

A Work Project, presented as part of the requirements for the Award of a Master's degree in Finance
from the Nova School of Business and Economics.

EQUITY RESEARCH ON
MASTERCARD: MOVING AWAY FROM
PLASTIC CARDS

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Abstract

The following equity research assesses Mastercard Inc., a global processing network, operating in the payments industry. Besides having grown in its traditional card rail, the company has been diversifying its operations through acquisitions in value-added services. Its historical performance was analysed while performing an overview of the payments industry current dynamics in the different regions where the company operates. The main risks were also accounted. A discounted cash flow method was followed, achieving a share price of \$333.85 for December 2020, with a 12.67% expected return. Henceforth, the report concludes with a BUY recommendation.

Keywords: Payments, Technology, Valuation, Mastercard Inc.

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MASTERCARD INC.

PAYMENTS SECTOR

STUDENT: JOANA MACHETE & MARIA JOSÉ ANICETO

COMPANY REPORT

JANUARY 2020

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Moving away from plastic cards

Diversification leading to success

- Consumer preferences shifting to technology-enabled solutions and competition rising with new entrants outline the current dynamics of the payments industry. Further digitalization of transactions is expected as ecommerce expands, mainly by mobile channel (22% of ecommerce by 2023). Cash, however, still accounted for 85% of total transactions worldwide, in 2017.
- Mastercard's GDV CAGR 2014-2018 of 7% reflects geographic expansion and increased services capabilities. Future growth for volume-based revenues (CAGR 2019-2024 of 12.21%) will result from transactions per card growing due to improved features (contactless, tokenization) and cards fostering through co-branded partnerships.
- Mastercard has been diversifying its operations beyond traditional card-rail through 12 strategic acquisitions, namely in real-time payments (forecasted CAGR 29.3% 2019-2025): Vocalink (\$1.1 billion) and Nets (\$3.2 billion). M&A total disclosed amount was \$4.96 billion.
- This report concludes a **BUY** recommendation with a FY20 share price target of \$333.85, representing an expected return of 12.67% to shareholders (10.04% capital gain and 2.63% dividend yield). A DCF was performed with a WACC of 7.79%.

Company description

Mastercard Inc. is a global technology company that operates in the payments sector. It provides electronic payments solutions through its networking that links consumers, merchants, governments and financial institutions and generates revenues from the volume of transactions on its products, from transactions switched and from services offered.

Recommendation: **BUY**

Vs Previous Recommendation N.A.

Price Target FY20: **333.85 \$**

Vs Previous Price Target N.A.

Price (as of 2-Jan-20) **303.39 \$**

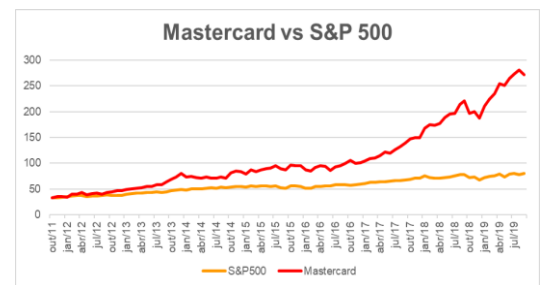
Reuters: MA.N, Bloomberg: MA:US

52-week range (\$) 180.98-303.53

Market Cap (\$B) 306.018B

Outstanding Shares (m) 1 008,66

Source: Bloomberg, Company Website, Analyst Estimates



Source: Bloomberg, Analyst Estimates

(Values in \$ millions)	2018	2019E	2020F
Gross Dollar Volume (in \$B)	5 901	6 749	7 723
Number of cards (in m)	2 007	2 179	2 348
Transactions switched (in B)	73.8	82.0	90.3
Net Revenue	14 950	17 118	19 670
EBIT	7 278	9 200	10 321
EBIT margin	48.7%	53.7%	52.5%
Net profit	5 859	7 493	8 399
Net margin	39.2%	43.8%	42.7%
EPS	5.81	7.43	8.33
Economic profit as % of Gross Revenue	59.6%	43.3%	42.3%

Source: Company Report, Analyst Estimates

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY JOANA MACHETE AND MARIA JOSÉ ANICETO, TWO MASTER IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL.

(PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

Table of Contents

COMPANY OVERVIEW	5
COMPANY DESCRIPTION.....	5
FINANCIAL PERFORMANCE.....	7
SHAREHOLDER STRUCTURE.....	9
INDUSTRY OVERVIEW	10
MARKET DYNAMICS	10
MARKET ANALYSIS	12
NORTH AMERICA	12
UNITED STATES.....	13
<i>Mastercard in the United States.....</i>	<i>14</i>
CANADA.....	15
<i>Mastercard in Canada</i>	<i>16</i>
EUROPE	16
<i>Mastercard in Europe</i>	<i>18</i>
ASIA PACIFIC, MIDDLE EAST AND AFRICA (APMEA)	19
<i>Mastercard in APMEA</i>	<i>20</i>
LATIN AMERICA.....	21
<i>Mastercard in Latin America</i>	<i>22</i>
RISKS.....	23
FORECAST	24
VALUATION.....	27
DISCOUNTED CASH FLOW.....	27
<i>Discount rates.....</i>	<i>27</i>
<i>Scenario analysis</i>	<i>28</i>
<i>Sensitivity analysis</i>	<i>29</i>
RELATIVE VALUATION.....	29
APPENDIX	30
REPORT RECOMMENDATIONS.....	32

	Transaction Volume (\$ trillion)
Union Pay	17.7
Visa	11.4
Mastercard	5.9

Fig. 1 Major players in the Payments Industry
Source: Annual Reports, Caixinglobal

Gross Revenue Breakdown (%)
2018

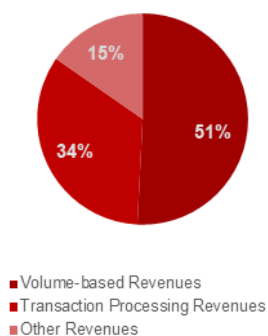


Fig. 2 Gross Revenue Breakdown – 2018
Source: Annual Report

Companies	Rank	Brand Value (\$ Million)
Amazon	1	315 505
Apple	2	309 527
Google	3	309 000
Visa	5	177 918
Facebook	6	158 968
Alibaba	7	131 246
Tencent	8	130 862
Mastercard	12	91 929
Paypal	26	44 166
American Express	33	35 071
Samsung	38	30 369

Fig. 3 Top 100 global brands 2019: Brand Ranking and Brand Value
Source: Financial Times

Company overview

Company description

Mastercard Incorporated, henceforward called Mastercard, was established in 1966 as Interbank Card Association by a group of banks and in 2006 started being traded at New York Stock Exchange (NYSE) as MA. The company is a global payments and technology company which aims to connect different stakeholders such as consumers, merchants, governments, businesses, financial institutions, and others through its processing networking solution. Instead of cash or checks, Mastercard used to promote plastic cards as an alternative payment. Nowadays, the network offers multiple solutions including plastic and virtual cards, real-time payments (RTP)¹, online and mobile app-based payments, many supported by electronic payment methods.

Mastercard core global payments operates in more than 210 countries and territories and in more than 150 currencies. In terms of volume, it is the second largest processing network in the US and the third worldwide, with a gross dollar volume (GDV) of \$5.9 trillion, in 2018.

The company generates revenues in three different ways²:

1. Volume-based revenues, including domestic assessment and cross-border volume fee revenues, generated from fees charged on the GDV of its products;
2. Transaction-based revenues from fees charged on processed transactions;
3. Other revenues which includes value-added products and services, real-time payment services and any other acquired capabilities.

The brand Mastercard is one of the company's main strengths, only comparable to Visa Inc. in its industry. According to Financial Times, the company's brand is ranked 12th in the 2019 Top 100 global brands, with an estimated value of \$91 929 million³. Mastercard's recent involvement in several litigations can damage not only the company's profit but also compromise its brand perception amongst merchants and customers⁴.

To enable transactions in the network, Mastercard offers several products and services that its customers can provide to accountholders:

1 Real-time payment is an upgrade of bank account-based payments (direct debit or direct credit) in which the transaction is transferred electronically and received almost instantaneously, so funds are available in real-time.

2 It is important to notice that Mastercard does not issue cards or credit nor receives revenues from the fees charged by issuers to accountholders nor from the fees charged by acquirers to merchants. Further analysis regarding revenues is provided in the financial performance section.

3 Ft.com. (2019). Top 100 global brands 2019: the full ranking | Financial Times. <https://www.ft.com/content/3a3419f4-78b1-11e9-be7d-6d846537acab> [Acc. 16 Nov. 2019].

4 Further details regarding litigation are provided in the financial performance section.

Cards	Consumer	Consumer Credit	
		Consumer Debit	
	Commercial	Commercial Travel	
		Commercial Credit and Debit to Small Business and Enterprises	
	Prepaid	Commercial Fleet (transportation sector) and Purchasing	
		Government programs (social security and unemployment programs)	
Commercial programs (payroll, health savings account, employee benefits)			
		Reloadable payment solution to unbanked consumers	
Services	Processing	Payment gateway	Enable merchants to accept electronic payments from a wide range of methods and channels (online, mobile)
		Prepaid management	Support companies to establish their own prepaid card program
		Payment Transaction	Provide switching services and ensure safe connectivity to the network
	Value-added services	Consulting & Analytics	Data-driven consulting and marketing services solutions
		Safety & Security	Solutions to prevent, detect and respond to fraud and cyber-attacks
		Loyalty and Rewards	Support merchants delivering customized rewards to their customers
	RTP services	Account-based instant payment solutions to businesses and consumers	

Focusing on its service offer, revenues from processing are reported in the income statement as transaction processing revenues and include the switching⁵ of transactions across its global network. Not all Mastercard transactions are switched by the company (most cross-border⁶ transactions are, whereas, in some countries, domestic⁷ transactions are switched by local processors).

