inventory management. Sample vendors include Clover (First Data), LightSpeed, NCR Silver, PayAnywhere, ShopKeep and Square. This universe can be extended to cloud-based POS, whereby checkout is invisible and happens behind the scenes, with Uber being the case study.

Mobile Wallets

Designed to transform mobile devices into payment devices, mobile wallets function as a platform to replace the leather wallet and digitally store payment credentials as

well as loyalty applications inside the phone. The market is crowded with wallet providers, but lack of standardization and acceptance has stunted adoption, though several vendors deserve close monitoring as listed in **Table 23** below.

Table 23: Mobile Wallet Schemes

Apple	Apple Pay	Wallet Brand	Parent	Niche
		Google Wallet	Google	<ul style="list-style-type: none"> NFC-based and compatible both in-store and online, linked with 20+loyalty programs, compatible w/ all cards, facilitates fast e=checkouts where Buy With Google button avail and Google Play. Also supports P2P payments integrated with Gmail. Offers no fee Google Wallet Card, a physical card for Google Wallet users to spend down the balance on their card at MasterCard locations. Acquired Softcard, former telco JV.
		CurrentC	MCX	<ul style="list-style-type: none"> QR-code, PIN-based payment app heavy with rewards and loyalty emphasis. Can fund via checking accounts, store gift cards and select store debit cards and credit cards. Pending commercial launch. Has exclusives with merchant partner/owners that operate over 110,000 locations.
		LevelUp	LevelUp (private)	<ul style="list-style-type: none"> QR-code-based, campaign focus model with 2.5M users and 14k businesses participating. ; LevelUp is a payment tender and merchant of record model
		Chase Pay	Chase	<ul style="list-style-type: none"> Bank-centric mobile wallet accepted at Chase Pay enabled merchants. Launch pending.
		Android Pay	Google	<ul style="list-style-type: none"> API layer to support payments on Android for online, app and offline purchases. Launch forthcoming
		PayPal	eBay (spin-out pending)	<ul style="list-style-type: none"> Flexible funding sources, unique phone-PIN authentication, omni-channel solutions, expanding physical merchants acceptance including Home Depot
		MasterPass	MasterCard	<ul style="list-style-type: none"> Wallet of wallets, can be white-labeled, leverages MasterCard PayPass acceptance
		Samsung Pay	Sumsung	<ul style="list-style-type: none"> Mobile payment application leveraging acquired LoopPay technology designed to work with exiting point-of-sale terminals. via Magnetic Secure Transmission as well as NFC. Embedded initially in Galaxy S6 for GA this summer.
		Visa Checkout	Visa Inc.	<ul style="list-style-type: none"> Branded checkout button for simplified checkout online. Over 3 million consumers and more than 100 of the largest e-commerce merchants

Source: Company reports and J.P. Morgan estimates.

What wallet technology will win out? There is a lot of confusion here as consumers, merchants and issuers must deal with a variety of authentication methods (PIN, NFC, QR-code, facial recognition, etc.) and credential storage options (cloud, secure element). In our view, the winning wallet must 1) be compatible both online and offline with simplified authentication no more complicated than swiping and signing/PIN-ing a card, 2) offer search, directory and review services, 3) integrate personalized and relevant offers/promotions, 4) be open and flexible to consumer funding options, 5) provide robust security and risk management and 6) take up a small footprint at the merchant with expedited checkout. In our view, the darkhouse group to watch is bank wallets, since banks are trusted entities with heavy mobile usage via mobile bank apps.

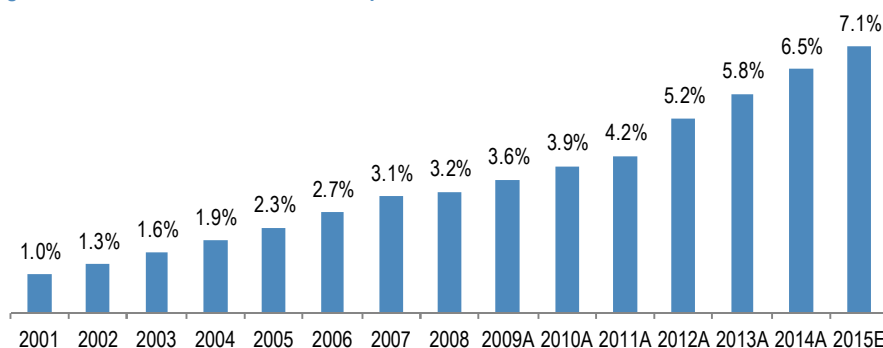
Apple Pay is likely the leader for now, given its brand and marketing weight, but still lacks broad merchant NFC acceptance (complicated by MCX claiming merchant exclusivity with its merchant owners) to claim ubiquity. We still await details on MCX's CurrentC launch, as well as how Google will respond with Android Pay, and of course Samsung Pay with a NFC workaround technology called Magnetic Secure Transmission and Chase's own wallet brand Chase Pay. With so many different brands and technologies and compatibility issues, we think consumer confusion will prevail and stunt growth in the near-term.

Revenue Model. Beyond offering a wallet as a merchant-of-record and earning spread fees (e.g. PayPal), we suspect most wallets will feed off of hosting and license fees and advertising/offer fees.

Mobile Commerce

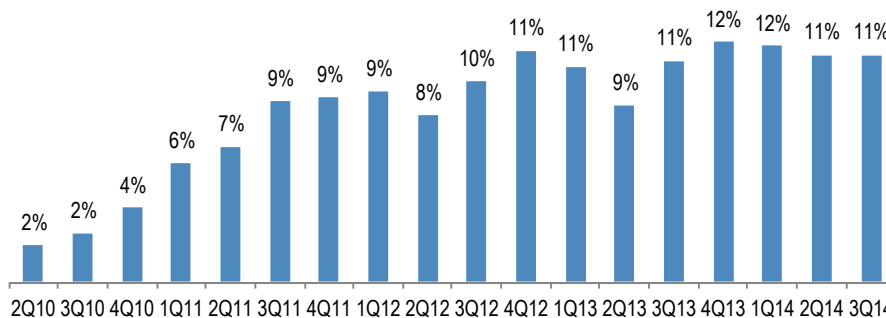
Somewhat forgotten with all the focus on mobile wallets and mobile acceptance, mobile commerce is growing rapidly at a premium to e-commerce off a smaller base. Currently, mobile commerce is estimated to represent about 19% of total e-commerce sales in the U.S. (**Figure 43**), while e-commerce represents about 7% of total retail sales according to comScore (**Figure 41**). This represents a lag to current internet usage statistics—approximately 63% of internet usage today is done via mobile device.

Figure 41: e-Commerce Share of Retail Spend



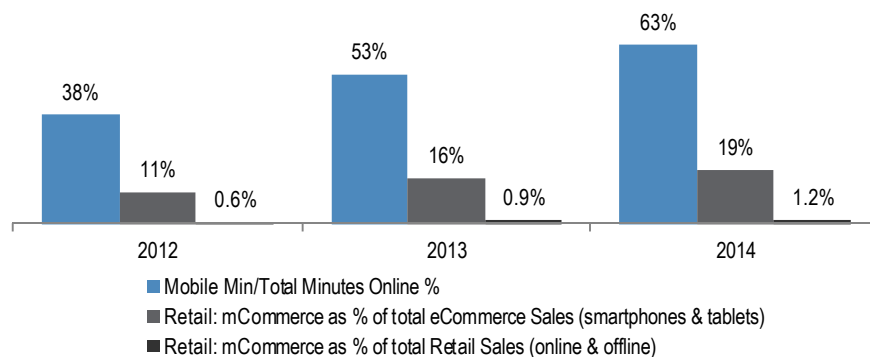
Source: US Department of Commerce E-Commerce Data, and J.P. Morgan estimates.

Figure 42: Percentage of Retail e-Commerce Dollars Spent via Mobile (Smartphone & Tablet)



Source: comScore Custom Mobile Research.