Mastercard's range of value-added products and services is rapidly increasing, evidencing how Mastercard is committed to deliver value to all its stakeholders. Some of the services and products recently announced are presented below:

Year	P/S	Description
2019	Click to Pay	Provide customers a safe and simple checkout when paying with cards (partnership with American Express, Discover and Visa)
	Corda	Cross-border transactions enhanced with blockchain capabilities (partnership with the blockchain software provider R3)
	Mastercard Send	This app is a solution to consumers as it increases liquidity by providing real-time access and transfer of their account balances
	Mastercard Innovation Engine	API-based digital platform to improve customer experience by providing customized digital payment solutions
2018	Mastercard Bill Pay Exchange	Reduce inefficiencies of handling bills in cash and checks format, allows consumers to manage their billing in a real-time enabled online platform
	Mastercard Track	Solution to B2B transactions (cross-border and account-to-account payments) based on real-time data collection
2017	Mastercard B2B Hub	Accounts payable automation solutions for B2B payments
before	Mastercard Start Path	Provide scale to later-stage fintechs in an acceleration 6-month program
	MasterPass	Mastercard's digital wallet that enables consumers to digital payments anywhere, online and in-store

Finally, the real-time payment services division was created after the acquisition of Vocalink. The additional capabilities in real-time account-based system enabled Mastercard to launch an instant payment system in the US for the first time in 2018⁸. More importantly, this deal allowed Mastercard to extend its network to business-to-business (B2B). With the acquisition of Nets (expected to

5 Transaction switching follows three steps: Authorization (conducting the transaction to the issuer to get its approval), Clearing (intermediating the exchange of financial transaction information between issuer and acquirer) and Settlement (enabling the exchange of funds).

6 Cross-border transactions are those where the issuer country is not the same as the acquirer one.

7 Domestic transactions are those where the issuer country is the same as the acquirer one.

8 MasterCard Social Newsroom. (2019). MasterCard Announces Acquisition of VocaLink. Avail. at: <https://newsroom.mastercard.com/press-releases/mastercard-announces-acquisition-of-vocalink/> [Acc. 29 Oct. 2019].

	Tech	FS	Telecom	
Europe	17%	0%	0%	17%
US	42%	17%	0%	58%
Canada	17%	0%	0%	17%
APMEA	0%	0%	8%	8%
Latin America	0%	0%	0%	0%
	75%	17%	8%	

Fig. 4 Mastercard acquisitions 2015-2019 by industry and region

Source: Company website, Analyst estimate

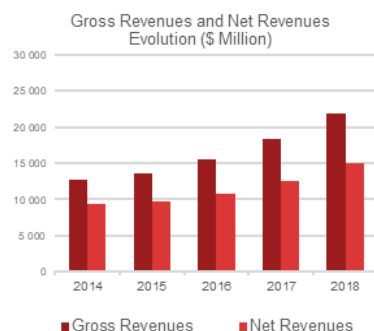


Fig. 5 Gross and Net Revenues evolution

Source: Annual report

	Net Revenues CAGR (2014 - 2018)	Net Income CAGR (2014 - 2018)
Mastercard Inc.	12.18%	12.82%
Visa Inc	12.86%	17.32%
Average	12.52%	15.07%

Fig. 6 Net Revenue and Net Income CAGR 2014-2018

Source: Annual Reports, Analyst estimate

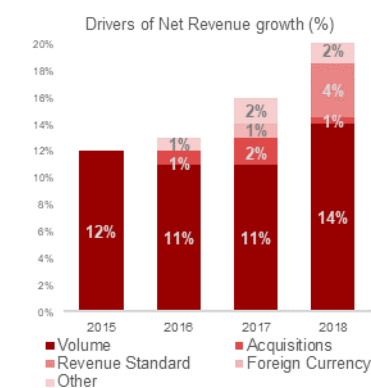


Fig. 7 Drivers of Net Revenue growth

Source: Annual Report

close in 2020)⁹, the company extended real-time services to account-to-account (A2A) payment flows, while growing in the Northern Europe, UK, Asia and Middle East markets¹⁰. Between 2015 and 2019, there had been 12 acquisitions that allowed Mastercard to not only diversify in products and services but also to grow in scale across the world. Most deals were for technological-enabled companies (75%), and, regionally, most were in the United States (58%). It is acquiring telecommunications capabilities in APMEA (8%), where mobile payment solutions are growing rapidly¹¹. Solely Nets and Vocalink were acquired in Europe for \$4.3 billion. Overall, M&A total disclosed value amounted to \$4.96 billion¹². The table below provides an overview of these acquisitions:

Year	Target	Acquired Services
2019	RiskRecon	Cybersecurity risk management solutions
	SessionM	Data-driven services for Customer loyalty & engagement
	Transactis	SaaS-based billing payment & loyalty products
	Nets	EBilling & clearing of instant payments
	Vyze	Point-of-sale (POS) safety and security solutions
	Ethoca	Fraud identification and prevention in eCommerce
	Transfast	Global payments network with significant volume in cross-border
2018	Oltio	Mobile payments technology
2017	Brighterion	AI capabilities
	NuData Security	Fraud management and security products
2016	Vocalink	BACS (automated clearing house technology that enables direct debit and credit payments) and LINK (UK's ATM network)
2015	APT	Business Analytics software

Financial Performance

The value reported for both net revenue and net income in 2018, \$14 950 million and \$5 859 million, is more than twice of that reported in 2012, \$7 391 million and \$2 759 million. Mastercard has shown strong revenue and earnings growth, yet reported CAGRs are still lower than Visa's. Net revenue growth can be driven by volume, acquisitions, revenue standard, foreign currency and others¹³. Across the years, volume has constantly been the most relevant driver, having generated around 14% out of the 20% of net revenue growth, in 2018.

The segment that contributes the most, volume-based revenues, can be broken down into volume effect (GDV) and price effect (revenue per dollar of GDV). GDV depends on the expansion and geographical reach of the products, given by the number of cards in each region, the frequency usage of the cards, given by transactions per card and the volume per transaction. Looking at the number of

9 MasterCard Social Newsroom. (2019). Mastercard Advances Its Leadership Position as a Multi-Rail Payments Company with the Acquisition of Nets' Account-to-Account Payment Business. Avail. at: <https://newsroom.mastercard.com/press-releases/mastercard-advances-its-leadership-position-as-a-multi-rail-payments-company-with-the-acquisition-of-nets-account-to-account-payment-business/> [Acc. 29 Oct. 2019].

10 PYMNTS.com. (2019). Why Mastercard Acquired Nets | PYMNTS.com. Avail. at: <https://www.pymnts.com/mastercard/2019/why-mastercard-acquired-nets/> [Acc. 21 Dec. 2019].

11 Further details provided in the Market Overview section.

12 Values for Nets and Vocalink were disclosed in the company's 2019 quarterly earnings report. Many of the other deal values were not publicly disclosed.

13 Others include effects from price and non-volume fees.

	CAGR 2014-2018
Gross Dollar Volume (GDV)	7.00%
Number of cards	9.56%
Transaction per card	4.39%
Purchase transactions per card	4.98%
Cash transactions per card	0.68%
GDV per transaction	-6.45%
Volume-based Revenue per dollar of GDV	4.78%

Fig. 8 GDV elements' CAGR of 2014 until 2018

Source: Annual reports, Analyst estimate



Fig. 9 Gross Revenues decomposition

Source: Annual reports, Analyst estimate

	CAGR 2014-2018
Volume-based revenues	12.11%
Transaction Processing Revenues	16.34%
Other Revenues	18.67%
Rebates and Incentives	20.14%

Fig. 10 Net revenues elements' CAGR of 2014 until 2018

Source: Annual reports, Analyst estimate

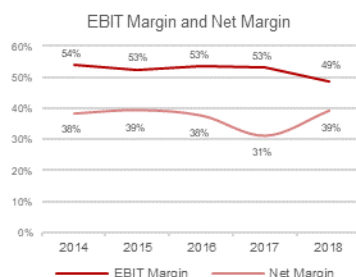


Fig. 11 EBIT Margin and Net Margin evolution from 2014 until 2018

Source: Annual reports, Analyst estimate

cards¹⁴, the company is still growing in its traditional card-rail, reaching 2 007 million cards, in 2018, with a CAGR of 9.56%, driven, for instance, by the renewal and establishment of new partnerships such as the extension of a global agreement with Citi until 2029¹⁵. Moreover, transactions per card, which includes cash disbursements and purchase transactions per card, have been growing, from 43 to 51, with a CAGR of 4.39%. Historically, cash disbursements per card have remained relatively constant, with a decline in the last two years, while purchase transactions tended to increase (CAGR of 0.68% vs 4.98%). Both the features embodied in the cards (contactless and tokenization¹⁶) and the evolution of the digital market (expansion of e-commerce and cross-border payments) help to understand these results. Contactless and tokenization have improved safety and confidence in card payments, positively impacting not only the number of purchase transactions per cards but also the number of cards. Additionally, Mastercard has improved customer experience with a faster checkout, through Click to Pay and Masterpass¹⁷. On the contrary, GDV per transaction¹⁸ has been decreasing over time, moving, to \$57.23, in 2018 (with a CAGR of -6.45%), leading to a slower growth of GDV. Revenue per dollar of GDV¹⁹ has been growing, with a CAGR of 4.78%.

Overall, despite an average growth, from 2014 to 2018, of 12.11%, this segment's relative weight in revenues has declined over time: it accounted for 55% of gross revenues, in 2014, whereas it only represented 51%, in 2018. The rapid growth of the other revenues segment can help understand this result as it had the highest growth, with a CAGR of 18.67%. As for the transaction processing revenue, CAGR was 16.34% for the same period. These growth rates reflect the company's latest efforts to expand its revenues beyond cards, namely through investments in acquisitions of other services' companies.

Rebates and incentives²⁰ were 31.5% of gross revenues, in 2018 (CAGR 20.14%), showing its response to rise in competition across the sector.

Historically, EBIT margin has been relatively stable, ranging from 52% to 54% between 2014 and 2017. Last year there was a disproportionate rise in expenses related to litigation of \$1 128 million²¹. This expense resulted in an EBIT margin fall to 48.68%. As for net margin, there was a gradual evolution from 2012

¹⁴ As stated in the annual report, the reported number of cards considers both physical and non-physical cards.

¹⁵ Transcribers, M. (2019). *MasterCard Inc (MA) Q3 2019 Earnings Call Transcript* | The Motley Fool. [online] The Motley Fool. Available at: <https://www.fool.com/earnings/call-transcripts/2019/10/29/mastercard-inc-ma-q3-2019-earnings-call-transcript.aspx> [Acc. 2 Nov. 2019].

¹⁶ Tokenization: Replacement of the primary account number of a card with a unique token that is stored by merchant instead of cardholder details. Mastercard.com. (2019). PCI Tokenization Services. Avail. at: <https://www.mastercard.com/gateway/processing/security/tokenization.html> [Acc. 26 Oct.19].

¹⁷ Further details provided in the Value-added products and services

¹⁸ Variable written in nominal terms, thus impacted by inflation.

¹⁹ Variable written in real terms.

²⁰ Rebates and Incentives is a contra-revenue caption that consists of benefits attributed to customers when they achieve a certain performance target (in volume hurdle, for example). Rebates and Incentives are deducted to gross revenues to get net revenues.

²¹ Amount relates to three distinct occurrences: fine imposed by the European Commission of \$654 million, litigation of US merchant class of \$237 million and respective fees, and settlements with merchants in Europe of \$237 million.

	EBIT Margin (2018)	Net Margin (2018)
Mastercard Inc.	48.68%	39.19%
Visa Inc.	65.11%	49.98%
Average	56.89%	44.59%

Fig. 12 Mastercard and Visa's EBIT Margin and Net Margin in 2018

Source: Annual reports, Analyst estimate

	Current Ratio (2018)
Mastercard Inc.	1.39
Visa Inc.	1.61
Average	1.50

Fig. 13 Mastercard and Visa's Current Ratio in 2018

Source: Annual reports, Analyst estimate

	Cash Conversion Cycle (2018)
Mastercard Inc.	55.57
Visa Inc.	21.39
Average	38.48

Fig. 14 Mastercard and Visa's Cash Conversion Cycle in 2018

Source: Annual reports, Analyst estimate

	Return on Equity (2018)
Mastercard Inc.	106.74%
Visa Inc.	30.29%
Average	68.52%

Fig. 15 Mastercard and Visa's ROE in 2018

Source: Annual reports, Analyst estimate

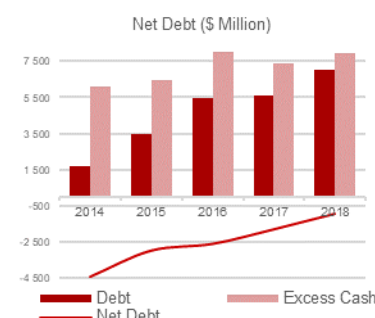


Fig. 16 Net Debt evolution from 2014 until 2018

Source: Annual reports, Analyst estimate

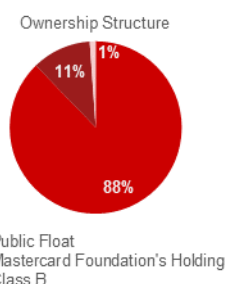


Fig. 17 Ownership Structure as of October 28 2019

Source: Company's Website, Analyst estimate

(37.3%) until 2016 (37.7%), followed by a drastic change in 2017: Mastercard declared in 2017 additional taxes expenses related to the repatriation of accumulated foreign earnings (Transition Tax) that drove net margin down to 31%. In 2018, due to the change in the statutory tax rate in the US, the net margin increased to 39.19%, in line with its historical performance. When looking at EBIT and net margins of Visa, it is possible to see that Mastercard in 2018 was below their average, seaming less efficient in transforming its revenues into earnings.

The company's liquidity ratios induce a healthy situation as the figures for 2018 show a current ratio of 1.39, thus Mastercard's current assets can fully cover its current liabilities. Despite the apparent healthy situation, Mastercard recorded below Visa's average liquidity. Furthermore, in 2018, Mastercard would take on average 55.57 days to complete a cash cycle²² (34 days more than Visa).

Mastercard's return on equity (ROE) has been increasing along the years, reaching 106.74%, in 2018, above Visa's. As ROE is higher than the estimated cost of equity of 7.88%²³, the company is creating value for shareholders.

Historically, Mastercard presents negative net debt due to its high levels of excess cash relatively to issued debt. Until 2014, Mastercard had no significant interest-bearing debt, whereas, in 2018, debt consisted of issued bonds and loans, which helps understand the upward trend of net debt, along the years.

Shareholder Structure

Mastercard has both Class A common voting stock, and Class B common non-voting stock. Class A common stock trades at \$303.39 (Jan 2) at NYSE, whereas Class B common stocks are currently not being traded. As of January 2020, there were 997.4 million Class A shares outstanding (98.9% of total) and 11.3 million of Class B (1.1% of total)²⁴. The company pays a quarterly cash dividend on both classes and announced a \$0.40 dividend (record date Jan 9, 2020). Mastercard has followed a relatively stable payout policy, with ratio ranging from 17% to 23%. However, the company seems to use share repurchase programs as a preferred way to give return to shareholders. In December 2019, the company announced its intention to buyback up to \$8 billion of Class A stocks, after the current share repurchase program is complete²⁵.

The current capital structure of the firm is heavily dependent on equity, yet Mastercard announced its intention to move to a more normalized mix of equity

²² For payments companies like Mastercard, the cash conversion cycle of Mastercard corresponds to the average collection period.

²³ Further details are provided in the Valuation section.

²⁴ Investor.mastercard.com. (2019). Mastercard Incorporated - Investor Relations - Stock Information. Avail. at: <https://investor.mastercard.com/investor-relations/stock-information/default.aspx> [Acc. 02 Dec. 2019].

²⁵ Investor.mastercard.com. (2019). Mastercard Board of Directors Announces Quarterly Dividend and \$8 Billion Share Repurchase Program. Avail. at: <https://investor.mastercard.com/investor-relations/investor-news/press-release-details/2019/Mastercard-Board-of-Directors-Announces-Quarterly-Dividend-and-8-Billion-Share-Repurchase-Program/default.aspx> [Acc. 18 Dec. 2019].

and debt²⁶, and indeed, historically, company's net debt to market value of equity has become less negative. Both the announcement and the historical trend were incorporated in the valuation model through the forward-looking debt to equity.

Industry Overview

Market dynamics

Nowadays, besides other networks, Mastercard competes with a wide range of technology-enabled companies, from online payment services providers (Paypal, Square, Stripe), big retailers and telecoms (Amazon, Apple, Samsung, Alibaba) to many financial technology startups (fintech). The biggest competitor of all, however, is still cash: according to Mastercard's CEO Ajay Banga, in 2017, cash accounted for 85% of the transactions worldwide²⁷.

The growth of ecommerce over the past years (CAGR 2016-2019 of 23.8%)²⁸ boosted the digital transactions market and introduced technological innovations, such as eWallets and mobile wallets²⁹. Indeed, many big ecommerce competitors find operational diversification in the payments sector while improving customer experience. EWallets such as Amazon Pay, Google Pay, Samsung Pay have become increasingly popular as an alternative payment method for physical cards and are already accepted worldwide, which may compromise traditional players such as Visa and Mastercard's growth through their own products designed for online transactions (Visa Checkout and MasterPass). However, they also rely on Mastercard to extend their financial services offer, by issuing co-branded cards, leveraging from the worldwide acceptance of its brand (for instance, Apple card with Mastercard). Other companies went beyond eWallets, developing Super Apps³⁰, like Alibaba with Alipay and TenCent with WeChat. These Chinese companies were pioneers in offering payment solutions that do not require cards, and currently many others have replicated this business model (Grab and Gojek in Asia), representing a growing threat to cards. Regarding telecom companies, mobile money solutions become a way to issue virtual cards, directly competing with Mastercard (M-Pesa and PalmPay, in Africa). Fintech startups³¹ represent a strategic player in the industry, with a large number

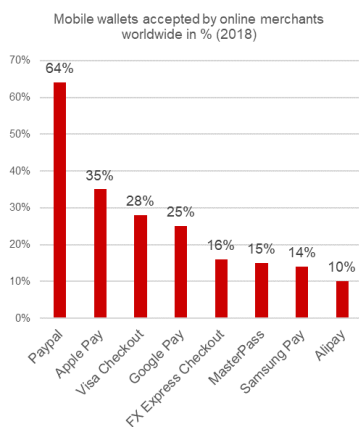


Fig. 18 Share of mobile wallets acceptance worldwide in 2018
Source: Statista

26 investor.mastercard.com/. (2019). Mastercard Investment Community Meeting 2019. Avail. at: https://s2.q4cdn.com/242125233/files/doc_presentations/2019/09/ICM-2019_9-11-19-v15-Website.pdf [Acc. 1 Oct. 2019].