Figure 43: mCommerce Penetration vs. Mobile Internet Usage Penetration

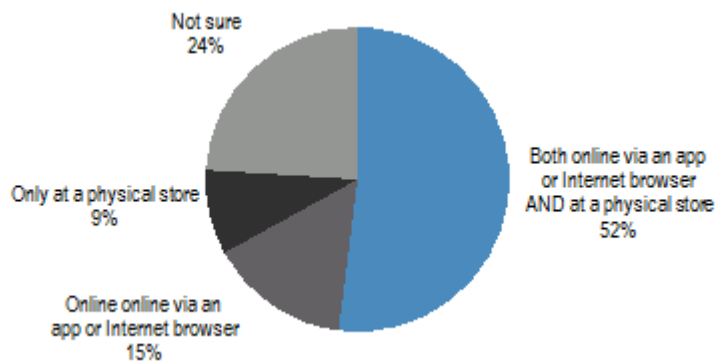


Source: eMarketer, comScore and J.P. Morgan estimates.

Mobile commerce is large enough of an opportunity that it is commonly managed distinctly from e-commerce, and given the complexity surrounding mobile, we see new revenue opportunities for processors/vendors to facilitate mobile payments for merchants, banks and MNOs.

The obvious challenge facing mobile commerce is that the checkout process on a mobile device can be unwieldy; so, simplified checkout without sacrificing security is a fundamental value proposition built into most mobile commerce models. PayPal solved this in e-commerce by creating a digital wallet built as a push model (on funding – PayPal is merchant of record) with simple e-mail/password authentication, but rivals view m-commerce as a second chance to reinsert themselves as a trusted enabler of mobile commerce transactions. The challenge is that many of the popular e-commerce retail sites like Apple, Amazon and Priceline all have one or two-click checkout built-in because enough consumers frequent and trust these sites to store their payment credentials at the site (to avoid re-populating shipping and payment information), making it hard for a new digital wallet to gain scale and sign up merchants and consumers (chicken-and-egg). As such, it is not surprising to see Amazon and FaceBook look to extend their single-sign on to include m-commerce checkout at participating merchants. Getting m-commerce right could ultimately be the answer for driving mobile wallet adoption. In the same comScore survey referenced above, 52% of respondents said they would prefer to use a digital wallet both online and at a physical store, with very low interest in only using a wallet exclusively at a physical store. We believe this bodes well for e-commerce leaders like PayPal and Visa, assuming they can effectively bridge offline with online commerce to become leaders in the early wallet war.

Figure 44: Where Would You Prefer to Make Purchases Using a Digital Wallet?



Source: comScore.

Developers Needed to Make M-Commerce Happen

Looking beyond digital wallets, the convergence of e-commerce and m-commerce has created a second wave of niche integrators looking to simplify the payment stack, offering everything from gateway services to payment design. Vendors include Braintree (PayPal), Stripe, Authorize.net, CyberSource (Visa), PayPal and MasterCard in addition to classic IT consultants like Accenture and Cognizant. Braintree, for instance, helped develop the payment application behind Uber (location-based car service) and LevelUp. We look for more creative m-commerce functions to emerge, and benefit these integrators for years to come.

Domestic Card Issuers

Table 24 and **Table 25**, below, summarizes prominent MasterCard and Visa debit and credit card issuers. The top 10 credit card issuers drive 82% of volume, while the top 10 debit card issuers comprise 55% of total debit card volume.

Bank Consolidation

Bank consolidation remains a threat to the payment networks and increases the possibility of client attrition and price compression.

Issuer consolidation creates increased pricing pressure on suppliers like card processors, as well as the risk of brand flips at the network level. We believe there is considerable cardholder attrition risk in flipping a credit card brand as cardholders do not like the disruption of learning a new card number and updating account numbers at recurring billers, which makes credit card brand relationships sticky. Moreover, the notion that credit card consumers tend to identify with the brand (more than the issuing bank) discourage issuers from changing brands.

In debit, we believe issuers prefer to have a single brand to market in a region for scale and continuity purposes. However, many issuers may use a second signature debit brand for co-branded cards or cards issued in specific/unique regions.

Table 24: Top 10 U.S. Visa and MasterCard Credit Card Issuers - 2014

Issuer	Purchase Volume (\$bn)	Market Share	Outstandings (\$bn)	Cards (mm)	Primary Retail Brand
JPMorgan Chase	\$510	28%	\$130	96	Visa
Bank of America	\$271	15%	\$96	47	Visa
Citibank	\$209	11%	\$80	51	V/MA
Capital One	\$176	10%	\$73	82	V/MA
U.S. Bancorp	\$102	6%	\$33	18	Visa
Wells Fargo	\$97	5%	\$35	17	Visa
Barclays	\$58	3%	\$21	14	V/MA
USAA Savings	\$34	2%	\$16	6	V/MA/AmEx
PNC Bank	\$25	1%	\$6	4	Visa
Cabela's	\$20	1%	\$4	3	Visa
Total Top 10	\$1,501	82%			
Total Bankcard Volume	\$1,820	100%			

Source: The Nilson Report.

Table 25: Top 15 U.S. Visa and MasterCard Debit Card Issuers - 2013

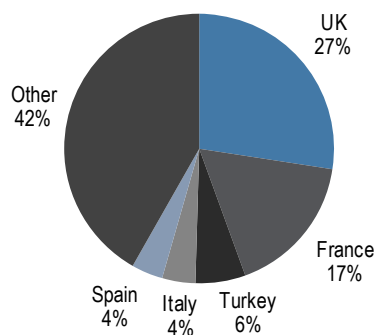
Issuer	Total Debit Volume (\$bn)	Market Share	Signature Volume (\$bn)	Cards (mm)	Primary Brand
Bank of America	\$274	15%	\$154	44	Visa
Wells Fargo	\$247	14%	\$146	53	Visa
JPMorgan Chase	\$183	10%	\$112	40	Visa
PNC Bank	\$54	3%	\$35	12	Visa
U.S. Bancorp	\$52	3%	\$33	41	Visa
The Bancorp Bank	\$40	2%	\$10	60	Visa
USAA Savings	\$39	2%	\$24	7	MasterCard
TD Bank	\$32	2%	\$20	7	Visa
Regions Bank	\$31	2%	\$17	5	Visa
SunTrust	\$31	2%	\$19	6	MasterCard
Citibank	\$29	2%	\$16	27	MasterCard
BB&T	\$26	1%	\$15	4	Visa
Capital One	\$26	1%	\$19	5	MasterCard
Fifth Third	\$24	1%	\$19	6	MasterCard
Navy FCU	\$22	1%	\$16	5	Visa
Total Top 15	\$1,112	62%			
Total Debit Volume	\$1,805	100%			

Source: The Nilson Report and J.P. Morgan estimates.

The European Payments Market

According to The Nilson Report, Europe generated nearly \$2.8 trillion in purchase volume and nearly 43 billion transactions on nearly 970 million cards in 2013. European bankcard payment penetration is approximately 22% vs. the Euro area. European payment penetration trails the U.S., Canada and Asia Pacific in all three of these measures. The U.K. and France are the largest markets, generating 40% of European purchase volume. Over the past year, the U.K. gained 100bps of market share while France lost 100bps. Distribution among the other countries remained steady.

Figure 45: European Purchase Volume Share (by Country) - 2013

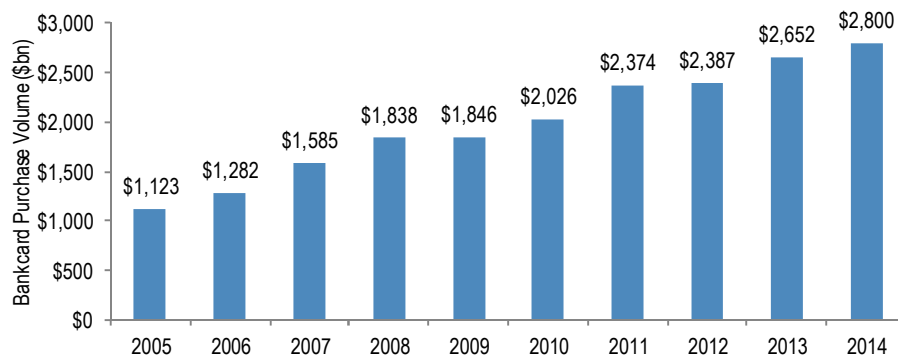


Source: The Nilson Report.

Figure 46 shows historic Eurozone bankcard purchase volume. We note purchase volume has increased at an 11% annualized rate since 2005.