27 Sundeep Khanna, S. (2019). My competition is with cash: Ajay Banga. Livemint. Avail. at: <https://www.livemint.com/Companies/eRxXFn05YgIMHM2BgBVIN/My-competition-is-with-cash-not-other-networks-or-Paytm-Aj.html> [Acc. 7 Dec. 2019].

28 Fesrsvd.fe.unl.pt. (2019). Statista. Avail. at: <https://fesrsvd.fe.unl.pt:2099/statistics/288487/forecast-of-global-b2c-e-commerce-growth/> [Acc. 11 Dec. 19].

29 eWallets consists of a digital wallet where the consumer can hold his payment cards and other documents. While some eWallets simply store documents, others can be used directly to make payments, replacing cards. Mobile-enabled ewallets are designated mobile wallets.

30 Super Apps are multi-purpose apps, in the sense they offer a wide variety of services, including payment solutions, within the same app with an easy customer-end interface.

31 The term fintech startup comprises a wide variety of companies that provide financial services in digital format, including lending, payment solutions, trading, currency exchange services, insurance and many others.



Fig. 19 Market Capitalization of companies from payments industry in 2018
Source: Statista

already operating worldwide (12 211, in 2019)³². Nonetheless, when evaluating them by market capitalization, they are still small compared to Visa or Mastercard. Again, Mastercard can leverage its larger scale to accelerate its growth. By providing these companies support and scale, the company creates valuable partnerships adding additional technology capabilities and improvements in end-customer experience³³.

Overall, whether this digitalization trend presents more opportunities or challenges, seems to depend significantly on each market economic development and pre-existing payments infrastructure. For instance, in countries where cards were already in circulation, Mastercard has used its scale and established mutual beneficial collaborations; in those where the informal sector is large, governments tend to create incentives to promote cashless payments; where there is still unbanked population, there are opportunities for fintech; lastly, where smartphones are widely used, telecom companies find significant advantages by offering payment solutions that may (or not) require card issuance. Most regions mix many of these features in a single dynamic market.

One must also pay close attention to the recent developments of open banking³⁴ across the globe. There has been a growing trend for countries to promote open banking. Probably the most well know initiative is PSD2³⁵, in Europe, which aimed to promote competition and foster new entries. Nonetheless, all around the globe there has been some signs concerning open banking: from Canada, where in the 2018 budget, the government already discussed open banking; Hong Kong, which launched its Open API initiative in 2018, separated into four different stages, aiming to attract fintech³⁶; in Brazil, the central bank announced that, from 2020 onwards, banks must share information with third-party providers, thus, as a way to empower fintech and promote transparency³⁷.

Changes on the demand-side were also accounted, as consumer preferences are shifting towards technological-enabled solutions. A survey conducted by Mastercard with Harvard Business Review found that consumers also look up beyond products: it is the customer experience that will define loyalty, accountable in terms of customer-end service, accessibility and digitalization. While this adds additional pressure on its current performance, it potentiates Mastercard's customer base, so the company has been investing not only in

What features are most important to the success of a loyalty program?		
	2014	2019
Economic Rewards (points, miles, cashback)	49%	42%
Digital and omnichannel access	10%	48%
Exceptional customer service	40%	51%
Ease of use	36%	45%
Assistance from humans/Access to expert advice	16%	12%

Fig. 20 Employees rank their top priority regarding loyalty programs
Source: Harvard Business Review and Mastercard Study

32 Statista. (2019). Number of Fintech startups worldwide as of February 2019, by region. Avail. at: <https://fesrvsd.fe.unl.pt:2099/statistics/893954/number-fintech-startups-by-region/> [Acc. 17 Dec. 2019].

33 PYMNTS.com. (2019). Mastercard Accelerate To Power FinTech Growth | PYMNTS.com. Avail. at: <https://www.pymnts.com/mastercard/2019/mastercard-accelerate-gives-fintechs-access-to-payment-services/> [Acc. 7 Dec. 2019].

34 Open banking allows third parties to have access to consumers' banking information.

35 Payment Services Directive 2 (PSD2) was imposed by the European Commission as an amendment to Payment Services Directive (PSD)

36 Finextra (2019). The AsiaPacific way of open banking. Avail. at: <https://www.finextra.com/blogposting/17396/the-asia-pacific-way-of-open-banking> [Acc. 17 Dec. 2019]

37 Spglobal.com. (2019). Fintechs Step on the Gas as Brazil Unveils Open Banking. [online] Avail. at: <https://www.spglobal.com/en/research-insights/articles/fintechs-step-on-the-gas-as-brazil-unveils-open-banking> [Acc. 9 Oct. 2019].

monetary rewards in cards, but also in point-based loyalty programs (asking consumers for ratings in exchange of benefits) and partnerships (such as with app for ride-share Lyft) to promote personalized customer experience³⁸.

Lastly, cryptocurrencies need to be closely watched, even though they are not widely used due to their instability and low acceptance, with their development, they can become a viable alternative payment solution. Mastercard has already started transforming its product into crypto-enabled through a partnership with blockchain platform R3³⁹ and launching its own cryptocurrency division⁴⁰, again illustrating the company's effort to be at the forefront of innovation.

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	0.44%	0.42%
Card Transactions	4.84%	5.28%
Number of cards	4.59%	2.75%

Fig. 21 Payments Industry Outlook CAGR of 2014 until 2018 and forecasted 2019 until 2024

Source: Euromonitor International, Analyst estimate

	CAGR 2019-2025
Digital Payments	17.60%
Mobile Payments	31.40%
Real-time Payments	29.30%
Online Payment Gateway	16.90%
Payment Processing	10.40%

Fig. 22 Predicted growth for key figures in the payments industry

Source: MarketWatch

Market analysis

According to Euromonitor International, the payments industry comprised 3 956 billion of transactions in 2018, out of which 29.9% were carded⁴¹. Total transactions were growing steadily from 2014 to 2018 (0.44% annually) whereas card transactions were growing rapidly (4.84% annually) as well as cards (4.59%). Ecommerce is expected to grow at fast pace (CAGR 2020-2023 of 15.9%⁴²), mostly within the mobile channel: by 2023, mobile commerce sales are expected to represent 22% of ecommerce sales (in 2018, 14%)⁴³. This will boost mobile transactions and accelerate digitalization across all payments sector, for which double-digit growth is predicted. Given the disparities regarding consumer preferences and technology for different regions, an analysis of each is required.

North America

North America presents a rather traditional structure of payments where cards are clearly the most used method both at POS and ecommerce (81% and 69% of volume, respectively), which seems natural as in 2017, only 5% of Americans were out of the formal banking system⁴⁴. Additionally, a survey from Statista concluded that ACH⁴⁵ is the most preferred payment method by 53% in B2B payments. Despite the smartphone penetration (66.5%)⁴⁶, mobile payments are starting to grow, with eWallets already accounting for 20% of ecommerce volume, proving that new entrants, such as Apple, Amazon or Facebook are leveraging from consumers' usage and brand awareness. While eWallets are

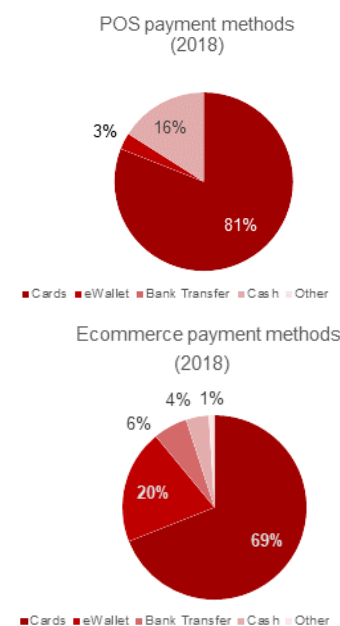


Fig. 23 & 24 Volume of different payment methods in 2018 in North America

Source: Wordpay

38 MasterCard Social Newsroom. (2019). Loyalty is Digital: 53% of Executives believe Omnichannel Access is Key in the Next 5 Years. [online] Available at: <https://newsroom.mastercard.com/news-briefs/loyalty-is-digital-53-of-executives-believe-omnichannel-access-is-key-in-the-next-5-years/> [Acc. 2 Dec. 2019].

39 Tenebruso, J. (2019). Crypto News: Mastercard Announces New Blockchain Payment System, Square Hires More Bitcoin Developers | The Motley Fool. The Motley Fool. Avail. at: <https://www.fool.com/investing/2019/09/25/crypto-news-mastercards-new-blockchain-payment-sys.aspx> [Acc. 2 Dec. 2019].

40 PYMNTS.com. (2019). Mastercard Looks To Hire Crypto Team | PYMNTS.com. Avail. at: <https://www.pymnts.com/cryptocurrency/2019/mastercard-looks-to-hire-crypto-team/> [Acc. 2 Dec. 2019].

41 Card transaction comprises any transaction associated to a card, regardless of the payment method (ewallet, physical card, mobile app, online platform)

42 Fesrvsd.fe.unl.pt. (2019). Statista. Avail. at: <https://fesrvsd.fe.unl.pt:2099/statistics/288487/forecast-of-global-b2c-e-commerce-grow/> [Acc. 11 Dec. 19].

43 Statista. (2019). Avail. at: <https://fesrvsd.fe.unl.pt:2099/topics/871/online-shopping/> [Acc. 2 Dec. 2019].

44 According to Federal Reserve's Report on the Economic Well-being of US Households (2017)

45 Automated clearing house (ACH) is a funds-transfer network (for direct debits and credits) that provides electronic payments in the US.