Figure 46: European Bankcard Purchase Volume

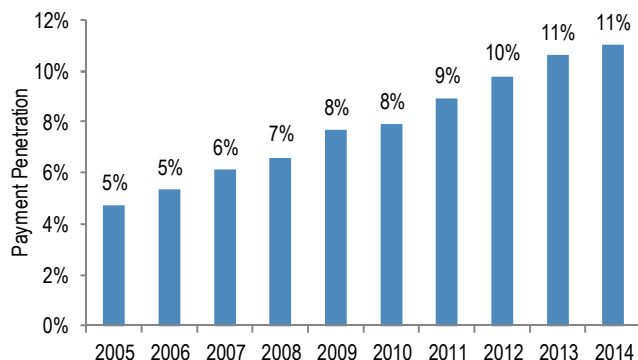
\$ in billions



Source: Visa Europe MasterCard company reports, J.P. Morgan estimates.

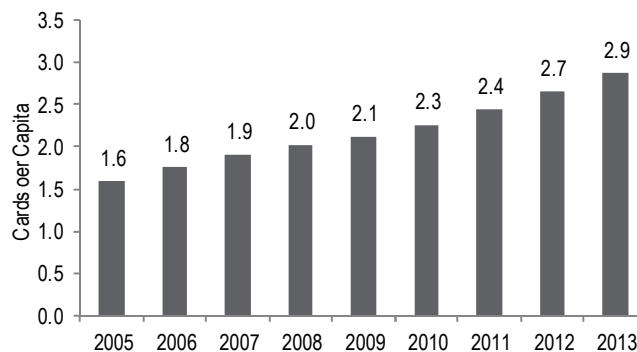
Figure 47 and **Figure 48** show historic Eurozone payment penetration and cards per capita. Payment penetration is calculated as V/MA purchase volume divided by GDP, while cards per capita is defined as total cards divided by the population over 15 years of age. Payment penetration has grown at a 7% annualized rate since 2005 while cards per capita have increased at an 8% annualized rate since 2005. The Eurozone's payment penetration is in line with the US; card levels trail Canada and the US but are ahead of the emerging markets.

Figure 47: Eurozone Payment Penetration



Source: J.P. Morgan Economic & Policy Research, Company reports and J.P. Morgan estimates.

Figure 48: Eurozone Cards per Capita



Source: The World DataBank, Company reports and J.P. Morgan estimates.

Watching Regulation

European Commission is capping consumer credit and debit card interchange fees at 30bps and 20bps respectively, expected to become effective later this year. While the fee reduction is meaningful, it is important to highlight that Europe is less interchange dependent as cardholder direct fees are common.

Based on the new fee structure, we see the greatest overall fee reduction in Poland (average MA/V fee reductions of 138bps/145bps), Germany (56bps/160bps) and Greece (93bps/59bps). More specifically, MasterCard branded cards would see the greatest average interchange reductions in Poland (138bps), Greece (93bps) and Spain (90bps), while Visa would see the greatest impact in Germany (160bps), Poland (145bps) and Greece (59bps).

The proposed rules would impact credit interchange more than debit, with MasterCard branded cards seeing an average 90bps reduction in base credit fees vs. 26bps in base debit fees. In turn, Visa Europe faces an average 65bps reduction in credit and 16bps in debit. Again, these are interchange fees earned by banks; Visa and MasterCard do not earn interchange revenue.

We calculate the approximate percent fee by dividing Visa and MasterCard country interchange fees (see **Table 27** for full listed fee) by Payworks' data on average country ticket size. For example, to calculate MasterCards's standard UK debit interchange fee in percent terms we took the original fee of £0.12 and divided it by the average debit ticket size of £52 to reach an average fee of 23bps.

Table 26: European Interchange Schedule (Calculated as % of Standard Ticket)

		Range		Standard		CNP		CNP (CVV2)	
Country	Network	Credit	Debit	Credit	Debit	Credit	Debit	Credit	Debit
Intra Europe (EEA)	MA	0.21% - 0.23%	0.20% - 0.22%	NA	NA	NA	NA	NA	NA
	V	0.27% - 0.33%	0.16% - 0.19%	0.27%	0.16%	0.33%	0.19%	0.33%	0.19%
Denmark	MA	0.45% - 0.60%	0.10% - 0.30%	0.60%	0.20%	NA	0.20%	NA	NA
	V	0.40% - 0.75%	0.20% - 0.30%	0.75%	0.30%	0.75%	0.30%	0.75%	0.30%
France	MA	NA	0.12% - 0.27%	NA	0.27%	NA	NA	NA	NA
	V	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Germany	MA	0.90% - 1.70%	0.20%	1.70%	0.20%	NA	0.20%	NA	0.20%
	V	0.68% - 1.85%	0.68% - 1.85%	1.85%	1.85%	NA	NA	NA	NA
Greece	MA	0.50% - 1.60%	0.30% - 1.11%	1.60%	0.81%	NA	1.11%	NA	1.11%
	V	0.45% - 1.5%	0.02% - 0.36%	1.50%	0.36%	1.30%	0.34%	1.20%	0.34%
Hungary	MA	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
	V	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
Ireland	MA	0.80% - 1.20%	0.08% - 0.16%	1.20%	0.16%	NA	0.12%	NA	0.12%
	V	0.55% - 1.30%	0.02% - 0.40%	1.30%	0.40%	1.30%	0.31%	0.75%	0.23%
Italy	MA	0.52% - 1.20%	0.42% - 0.60%	1.20%	0.46%	NA	0.56%	NA	0.56%
	V	0.55% - 0.95%	0.11% - 0.47%	0.95%	0.47%	0.85%	0.47%	0.75%	0.42%
Netherlands	MA	0.40% - 0.4750%	0.09% - 1.18%	0.475%	0.09%	NA	1.18%	NA	1.18%
	V	0.55% - 0.95%	0.19% - 0.23%	0.95%	0.23%	0.85%	0.23%	0.75%	0.20%
Poland	MA	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
	V	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
Spain	MA	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%
	V	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%
Sweden	MA	0.80% - 1.20%	0.53% - 1.19%	1.20%	0.64%	NA	1.19%	NA	1.19%
	V	0.55% - 0.95%	0.19% - 0.23%	0.95%	0.23%	0.85%	0.23%	0.75%	0.20%
UK	MA	0.80%	0.13% - 0.28%	1.00%	0.13%	NA	NA	NA	NA
	V	0.65% - 1.30%	0.37%	1.30%	0.37%	1.30%	0.37%	1.10%	0.37%

Source: Company reports, Payworks and J.P. Morgan estimates.

Note: Mail/telephone order transactions are used as a proxy for Visa CNP transactions in Spain. MA secure e-commerce transactions used as a proxy for CNP and CNP (CVV2) transactions.

Note: MA debit figures represent Maestro interchange rates.

Table 27: European Interchange Schedule

		Range		Standard		CNP		CNP (CVV2)	
Country	Network	Credit	Debit	Credit	Debit	Credit	Debit	Credit	Debit
Intra Europe (EEA)	MA	0.16% - 0.18% + €0.025	0.15% - 0.17% + €0.025	NA	NA	NA	NA	NA	NA
	V	0.23%+€0.02 - 0.29%+€0.02	0.135%+€0.015 - 0.16%+€0.015	0.23%+€0.02	0.135%+€0.015	0.29%+€0.02	0.16% + €0.015	0.29%+€0.02	0.16% + €0.015
Denmark	MA	0.45% - 0.60%	0.10% - 0.30%	0.60%	0.20%	NA	0.20%	NA	NA
	V	0.40% - 0.75%	0.20% - 0.30%	0.75%	0.30%	0.75%	0.30%	0.75%	0.30%
France	MA	NA	0.1%+€0.012 - 0.225%+€0.024	NA	0.225%+€0.024	NA	NA	NA	NA
	V	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025	0.20%+€0.025
• Germany	MA								
	V	0.90% - 1.70%	0.20%	1.70%	0.20%	NA	0.20%	NA	0.20%
Greece	MA	0.40% - 1.85%	0.40% - 1.85%	1.85%	1.85%	NA	NA	NA	NA
	V	0.50% - 1.60%	0.30% - 1.05%+€0.05	1.60%	0.75% + €0.05	NA	1.05% + €0.05	NA	1.05% + €0.05
Hungary	MA	0.45% - 1.5%	€0.02 - €0.30	1.50%	€ 0.30	1.30%	€ 0.29	1.20%	€ 0.29
	V	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
Ireland	MA	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
	V	0.80% - 1.20%	€0.05 - €0.10	1.20%	€ 0.10	NA	€ 0.08	NA	€ 0.08
Italy	MA	0.55% - 1.30%	€0.01 - €0.26	1.30%	€ 0.26	1.30%	€ 0.20	0.75%	€ 0.15
	V	0.50%+€0.02 - 1.20%	0.40%+€0.02 - 0.50%+€0.05	1.20%	0.40% + €0.05	NA	0.50% + €0.05	NA	0.50% + €0.05
Netherlands	MA	0.55% - 0.95%	€0.01+0.10% - €0.10+0.35%	0.95%	€0.10 + 0.35%	0.85%	€0.10 + 0.35%	0.75%	€0.10 + 0.30%
	V	0.40% - 0.4750%	€0.034 - 1.05%+€0.050	0.475%	€ 0.034	NA	1.05% + €0.050	NA	1.05% + €0.050
Poland	MA	0.55% - 0.95%	0.15%-0.19% + €0.015	0.95%	0.19% + €0.015	0.85%	0.19% + €0.015	0.75%	0.16% + €0.015
	V	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
Spain	MA	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%	0.30%	0.20%
	V	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%
Sweden	MA	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%	0.20% - 0.30%	0.10% - 0.20%
	V	0.80% - 1.20%	0.45%+€0.03 - 1.05%+€0.05	1.20%	0.50% + €0.05	NA	1.05%+€0.05	NA	1.05%+€0.05
• UK	MA	0.55% - 0.95%	0.15%-0.19% + €0.015	0.95%	0.19% + €0.015	0.85%	0.19% + €0.015	0.75%	0.16% + €0.015
	V	0.80%	£0.08-£0.18	1.00%	£0.08	NA	NA	NA	NA
	V	0.65% - 1.30%	0.20% + £0.11 (£1 max)	1.30%	0.20% + £0.11 (£1 max)	1.30%	0.20% + £0.11 (£1 max)	1.10%	0.20% + £0.11 (£1 max)

Source: Company reports and J.P. Morgan estimates.

Note: Mail/telephone order transactions are used as a proxy for Visa CNP transactions in Spain. MA secure e-commerce transactions used as a proxy for CNP and CNP (CVV2) transactions.

Note: MA debit figures represent Maestro interchange rates.

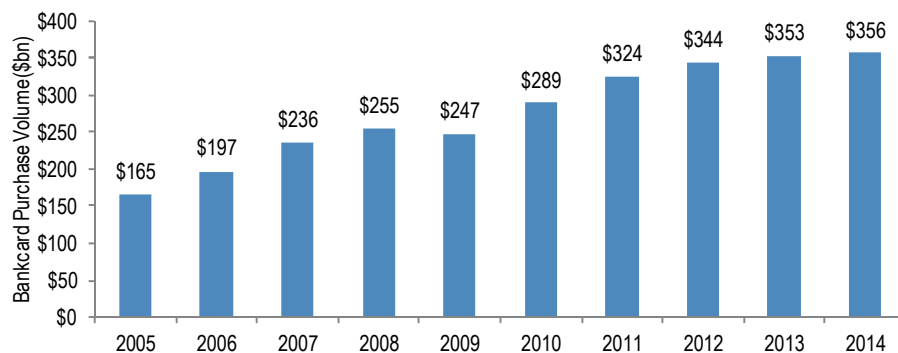
The Canadian Payments Market

Canada generated over \$560 billion in purchase volume and 8.4 billion transactions in 2013, making it about one-eighth the size of the United States. The Canadian market is unique in that the vast majority of its debit volume is processed over the Interac PIN network (state owned/operated) and Visa and MasterCard volume is still primarily credit. Visa and MasterCard have been aggressively trying to grow their debit presence in Canada, and have begun making progress in 2013. Card-based payment penetration is fairly high at ~30% of GDP, which is ahead of payment penetration in the United States by approximately three points.

Figure 49 and **Figure 50** show historic Canadian bankcard purchase volume and transaction trend. We note bankcard purchase volume has increased at a 9% annualized rate since 2005, in line with bankcard transactions growth.

Figure 49: Canada Bankcard Purchase Volume

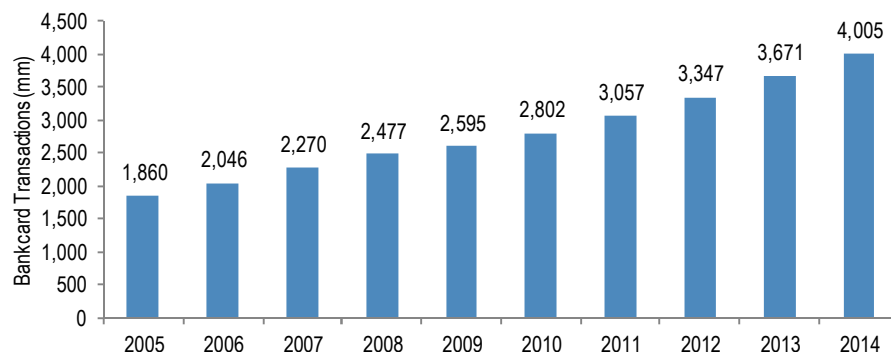
\$ in billions



Source: Visa and MasterCard company reports

Figure 50: Canada Bankcard Transactions

Transactions in millions

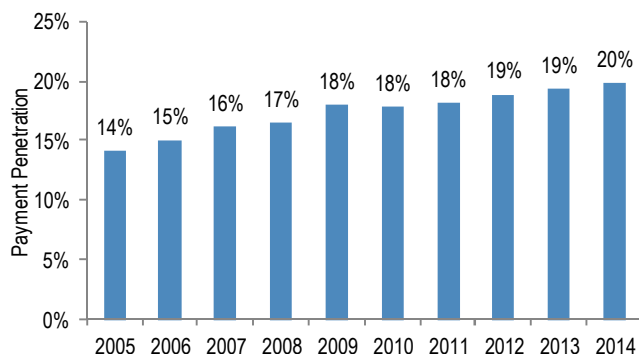


Source: Visa and MasterCard company reports.

Figure 51 and **Figure 52** show historic Canadian payment penetration and cards per capita. Payment penetration is calculated as V/MA purchase volume divided by GDP, while cards per capita is defined as total cards divided by the population over 15. We note that payment penetration and cards per capita have grown at a 4% and

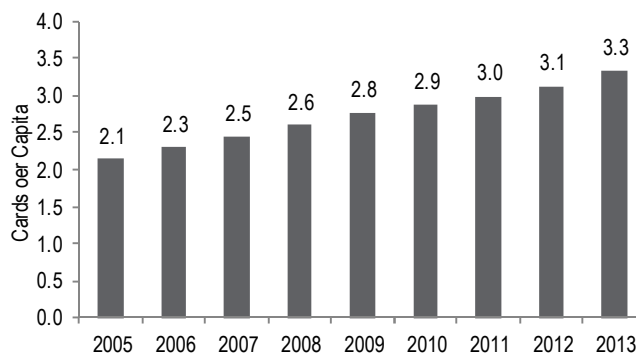
6% annualized rate since 2005 respectively, with Canadian payment penetration running at a similar rate to the U.S, but still lagging in cards per capita.

Figure 51: Canada Payment Penetration



Source: J.P. Morgan Economic & Policy Research, Company reports and J.P. Morgan estimates.

Figure 52: Canada Cards per Capita

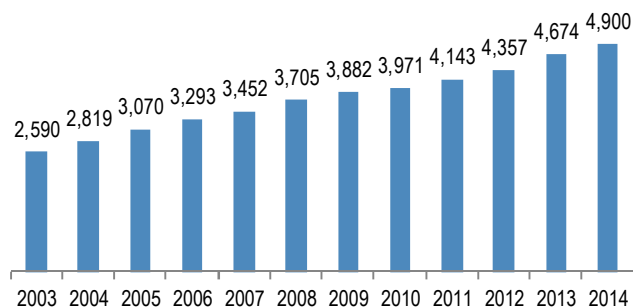


Source: The World DataBank, Company reports and J.P. Morgan estimates.

Figure 53 and Figure 54, below, show historic volume and transactions on Canada's Interac network. We note that Interac transactions and card volume have both grown at a 6% CAGR since 2003, representing a 3 point discount on transactions and volume.