46 Fesrvsd.fe.unl.pt. (2019). Statista. [online] Available at: <https://fesrvsd.fe.unl.pt:2099/statistics/203713/smartphone-penetration-per-capita-in-north-america-since-2000/> [Acc. 24 Nov. 2019].

expected to become increasingly popular and mobile payments expected to grow, lack of encouragement from regulators and delays in the modernization of its infrastructure may compromise the region's evolution towards innovative payment solutions.

United States

	United States
GDP pc real growth 2018	2.22%
Inflation growth 2018	2.44%
Population growth CAGR 2014-2018	0.68%
Population 2018 (million)	327.17

Fig. 25 Macroeconomic indicators of the US
Source: World Bank

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	4.65%	3.17%
Card Transactions	6.98%	4.52%
Number of cards	4.00%	3.07%

Fig. 26 US Payments Industry Outlook
CAGR of 2014 until 2018 and forecasted 2019 until 2024
Source: Euromonitor International, Analyst estimate

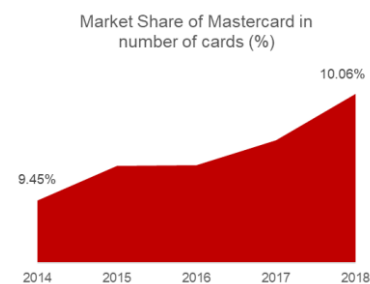


Fig. 27 Mastercard's market share measured by number of cards evolution from 2014 until 2018 in the US
Source: Euromonitor International, Annual report, Analyst estimate

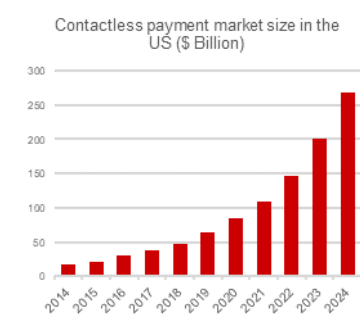


Fig. 28 Contactless payment market revenue in the United States from 2014 to 2024 (in billion U.S. dollars)
Source: Statista

The US has seen its economy slightly recover, reaching a 2.22% growth in its real GDP per capita, in 2018, and an inflation of 2.44%, improving from past years' low values. Looking at population evolution, in 2018, the US had around 327 million inhabitants, representing a 0.68% CAGR from 2014 until 2018. To better understand the dimension of the payment industry, one must consider the number of total transactions, card transactions and cards.

Regarding the number of transactions, growing 4.65% from 2014 and 2018 (CAGR), the US accounted for 90.71% of North America's transactions in 2018. Carded transactions were 72.59% of total transactions that year in the US. As for cards, they have been increasing at a CAGR of 4% between 2014 and 2018, reaching 4 343.8 million, in 2018, however not all card scheme have the same importance. Firstly, Visa is the predominant network, with around 21% of all cards in circulation between 2014 and 2018. Secondly, Mastercard has seen its position increase from 9.45%, in 2014, to 10.06%, in 2018. Less relevant in terms of number of cards are American Express, with less than 2%, and Discover Financial Services, with less than 1.5%⁴⁷.

Regarding competition, there are several fintech increasing their range of products, putting pressure on the typical rewards used by traditional players. One example is Credit Karma, a \$4 billion fintech that provides several services for free, instead getting revenues from personalized offers that it exhibits in its platform⁴⁸ or companies such as Apple with its credit card that, when used on Apple Pay, gives cash back. This increasing competition ends up benefiting consumers as they gain from the diversification of offers and from the innovation in loyalty rewards.

One important trend in the payment industry in the US is contactless. Despite not being widely used in the country, it is expected to become a recurrent payment technology, with revenues expected to reach \$269 billion by 2024.⁴⁹

It is also important to notice the development of blockchain, as the US had the largest number of blockchain companies worldwide in 2019 (726)⁵⁰ and the

⁴⁷ Euromonitor International (2018). Financial cards and payments in the US. Avail. at <https://www.euromonitor.com/financial-cards-and-payments-in-the-us/report>

⁴⁸ Forbes.com. (2019). The 11 Biggest Fintech Companies In America 2019. Avail. at: <https://www.forbes.com/sites/jeffkauflin/2019/02/04/the-10-biggest-fintech-companies-in-america-2019/> [Acc. 27 Nov. 2019].

⁴⁹ Statista. (2018). Contactless payment market revenue in the United States from 2014 to 2025 (in billion U.S. dollars), by solution. Statista. Statista Inc.. Accessed: December 22, 2019. <https://fessvds.fe.unl.pt:2099/statistics/784181/contactless-payment-market-size-in-the-us-by-solution/>

increasing usage of cryptocurrency. Even though, according to a survey conducted, still 72% of the sample do not own Bitcoin nor have interest in buying it⁵¹, only 10.69% thought that was illegal⁵². Therefore, there seems to be room for Bitcoin to increase its usage and importance in the medium and long term, when both merchants and consumers choose it as a payment method. According to another survey, in February 2019, cryptocurrency was already used by at least 5% of the respondents⁵³ and the US was the country with the most wallet providers, accounting for 34% of worldwide wallet providers⁵⁴.

Moreover, the federal reserve announced this April a new real-time payment system, the FedNowService, to be launched in 2024. Even though real-time payment is already available, smaller banks will have access to this service without having to incur into such high costs and consumers will have wider choice as it aims to be an universal product applicable to every type of platform⁵⁵.

Looking at the prospects of the payment industry, the overall number of transactions is forecasted to growth at a CAGR of 3.17%, from 2019 to 2024, reaching around 239 330 million transactions, in 2024. Following the same pattern, the number of cards is also forecasted to increase at a CAGR of 3.07%, between 2019 and 2024, and card transactions at 4.52% (CAGR).

Mastercard in the United States

Historically, the US has been the country that has contributed the most to Mastercard's revenue, accounting for 33% of its total revenues in 2018. It also accounted for almost 30% of total GDV, with \$1 769 billion in 2018. It had a growth trend of 7.09% (CAGR), between 2014 and 2018. This evolution results from the expansion of the number of cards (CAGR of 5.63%) and the slight increase in purchase transactions per card (CAGR of 1.97%), from 2014 to 2018. In fact, recently, Mastercard made important announcements that induce there is card growth potential in this region, such as the renewal of exclusivity contracts with major banks issuers in the US for the next 10 years, a new partnership with Revolut to launch its first cards in the US (effective at the end of 2019) and partnered with Apple to launch Apple's first credit card⁵⁶. Moreover, the

	CAGR 2014-2018
Gross Dollar Volume (GDV)	7.09%
Number of cards	5.63%
Transaction per card	1.61%
Purchase transactions per card	1.97%
Cash transactions per card	-4.72%
GDV per transaction	-0.22%

Fig. 29 GDV elements' in the US CAGR of 2014 until 2018
Source: *Annual reports, Analyst estimate*

50 IPlytics GmbH. (2019). Number of blockchain companies worldwide as of April 2019, by country. Statista. Statista Inc.. [Acc. 22 Dec. 2019]. <https://fesrvsd.fe.unl.pt:2099/statistics/1015489/worldwide-blockchain-companies-country/>

51 Gallup. (2018). Do you currently own Bitcoin?. Statista. Statista Inc.. [Acc. 22 Dec. 2019]. <https://fesrvsd.fe.unl.pt:2099/statistics/770425/ownership-of-bitcoin-in-the-us/>

52 LendEDU. (2017). Is owning Bitcoin in the U.S. illegal?. Statista. Statista Inc.. [Acc. 22 Dec. 2019]. <https://fesrvsd.fe.unl.pt:2099/statistics/769881/opinion-on-illegality-of-bitcoin-usa/>

53 Statista. (2019). Which of these financial products and investments do you currently use/own?. Statista. Statista Inc.. [Acc. 22 Dec. 2019]. <https://fesrvsd.fe.unl.pt:2099/forecasts/997144/financial-product-usage-in-the-us>

54 Cambridge Judge Business School. (2017). Distribution of cryptocurrency wallet providers worldwide in 2016, by country. Statista. Statista Inc. [Acc. 22 Dec. 2019]. <https://fesrvsd.fe.unl.pt:2099/statistics/730873/cryptocurrency-wallet-providers-by-country/>

55 TechCrunch. (2019). The Federal Reserve announces plans for a real-time payments system that will be available to all banks – TechCrunch. Avail. at: <https://techcrunch.com/2019/08/05/the-federal-reserve-announces-plans-for-a-real-time-payments-system-that-will-be-available-to-all-banks/> [Acc. 27 Nov. 2019]. Frbsservices.org. (2019). *FedNow Service*. Avail. at: <https://www.frbsservices.org/financial-services/fednow/index.html> [Acc. 9 Dec. 2019].

56 Apple Newsroom. (2019). Apple Card launches today for all US customers. [online] Avail. at: <https://www.apple.com/newsroom/2019/08/apple-card-launches-today-for-all-us-customers/> [Acc. 3 Dec. 2019].

expansion of purchase transactions may be driven by the expansion of contactless in Mastercard-branded card, which may induce consumption. On the other hand, the decrease in cash transactions may have been caused by the previously described increasing digitalization, with the still slow but present adoption of mobile payments.

Mastercard has incurred into strategic acquisitions in the US, having acquired five companies since 2016, in both tech and financial services industry, aiming to develop its value-added services⁵⁷.