Figure 53: Interac Transactions

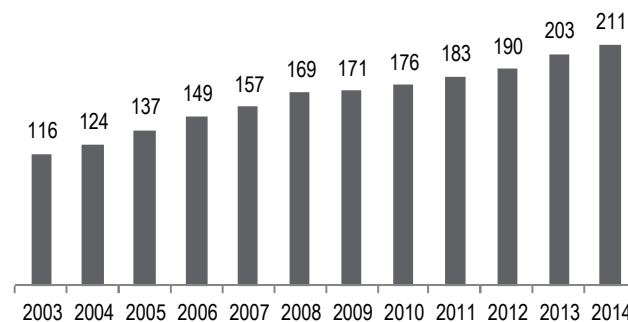
Transactions in millions



Source: Company reports.

Figure 54: Interac Card Volume

CAD in billions

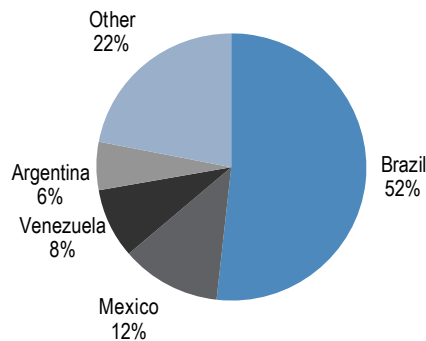


Source: Company reports.

The Latin American Payments Market

Latin America generated roughly \$670 billion in bankcard purchase volume (growing at an 18% clip) and nearly 14.4 billion transactions in 2013, making it about one-seventh the size of the United States. Visa is the dominant issuer in Latin America, with over 60% market share. Brazil and Mexico are the largest markets, generating nearly 65% of bankcard purchase volume, with bankcard payments representing 15% and 6% of GDP, respectively, versus roughly 28% in the United States. We note that Brazil's purchase volume market share declined 400bps since 2012, while Mexico and Venezuela gained 100bps each. Overall, Latin American payments volume penetration is only approximately 12%, the lowest penetration of all the regions in this report.

Figure 55: Latin America Purchase Volume Share (by Country) - 2013

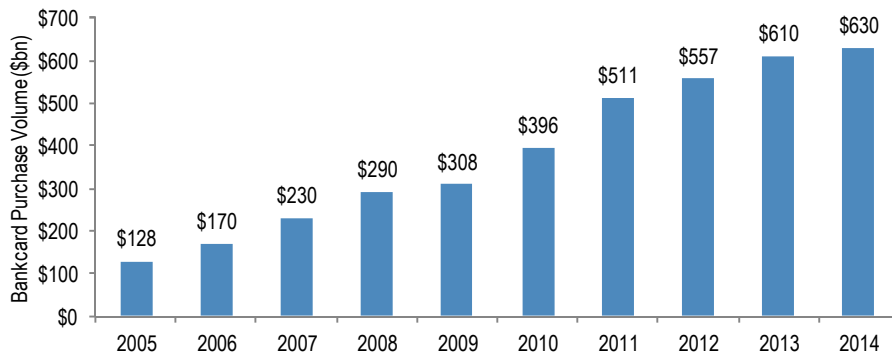


Source: The Nilson Report

Figure 56 and **Figure 57** show historic Latin American bankcard purchase volume and transaction trends. We note bankcard purchase volume has increased at a 19% annualized rate since 2005. Bankcard transactions have increased at a 17% annualized rate since 2005.

Figure 56: Latin American Bankcard Purchase Volume

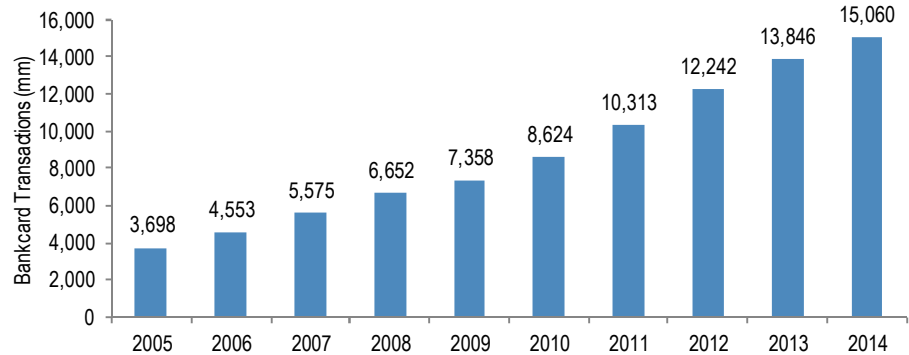
\$ in billions



Source: Visa and MasterCard company reports/

Figure 57: Latin America Bankcard Transactions

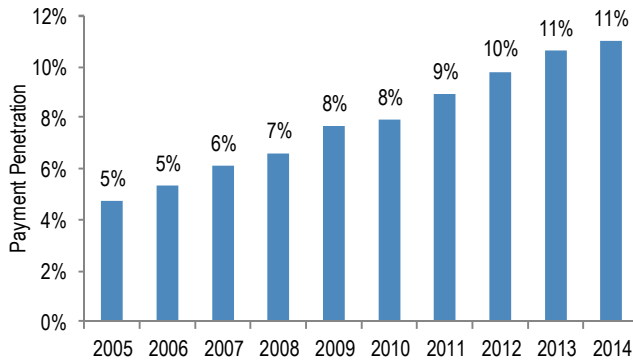
Transactions in millions



Source: Visa and MasterCard company reports.

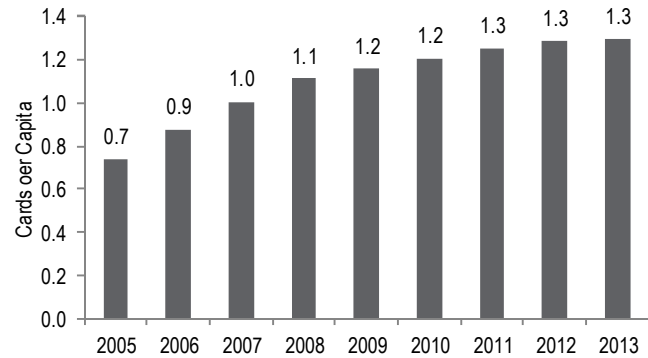
Figure 58 and **Figure 59** show historic Latin American payment penetration and cards per capita. Payment penetration is calculated as V/MA purchase volume divided by GDP, while cards per capita is defined as total cards divided by the population over 15. We note payment penetration has grown at a 10% annualized rate since 2005, the fastest of the regions examined and ahead of LatAm GDP growth. Cards per capita have increased at a 7% annualized rate since 2005.

Figure 58: Latin America Payment Penetration



Source: J.P. Morgan Economic& Policy Research, Company reports and J.P. Morgan estimates.

Figure 59: Latin America Cards per Capita

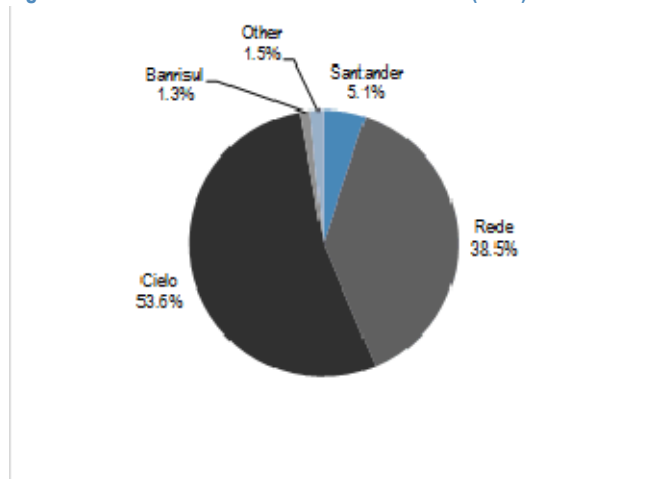


Source: The World DataBank, Company reports and J.P. Morgan estimates.