Canada

Canada's economic stability (real GDP growth of 0.45% and inflation rate of 2.27%, in 2018) is consistent with total number transactions growing steadily (3.01%). As of 2018, the Canadian market comprised around 20.2 billion transactions, and 230 million cards in circulation. Cards are widely used in this market: according to Euromonitor International, on average, there are 0.79 credit cards per capita, and 2.1 debit cards per capita. Card transactions have been growing at a CAGR of 7.25%, which could be linked to the growing importance of ecommerce, where card networks dominate, comprising 90% of ecommerce value of transactions⁵⁸ in 2018 (\$199 billion), mostly online payments. However, more than 50% of consumers reveal security and data storage concerns, which may limit ecommerce expansion⁵⁹.

Regarding competition, Mastercard, Visa and Interac Association accounted for around 80% of the total amount of cards, in 2018. These three players have been consistently the top operators at least since 2014, with Visa on the lead.

Contactless payments grew almost 30% from 2017 to 2018, to 4.1 billion transactions. As contactless tends to substitute cash due to its convenience, it usually has a lower average transaction size. Thus, its expansion has contributed to the decline in average volume of transaction (from \$44, in 2013, in 2018 to \$42, for debit cards). The same does not apply to mobile-enabled solutions as studies find 38% of the Canadian do not want to pay anything with smartphone. A2A electronic transactions are expanding in the region as well, accounting for 52% growth in volume, last year. However, the key service in this segment is Interac e-Transfer, especially in P2P, moving around \$465 million, in 2018⁶⁰.

	Canada
GDP pc real growth 2018	0.45%
Inflation growth 2018	2.27%
Population growth CAGR 2014-2018	1.12%
Population 2018 (million)	37.06

Fig. 30 Macroeconomic indicators of Canada
Source: World Bank

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	3.01%	2.58%
Card Transactions	7.25%	4.13%
Number of cards	3.82%	1.92%

Fig. 31 Canada Payments Industry Outlook
CAGR of 2014 until 2018 and forecasted
2019 until 2024
Source: Euromonitor International, Analyst
estimate

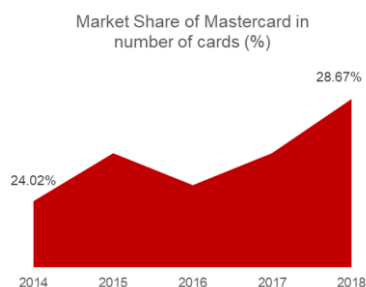


Fig. 32 Mastercard's market share measured
by number of cards evolution from 2014 until
2018 in Canada
Source: Euromonitor International, Annual
report, Analyst estimate

⁵⁷ Further details are provided in the Company overview section.

⁵⁸ Euromonitor International (2018). Payments and financial cards in Canada. Avail. at <https://www.euromonitor.com/financial-cards-and-payments-in-canada/report>

⁵⁹ Payments.ca. (2019). [online] Avail. at: https://www.payments.ca/sites/default/files/canadianpaymentmethodsandtrendsreport_2019.pdf [Acc. 11 Nov. 2019].

⁶⁰ Payments.ca. (2019). [online] Avail. at: https://www.payments.ca/sites/default/files/canadianpaymentmethodsandtrendsreport_2019.pdf [Acc. 11 Nov. 2019].

In the future, transactions are expected to grow (CAGR of 2.58%) driven by ecommerce, fostered by the increasing adoption of contactless and more retailers accepting this payment method. Cards already vast penetration and low population growth (1.12%, on average, from 2014 to 2018) fundament cards growing steadily (CAGR of 1.92% from 2019 until 2024).

Mastercard in Canada

In 2018, Canada represented around 3% of Mastercard's total GDV, with \$173 billion and it grew at 7.2%, on average (CAGR 2014-2018). Growth resulted from cards increasing at a CAGR of 8.51% and purchase transactions per card at 4.60%, cash transactions per card and GDV per transaction declined at a CAGR of -5.90% and -5.44%, respectively, from 2014 to 2018, mainly due to the increasing adoption of contactless.

Mastercard's strategy for this region seems to be focused on keeping with the growth in ecommerce, having announced a partnership with ScotiaBank to facilitate online and in-app payments⁶¹ and to facilitate cross border transactions. Mastercard has also partnered with Interac, in May 2019, to leverage from its e-Transfer platform and Mastercard Send to promote international move of money⁶². Mastercard's recent acquisitions of NuData Security and Ethoca, aiming to expand its safety and fraud prevention products⁶³ provide the company a strategic position to address the previously described consumers' concern in ecommerce and focus in providing security solutions.

Europe

Europe⁶⁴ is a developed region, still recovering from the last financial crisis and its debt crisis, registered a GDP per capital growth of 1.74% in 2018. Despite its slow growth, its inflation is catching up to historical normal levels, having reached 2.01%, in 2018, which may represent some improvements in consumers purchasing power, positively impacting the payments industry. Moreover, to better understand the dimension of this market, one should know it involves around 919 million inhabitants but growing steadily (CAGR 2014-2018 of 0.43%). Focusing on the payments industry, it involved 565 673 million transactions, in 2018, that resulted from a 1.15% CAGR between 2014 and 2018. Out of those transactions, around 167 583 million were carded (CAGR of 13.17% for the same period). In 2018, there were 2 262 million cards, increasing at 3.01% annually, on

	CAGR 2014-2018
Gross Dollar Volume (GDV)	7.20%
Number of cards	8.51%
Transaction per card	4.47%
Purchase transactions per card	4.60%
Cash transactions per card	-5.90%
GDV per transaction	-5.44%

Fig. 33 GDV elements' in the Canada CAGR of 2014 until 2018

Source: Annual reports, Analyst estimate

	Europe
GDP pc real growth 2018	1.74%
Inflation growth 2018	2.01%
Population growth CAGR 2014-2018	0.43%
Population 2018 (million)	918.79

Fig. 34 Macroeconomic indicators of Europe

Source: World Bank

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	1.15%	0.63%
Card Transactions	13.17%	5.97%
Number of cards	3.01%	2.53%

Fig. 35 Europe Payments Industry Outlook CAGR of 2014 until 2018 and forecasted 2019 until 2024

Source: Euromonitor International, Analyst estimate

61 MasterCard Social Newsroom. (2019). Mastercard and Scotiabank team up to bring customers Scotiabank Masterpass. Avail. at: <https://newsroom.mastercard.com/press-releases/mastercard-and-sciotiabank-team-up-to-bring-customers-sciotiabank-masterpass/> [Acc. 21 Nov. 2019].

62 MasterCard Social Newsroom. (2019). Mastercard and Interac collaborate to give Canadians a fast, simple and secure way to send money globally. Avail. at: <https://newsroom.mastercard.com/press-releases/mastercard-and-interac-collaborate-to-give-canadians-a-fast-simple-and-secure-way-to-send-money-globally/> [Acc. 29 Nov. 2019].

63 Further details are provided in the Company overview section.

64 Russia is being included in this region.

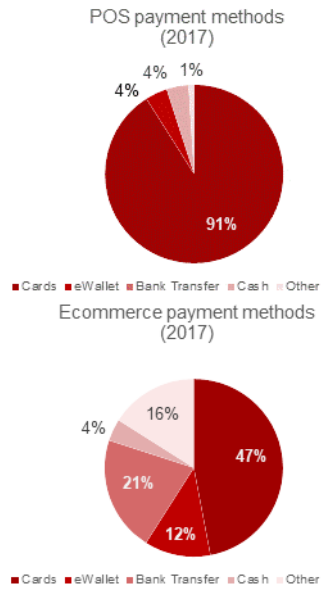


Fig. 36 & 37 Volume of different payment methods in 2017 in **Norway**
Source: WordIpay

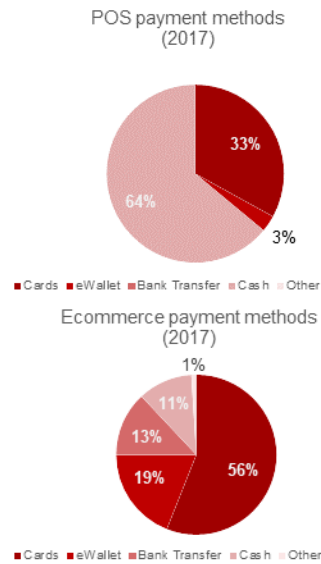


Fig. 38 & 39 Volume of different payment methods in 2017 in **Spain**
Source: WordIpay

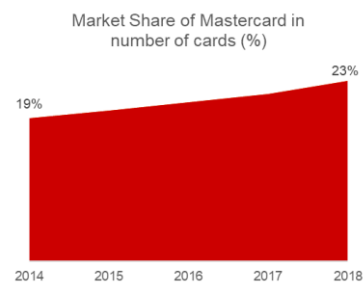


Fig. 40 Mastercard's market share measured by number of cards evolution from 2014 until 2018 in Europe
Source: Euromonitor International, Annual report, Analyst estimate

average, since 2014, mainly because of countries like Greece, Spain, Italy which are recovering from the debt crisis and are moving towards cards in detriment of cash. In Greece, for instance, the government enforced capital controls to fight against money laundry and tax evasion, while on Italy and Spain consumers shift preferences for contactless and mobile payments, reducing the use of cash⁶⁵.

Europeans' payments preferences are not uniformly distributed. When looking at Western Europe, the Nordics favour card and mobile payments. One clear example is Norway, where at POS payments, 91% of the volume was attributed to cards, in 2017, while only 4% involved cash. When looking at eCommerce, cards (47%), bank transfers (21%) and eWallet (12%) were clearly the preferred methods of payment, with cash again only accounting for 4%. Contrarily, at the southern countries, there is still some dominance of cash in POS. In Spain, for instance, at POS payments, cash accounted for 64% while cards only represented 33%, in 2017. When looking at eCommerce, cards increase their usage (56%). However, there seems to be some replacement of cash with electronic payments such as cards and mobile. Moreover, in Eastern European countries, a lot of cash is still used due to its large informal economy⁶⁶.