A Closer Look at the Brazilian Card Market

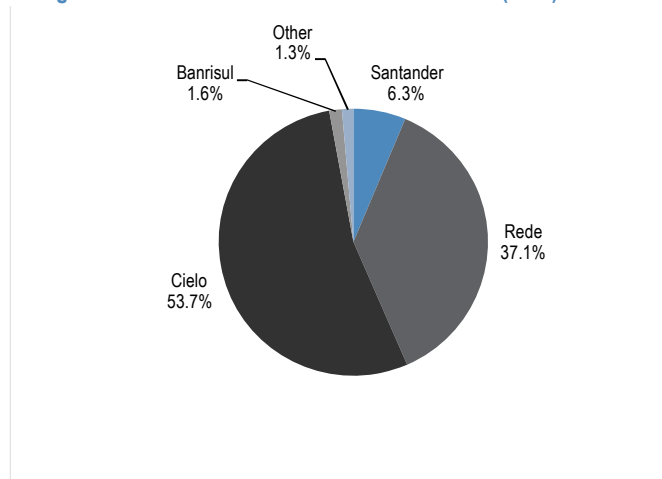
Figure 60 and Figure 61, below, summarizes market share for the largest Brazilian acquirers: Cielo, Rede and Santander (GetNet). In 2014, Santander and Banrisul are gaining share, largely at the expense of Rede.

Figure 60: Total Processed Volume Market Share (2013)



Source: Company reports, Abecs and J.P.Morgan Research.

Figure 61: Total Processed Volume Market Share (2014)

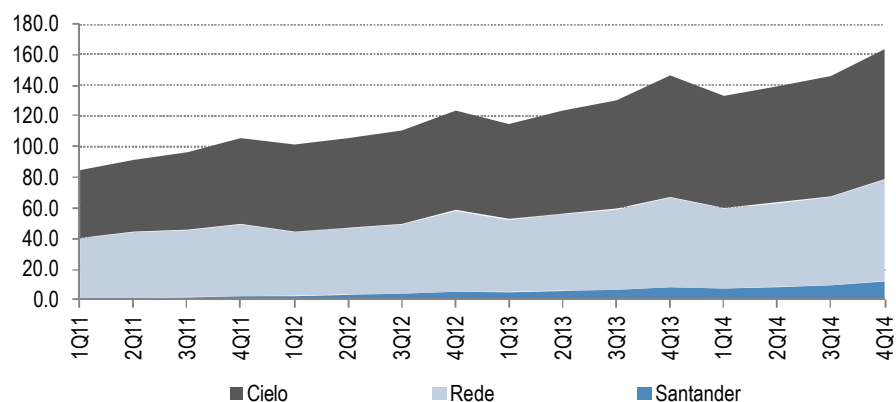


Source: Company reports, Abecs and J.P.Morgan Research.

Credit

Figure 62, below, summarizes credit card volume trends by brand. Cielo and Rede hold a dominant share, but Santander is the fastest grower, albeit from a low base.

Figure 62: System - Credit Card Processed Volume (R\$ billion)

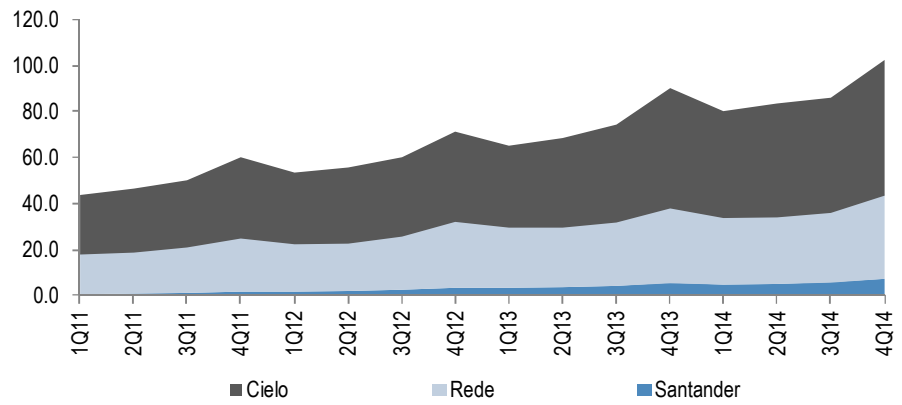


Source: Company reports and J.P. Morgan estimates.

Debit

Figure 63, below, summarizes debit card volume trends by brand. Similar to credit, Cielo and Rede hold a dominant share, but Santander is the fastest grower, albeit from a low base.

Figure 63: System - Debit Card Processing Volume (R\$ billion)

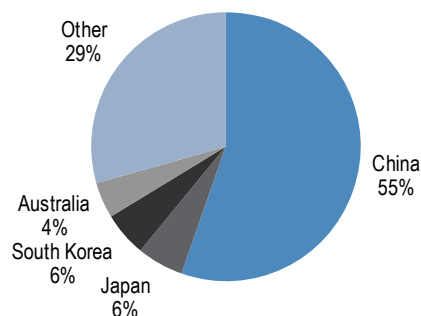


Source: Company reports and J.P. Morgan estimates.

The Asia Pacific Payments Market

Asia Pacific generated nearly \$7.4 trillion in bankcard purchase volume in 2013, making it nearly 1.6x the size of the United States. Visa and MasterCard branded cards made up over \$1.9 trillion of APAC purchase volume or ~26% share. China UnionPay brand cards have a significant market presence in Asia Pacific, with over \$5.1 trillion in APAC purchase volume or nearly 70% share. We note that UnionPay purchase spend is skewed upward as it can encompass automobile and house purchase activities, unlike other typical card spend. Approximately 90% of UnionPay cards are debit. **Figure 64**, below, summarizes market share by country. China has increased its market share by 600bps over the past year, while Japan, Australia and South Korea saw a 200bp decline.

Figure 64: Asia Pacific Purchase Volume Share (by Country) - 2013

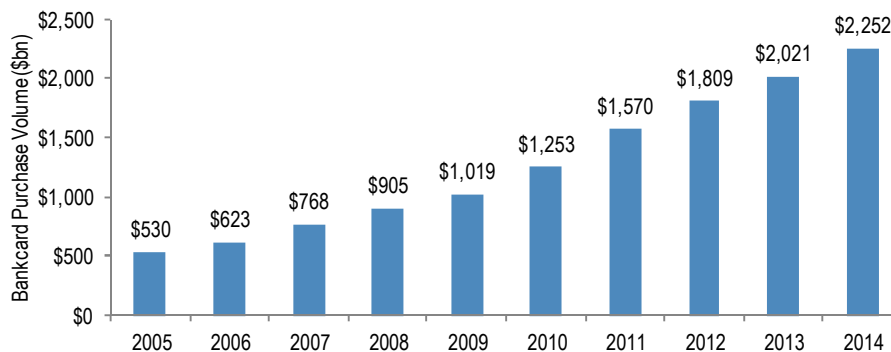


Source: The Nilson Report.

Figure 65 and **Figure 66** show historic Asia Pacific bankcard purchase volume and transaction trends. We note bankcard purchase volume has increased at a 17% annualized rate since 2005, while transactions have increased at a 16% annualized rate.

Figure 65: Asia Pacific Bankcard Purchase Volume

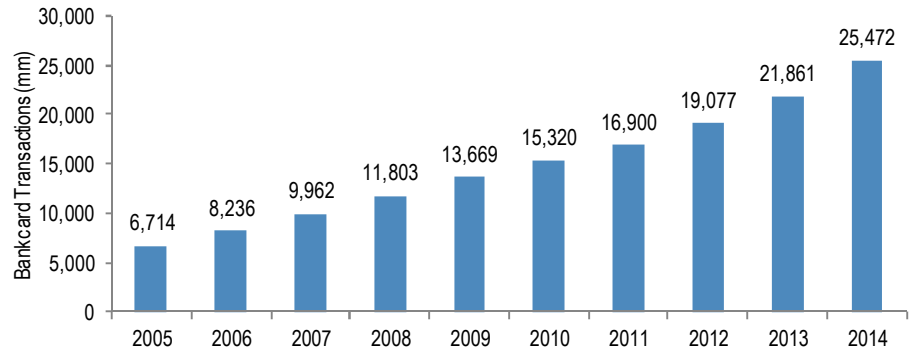
\$ in billions



Source: Visa and MasterCard company reports

Figure 66: Asia Pacific Bankcard Transactions

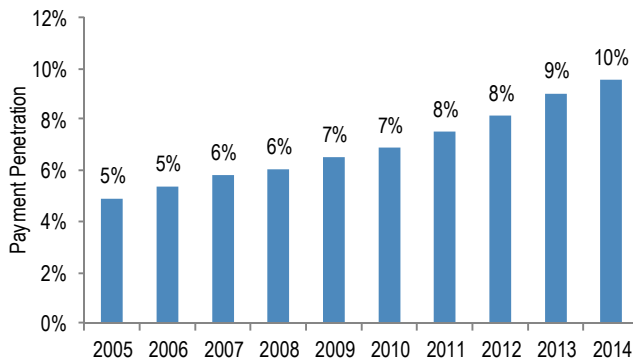
Transactions in millions



Source: Visa and MasterCard company reports.