Europe is characterized by having some card schemes at the national level in the payments industry. For instance, in Norway, BankAxept, in 2017, moved 73% of the volume followed by Mastercard with 13% and Visa with 11%⁶⁷. Nevertheless, with EU Regulation on Interchange Fees in 2015, there was an elimination on territorial restrictions in licenses, representing an opportunity for international card schemes to expand across Europe⁶⁸. Furthermore, when treating Europe as a whole, it is possible to see that Mastercard has been increasing its market share measured by number of cards since 2014, reaching around 23%, in 2018.

It is essential to mention PSD2, which aims to liberalize the payments sector in the EU, with third-parties gaining access to consumers data, which will facilitate the appearance of fintech, such as Revolut or N26, and encourage their development. Besides that, it also imposed new security requirements in order to improve the authentication process, with Strong Customer Authentication (SCA). SCA aims to decrease fraud levels and increase security in online payments.⁶⁹

Looking at prospects of the region, the number of transactions are expected to grow at a CAGR of 0.63%, while card transactions at a CAGR of 5.97%. This higher growth of card transactions is aligned not only with historical evolution but

⁶⁵ Euromonitor International, Payments in Western Europe, 2019

⁶⁶ Euromonitor International, Payments in Eastern Europe, 2019

⁶⁷ Paymentcardsandmobile.com. (2019). [online] Avail. at: https://www.paymentcardsandmobile.com/wp-content/uploads/2018/11/Global-Payments-Report_Digital-2018.pdf [Acc. 2 Dec. 2019].; Euromonitor International, Payments in Western Europe, 2019

⁶⁸ European Commission - European Commission. (2015). Press corner. Avail. at: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_2162 [Acc. 20 Dec. 2019].

⁶⁹ Stripe.com. (2019). PSD2: Strong Customer Authentication. Avail. at: <https://stripe.com/en-pt/guides/strong-customer-authentication> [Acc. 18 Nov. 19].

also with the previously described digitalization of payments, with eWallets gaining importance. However, higher levels of growth do not seem reasonable, since population is not increasing too much and the countries with the most cash are already changing their preferences. Therefore, it seems only natural that the number of cards keeps its trend of growth but at a slower pace (CAGR for 2019-2024 of 2.53%). PSD2 and lower interchange fees will positively impact the number of cards as a higher merchant acceptance is expected.

Mastercard in Europe

Europe was the third region that contributed the most to Mastercard's GDV, in 2018, with \$1 738 billion. From 2014 to 2018, GDV growth (CAGR 2014-2018 of 6.42%) results from the positive evolution of the company's branded cards, cash and purchase transactions per card. Even though Europe did not register a considerable population growth, Mastercard's cards have been growing, with a CAGR of 9.20% between 2014 and 2018. Thus, Mastercard seems to be capitalizing from the trend of some countries where cash has been historically used to move towards electronic payments. Besides this, it is also taking advantage of the EU regulation on Interchange Fees and the elimination of territorial licenses. Nevertheless, there has been a considerable decline in GDV per transaction. Actually, from 2014 and 2018, GDV per transaction had a CAGR of -10.21%. This decrease follows the trend of other developed regions, such as North America, where the expansion of contactless lead consumers to recognize its convenience and started to shift cash with cards even for smaller transactions.

Mastercard has been partnering with fintech in the region, namely with .sync. It announced a partnership with .sync in December 2019, which aims to create "the most secure card in the market" to be used in .sync's app⁷⁰. Moreover, it sees an opportunity in the MSME⁷¹ segment, thus, in July 2019, it announced a partnership with SumUp, a mobile payment company, aiming to a facilitate the acceptance of electronic payments methods through card reader or mobile.⁷²

Mastercard has also valued the importance of ACH and real time payments in this region, with PSD2 facilitating the entrance of fintech in this area. Therefore, its acquisition strategy for the region has shown the company's effort to be included in this segment. In 2017 and in 2019, the company has acquired two European companies, Vocalink and Nets, that operate in real-time payments.

	CAGR 2014-2018
Gross Dollar Volume (GDV)	6.42%
Number of cards	9.20%
Transaction per card	8.53%
Purchase transactions per card	9.56%
Cash transactions per card	2.33%
GDV per transaction	-10.21%

Fig. 41 GDV elements' in Europe CAGR of 2014 until 2018
Source: Annual reports, Analyst estimate

⁷⁰ MasterCard Social Newsroom. (2019). Mastercard announces new partnership with sync. as it prepares to launch. Avail. at: <https://newsroom.mastercard.com/eu/news-briefs/mastercard-announces-new-partnership-with-sync-as-it-prepares-to-launch/> [Acc. 31 Dec. 2019].

⁷¹ MSME stands for micro, small and medium sized enterprises

⁷² PYMNTS.com. (2019). Mastercard, SumUp Partner For Europe ePayments | PYMNTS.com. Avail. at: <https://www.pymnts.com/news/partnerships-acquisitions/2019/mastercard-sumup-partner-to-expand-epayments-across-europe/> [Acc. 31 Dec. 2019].

	East Asia & Pacific	South Asia
GDP pc real growth 2018	3.53%	5.86%
Inflation growth 2018	2.07%	4.06%
Population growth CAGR 2014-2018	0.66%	1.23%
Population 2018 (million)	2 328.22	1 814.39

	MENA	Subsaharan Africa
GDP pc real growth 2018	0.99%	0.00%
Inflation growth 2018	2.00%	4.01%
Population growth CAGR 2014-2018	1.80%	2.71%
Population 2018 (million)	448.91	1 078.31

Fig. 42 & 43 Macroeconomic indicators of APMEA

Source: World Bank

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	-0.22%	-0.11%
Card Transactions	2.80%	5.08%
Number of cards	4.96%	2.65%

Fig. 44 APMEA Payments Industry Outlook CAGR of 2014 until 2018 and forecasted 2019 until 2024

Source: Euromonitor International, Analyst estimate

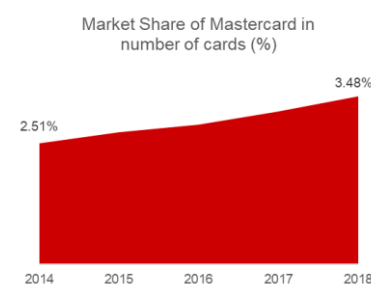


Fig. 45 Mastercard's market share measured by number of cards evolution from 2014 until 2018 in APMEA

Source: Euromonitor International, Annual report, Analyst estimate

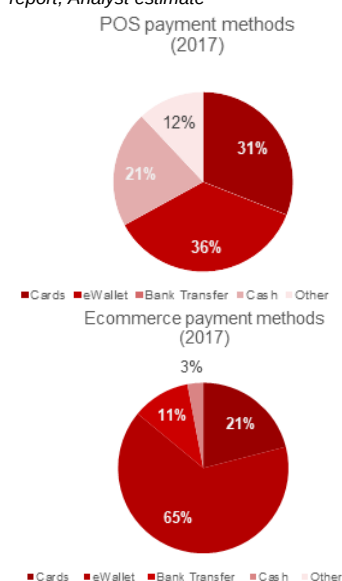


Fig. 46 & 47 Volume of different payment methods in 2017 in China

Source: Wordlpay

Asia Pacific, Middle East and Africa (APMEA)

APMEA is a broad region, comprising: Sub-Saharan Africa, where the rapid population growth (CAGR 2014-2018 of 2.71%) is positively affecting the payments industry; Middle East and North Africa (MENA), where social and political conflicts lead to a stagnant real GDP per capita growth (in 2018, 0.99%) compromising the payments industry; East Asia and Pacific, the payments sector was negatively affected by the US-China trade war; lastly, in South Asia, real GDP per capita grew above inflation in 2018 (5.86% vs 4.06%), thus increasing purchasing power, which positively affects the payments industry.

APMEA represented 72.2% of global transactions in 2018. However, transactions have been decreasing between 2014 and 2018 (CAGR of -0.22%) due to trade tensions between China and the US. Nonetheless, both cards and card transactions have increased in the same period (CAGR of 4.96% and 2.8%, respectively) due to diversification of card products and government incentives to digitalization⁷³. Mastercard's market share of cards is still small (3.48% in 2018), yet it has been growing through local partnerships (discussed further).

There are significant dichotomies regarding digitalization. On the one hand, China and South Korea lead in mobile commerce, benefitting from high mobile penetration (as of 2018, 71% and 85%, respectively)⁷⁴ and large merchant acceptance of digital payments in Asia Pacific (as of 2018, 72%)⁷⁵. On the other hand, majority of markets are still cash-based, because of the large unbanked population⁷⁶ and the elevated levels of financial illiteracy. Therefore, in the region, competition arises both from Super Apps such as AliPay and WeChat in China, Paytm in India, but also from telecom companies. For example, in South Africa, where Mastercard and Visa together comprise 99% of card volume⁷⁷, most transactions are processed by telecoms, such as Vodacom. Additionally, Mastercard faces large domestic card networks, such as JCB⁷⁸ in Japan, RuPay in India, Verve in South Africa and Nigeria, China UnionPay⁷⁹ in Asian countries.