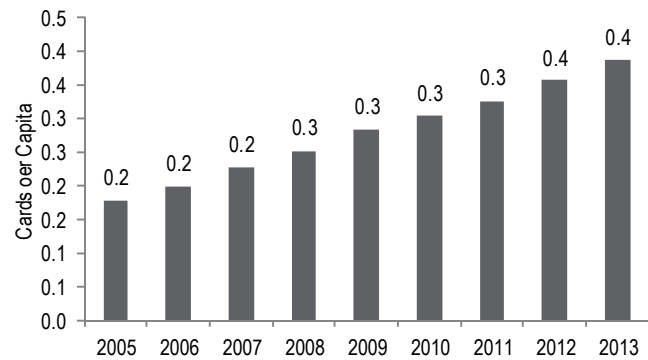
Figure 67 and **Figure 68** show historic Asia Pacific payment penetration and cards per capita. Payment penetration is calculated as V/MA purchase volume divided by GDP, while cards per capita is defined as total cards divided by the population over 15. We note payment penetration has grown at an 8% annualized rate since 2005, while cards per capita have grown 10% annually. The cards per capita metric in Asia Pacific remains one of the lowest among the different regions we examined, likely due to the comparatively less developed nature of the region.

Figure 67: Asia Pacific Payment Penetration



Source: J.P. Morgan Economic & Policy Research, Company reports and J.P. Morgan estimates.

Figure 68: Asia Pacific Cards per Capita

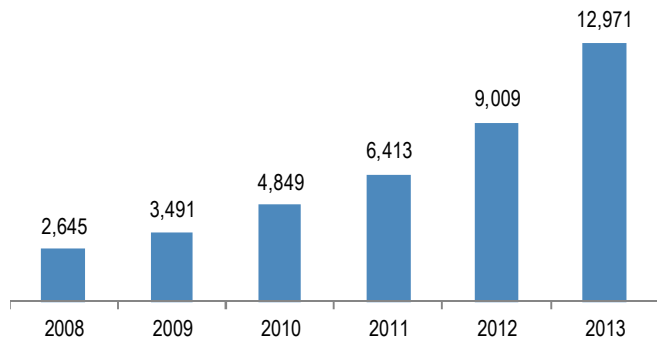


Source: The World DataBank, Company reports and J.P. Morgan estimates.

Figure 69 and **Figure 70**, below, show historic purchase volume and transactions on China's UnionPay network. We note that UnionPay transactions have grown at a 51% CAGR since 2007, while purchase transactions have grown at a 37% CAGR since 2008. This compares to Visa and MasterCard transactions and volume growing at a 16% and 17% CAGR since 2005, respectively.

Figure 69: China UnionPay Purchase Transactions

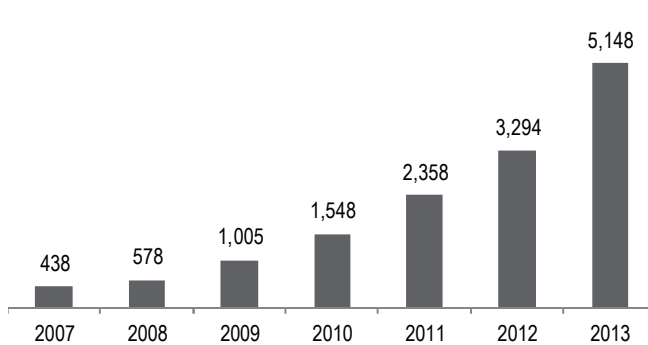
Transactions in millions



Source: Company reports.

Figure 70: China UnionPay Purchase Volume

\$ in billions



Source: Company reports.

MAV Tale of the Tape

Table 28, below, compares key financial metrics for MasterCard and Visa. Visa Inc. has greater scale (but MasterCard is gradually chipping away at that lead), generating 64% more total volume (down six points from prior year), 45% more purchase volume (down one point from the prior year) and 36% more revenue than MasterCard (down nine points from the prior year). Not surprisingly, Visa's operating margins are roughly ten points higher than MasterCard's. MasterCard posted slightly faster constant currency purchase volume growth in CY14 (consistent with last year), however reported revenue growth was more than six points higher than Visa's, due to acquisitions and diverging client incentives and cross-border revenue growth rates. We note our analysis excludes include Visa Europe results and volumes.

Table 28: Payment Network CY14 Financial Summary

	MasterCard	Visa
Revenues (\$ millions)	9,473	12,929
% change (y/y)	13.5%	7.0%
Revenue Yield (bps)	21.1	17.6
Personnel Expense (\$ millions)	2,064	1,914
Marketing Expense (\$ millions)	862	919
Adjusted Operating Profits (\$ millions)	5,106	8,311
Operating Margins	53.9%	64.3%
Change in Operating Margins (y/y)	-120bps	210bps
Total Volume (\$bn)	4,496	7,352
Growth (Local Currency)	12.8%	10.3%
Global Purchase Volume (\$bn)	3,281	4,758
Growth (Local Currency)	12.1%	11.6%
US Purchase Volume (\$bn)	1,143	2,484
US Credit (\$bn)	608	1,212
US Debit (\$bn)	530	1,270
Global Processed Transactions (millions)	42,984	66,558
% change (y/y)	11.2%	10.4%
US Debit Cards Outstanding (millions)	181	450
US Credit Cards Outstanding (millions)	191	305
Int'l Debit Cards Outstanding (millions)	490	1,042
Int'l Credit Cards Outstanding (millions)	576	545
Efficiency Measures:		
Employees	10,300	9,500
% change (y/y)	27%	0%
Rev per Employee(\$,000s)	920	1,360
Personnel expense per Employee (\$)	200,388	201,474
Operating Income per Employee (\$,000s)	496	875
Ad & Marketing % of Revs	9%	7%
GDV per \$ of Ad & Marketing Spend (\$)	5,216	8,000

Source: Company reports.

Note: Revenue yield is net revenue divided by gross dollar volume. MasterCard's reported data exclude debit transactions on Maestro and Cirrus-branded cards

Payment Volume Mix

Purchase Volume Mix by Card Type

Table 29, Figure 71 and Figure 72 show network volume mix and growth rates by card type. While MasterCard's local currency global purchase volume grew slightly faster than Visa's (12.1%/11.6%) last year, Visa's domestic purchase volume, which generates higher revenue yields, grew slightly faster than MasterCard's (9.7%/8.8%). **Interestingly, aggregate US credit volume growth outpaced US debit volume growth in 2014, which has only happened once previously over the past 15 years** (2012, when debit regulation distorted reported volume growth). We note Visa domestic credit and debit businesses are more than twice as large as MasterCard's. Internationally, MasterCard is only slightly smaller than Visa, excluding Visa Europe.

Table 29: Purchase Volume Analysis (by Payment Type)

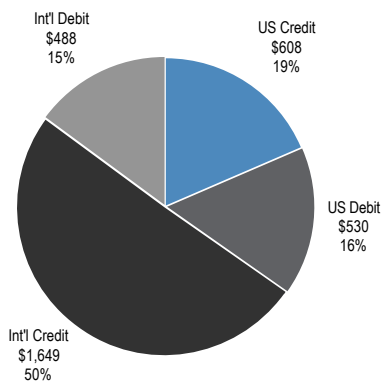
\$ in billions

	MasterCard	Visa
Purchase Volume (\$bn)	\$3,281	\$4,758
<i>US Credit</i>	\$608	\$1,212
<i>US Debit</i>	\$530	\$1,270
<i>Int'l Credit</i>	\$1,649	\$1,782
<i>Int'l Debit</i>	\$488	\$493
Purchase Volume Mix		
<i>US Credit</i>	19%	25%
<i>US Debit</i>	15%	27%
<i>Int'l Credit</i>	50%	37%
<i>Int'l Debit</i>	15%	10%
Purchase Volume Growth Rates (Local)		
<i>US Credit</i>	8.4%	12.4%
<i>US Debit</i>	9.3%	7.1%
<i>Int'l Credit</i>	12.2%	11.9%
<i>Int'l Debit</i>	20.0%	20.8%

Source: Company data.

Note: (1) MasterCard's reported data exclude debit transactions on Maestro and Cirrus-branded cards, and (2) Visa data excludes Visa Europe.

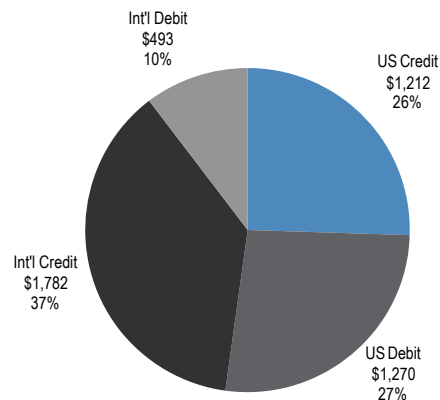
Figure 71: MasterCard Purchase Volume Mix (Card Type) - 2014
\$ in millions



Source: Company reports

Note: Excludes debit transactions on Maestro and Cirrus-branded cards, and Mondex transactions

Figure 72: Visa Purchase Volume Mix (Card Type) - 2014
\$ in millions



Source: Company reports

Note: Excludes Visa Europe

Purchase Volume Mix by Geography

Table 30, Figure 73 and Figure 74 show network volume mix and growth rates by geography. Visa is more U.S. centric (52%/35%), which may explain why MasterCard's local currency global purchase volumes grew slightly faster (12.1%/11.6%). Visa has roughly 2/3rds relative market share (based on purchase volume) in all regions. However, MasterCard is growing faster in all geographies with the exception of the U.S.

Table 30: Purchase Volume Analysis (by Geography)

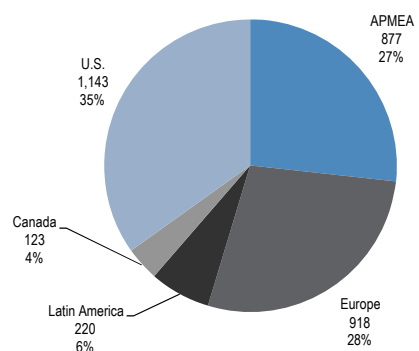
\$ in billions

	MasterCard	Visa
Purchase Volume (\$bn)	\$3,281	\$4,758
APMEA	\$877	\$1,631
Europe	\$918	n/a
Latin America	\$220	\$410
Canada	\$123	\$233
U.S.	\$1,143	\$2,484
Purchase Volume Market Share	41%	59%
APMEA	35%	65%
Europe	n/a	n/a
Latin America	35%	65%
Canada	35%	65%
U.S.	32%	68%
Purchase Volume Penetration Rate		
APMEA	67%	53%
Europe	68%	n/a
Latin America	61%	38%
Canada	94%	92%
U.S.	85%	84%
Purchase Volume Growth Rates (Local)		
APMEA	16.4%	12.4%
Europe	10.7%	n/a
Latin America	21.2%	14.0%
Canada	8.7%	8.2%
U.S.	8.8%	9.7%
Total	12.1%	11.6%

Source: Company data.

Figure 73: MasterCard Purchase Volume Mix (Geographic) - 2014

\$ in billions

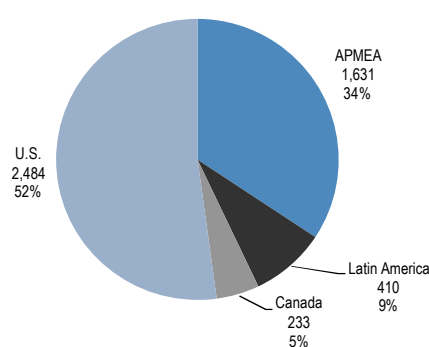


Source: Company reports.

Note: Excludes debit transactions on Maestro and Cirrus-branded cards, and Mondex transactions

Figure 74: Visa Purchase Volume Mix (Geographic) - 2014

\$ in billions



Source: Company reports.

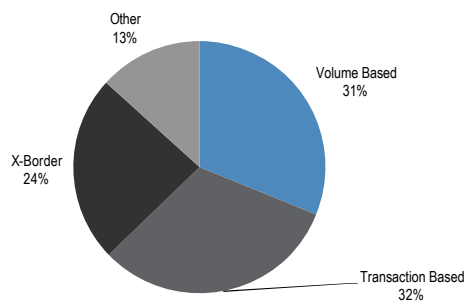
Note: Visa data excludes Visa Europe

Gross Revenue Composition

Figure 75 and Figure 76, below, show MasterCard and Visa's gross revenue composition. We note cross border revenues account for about 1/4th of gross

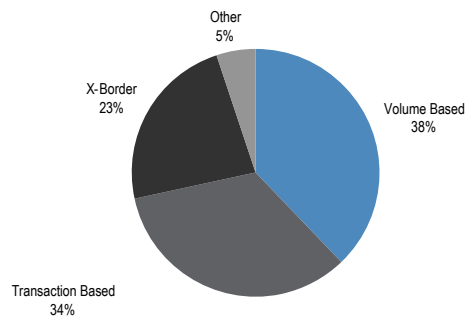
revenues for both companies, while MasterCard has a slightly lower mix of volume-based and transaction based revenues.

Figure 75: MasterCard Revenue Mix (as % of Gross Revenue) - 2014



Source: Company reports.

Figure 76: Visa Revenue Mix (as % of Gross Revenue) - 2014



Source: Company reports.

Appendix I: Industry Market Share Summary

Below is a scattershot of market share data for key focus areas.

Domestic Merchant Acquirers/Processors

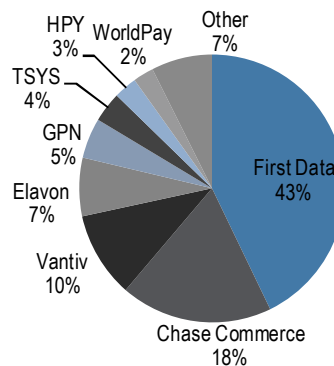
Table 31: Top U.S. Merchant Acquirers - 2014

\$ in billions

Acquirer	Bank Card Volume (\$bn)	Market Share	Transactions (mm)	Merchants
Chase Commerce Solutions	617	17%	10,874	425,105
Bank of America (BAMS)	518	14%	10,329	652,000
First Data	433	12%	6,421	992,000
Vantiv	370	10%	8,176	641,092
Elavon (U.S. Bank)	249	7%	2,994	743,957
Wells Fargo Merchant Services	193	5%	2,249	373,102
Citi Merchant Services	162	4%	6,784	236,099
Global Payments	130	4%	2,255	757,917
Heartland Payment Systems	104	3%	2,680	238,383
Worldpay	90	2%	2,162	184,639
Total Top 10	2,866	79%	54,924	
Total	3,627	100%		

Source: The Nilson Report

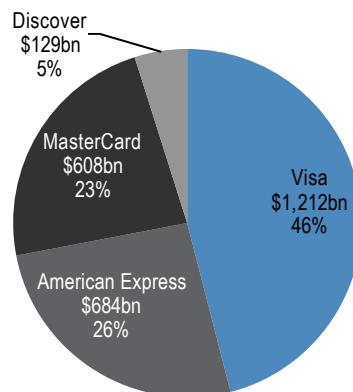
Figure 77: Domestic Merchant Processors Volume Share – 2014



Source: The Nilson Report and J.P. Morgan estimates.

U.S. Credit

Figure 78: U.S. Credit Purchase Volume Share – 2014

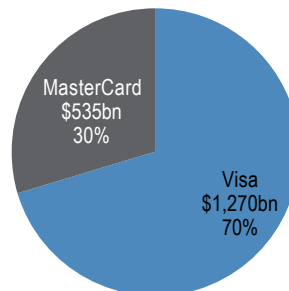


Source: Company reports, The Nilson Report.

U.S. Signature Debit

Figure 79: U.S. Signature Debit Purchase Volume Share – 2014

\$ in billions



Source: Company reports.

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