Consumer preferences reflect these discrepancies as well. While eWallets were the preferred payment method in China, both at POS (36%) and ecommerce (65%), emphasizing the dominance of Super Apps (Alipay and WeChat account for 90% of market volume in 2018⁸⁰), in India cash is still dominating at POS

⁷³ Euromonitor International, Payments in Asia Pacific, 2019

⁷⁴ Statista (2019). Active mobile social media penetration in Asia Pacific countries. Avail. <https://fesrvsd.fe.unl.pt:2099/statistics/295631/active-mobile-social-media-penetration-in-asian-countries/>

⁷⁵ Statista (2019). Payment acceptance in Asia Pacific by method of payment. Avail. at <https://fesrvsd.fe.unl.pt:2099/statistics/896229/asia-pacific-accepted-payment-methods-on-social-media/>

⁷⁶ According to the World Bank, unbanked people account for the population that due to lack financial means or elevated level of financial illiteracy are excluded from the formal banking system, meaning they do not hold an account nor a mobile money provider.

⁷⁷ Paymentcardsandmobile.com. (2019). [online] Avail. at: https://www.paymentcardsandmobile.com/wp-content/uploads/2018/11/Global-Payments-Report_Digital-2018.pdf [Acc. 2 Dec. 2019].

⁷⁸ Japanese private company provides financial services, annual volume amounted to \$294.4 billion

⁷⁹ In China, China Unionpay that owns 99% of the cards volume in the country last year generated a volume of \$17.7 trillion, according to their website

⁸⁰ Euromonitor International (2018). Payments in Asia Pacific report

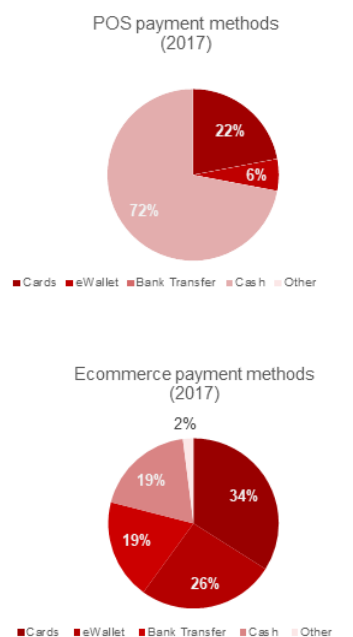


Fig. 48 & 49 Volume of different payment methods in 2017 in India
Source: Wordlpay

(72%), explained by the large informal setor that employs around 81% of population⁸¹. Despite differences in preferences, these countries account for the two largest unbanked populations (as of 2017, 225 million in China and 190 million in India, according to the World Bank).

Moreover, regulation represents both an opportunity and a threat for traditional card schemes as Mastercard. When governments promote digitalization to stimulate the economy and to contain corruption and tax avoidance, as seen in emerging Asian economies; or programs aimed at financial inclusion⁸² in Africa; or initiatives such as tax incentives for card usage (Japan), prepaid card distribution and loyalty programs (South Korea) and investments in card infrastructure (UAE) represent an opportunity for Mastercard to extend its customer base and grow in the region. The increase of over 32 million POS terminals, from 2013 until 2018 across APMEA illustrates the success of these programs⁸³. However, when telecoms such as Vodacom established protocols with governments⁸⁴, or when regulation forbids international competition such as in China⁸⁵ or simply restrains it as in India⁸⁶, Mastercard sees its expansion severely compromised.

The payment sector is expected to benefit from the growth in ecommerce, mainly from mobile payments, but transactions growth will still be restrained by international trade tension. Overall forecasted transactions are shrinking (CAGR 2019-2024 of -0.11%), card transactions are forecasted to grow rapidly (5.08%, annually, on average), but cards' growth deaccelerates (4.96% vs 2.65%).

Mastercard in APMEA

APMEA is the third largest reported region, comprising 30.7% of 2018 total GDV. Mastercard's dollar volume has grown each year at a higher pace. This growth was achieved through the increase of cards (CAGR 2014-2018 of 13.87%), fostered by local partnerships (in UAE, with Emirates Islamic Bank; in Africa, with Airtel) that enable growth for virtual cards and QR capabilities. Growth in purchase transactions per card was also accountable (6.09%) and outlines Mastercard's investment in financial inclusion initiatives to provide digital solutions, such as the partnership with International Finance Corporation (IFC) to expand microfinance and advance financial services in Sub-Saharan Africa and

	CAGR 2014-2018
Gross Dollar Volume (GDV)	8.36%
Number of cards	13.87%
Transaction per card	4.25%
Purchase transactions per card	6.09%
Cash transactions per card	-1.00%
GDV per transaction	-8.72%

Fig. 50 GDV elements' in APMEA CAGR of 2014 until 2018
Source: Annual reports, Analyst estimate

81 The Wire. (2019). *Nearly 81% of the Employed in India Are in the Informal Sector: ILO*. [online] Avail. at: <https://thewire.in/labour/nearly-81-of-the-employed-in-india-are-in-the-informal-sector-ilo> [Acc. 30 Dec. 2019].

82 According to the World Bank, Financial Inclusion translates into providing access to affordable payment solutions to everyone.

83 Euromonitor International (2018). *Payments and Financial cards in Asia Pacific*

84 Vodacom Now!. (2019). *Vodacom Now!*. [online] Avail. at: <https://now.vodacom.co.za/article/public-private-partnership-will-help-accelerate-networks-in-rural-areas> [Acc. 27 Dec. 2019].

85 The government that can vect the entrance of foreign companies, which is why neither Mastercard nor any of the global networks (such as Visa, American Express) operate in China.

86 News.bloombergtax.com. (2019). *India Data Rules May Raise Tax Issues for Mastercard, Visa*. [online] Avail. at: <https://news.bloombergtax.com/daily-tax-report-international/india-data-rules-may-raise-tax-issues-for-mastercard-visa> [Acc. 8 Dec. 2019].

	Latin America
GDP pc real growth 2018	0.51%
Inflation growth 2018	2.38%
Population growth CAGR 2014-2018	0.99%
Population 2018 (million)	641.36

Fig. 51 Macroeconomic indicators of Latin America

Source: World Bank

	CAGR 2014-2018	CAGR 2019-2024
Total Transactions	2.94%	2.55%
Card Transactions	6.88%	6.95%
Number of cards	3.17%	3.88%

Fig. 52 Latin America Payments Industry Outlook CAGR of 2014 until 2018 and forecasted 2019 until 2024

Source: Euromonitor International, Analyst estimate

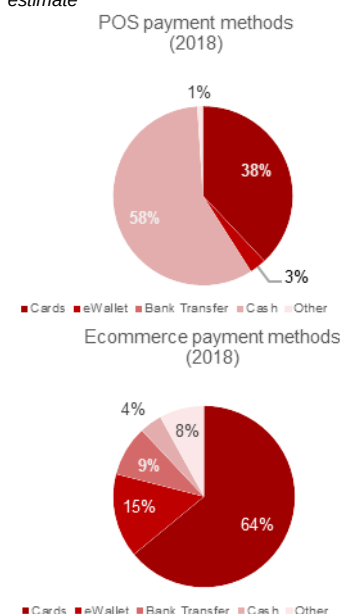


Fig. 53 & 54 Volume of different payment methods in 2018 in Latin America

Source: Wordlpay

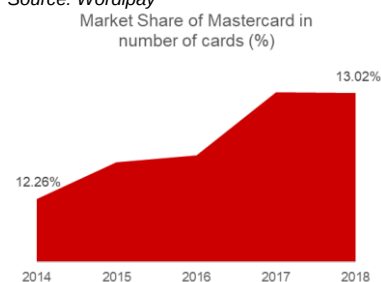


Fig. 55 Mastercard's market share measured by number of cards evolution from 2014 until 2018 in Latin America

Source: Euromonitor International, Annual report, Analyst estimate

Mastercard's \$500 million commitment to its Impact Fund⁸⁷. However, growing concerns regarding compliance with data regulation India could become a concern, as according to the company's CEO, 14% of its employees work there. Mastercard's acquisition of Oltio (2018) shows that the company is positioning itself towards the rapid growth in mobile payment in the region and simultaneously entering cash-dominant countries (Nigeria, South Africa)⁸⁸.

Latin America

Latin America's real growth per capita was positive in 2018 (0.51%), showing some signs of recovery from the recession period, however, inflation is not stabilized yet (2.38%), negatively impacting consumer's purchasing power. Despite that, the number of cards grew between 2014 and 2018 (CAGR of 3.17%) as well as the number of transactions for the same period (2.94%). It is interesting to analyze the evolution of carded transactions, which are growing at a higher pace due to the decline in unbanked people in the region (from 48%, in 2014, to 45%, in 2017, according to Statista).

Even though there is a shifting from cash to cards, 85% of transactions are still held in cash⁸⁹ and there is a low acceptance of digital payments⁹⁰, which could compromise growth in digital channels. There is a growing concern to promote financial inclusion, moving away from cash payments, namely through pre-paid card programs. They have become increasingly popular as they provide a simple payment solution that does not require formal banking but offer unbanked people access to digital payment channels. Ultimately, they also convert cash transactions into digital ones, reducing its weight within the industry.

Quantifying, cash persisted at POS (58% of volume), explained by the high percentage of unbanked population and in some countries by the fear of fraudulent events that occur frequently, such as in Mexico⁹¹. Cards are the preferred method, representing 64% in ecommerce and 38% at POS. The large mobile internet penetrations of the regions in Latin America (South America 109%; Central America 96%; Caribbean 73%)⁹² help understand why eWallets are the second preferred payment for this region in ecommerce (15% of volume).

⁸⁷ According to the 2018 annual report, Mastercard will contribute every year with \$100 (started 2018) to Mastercard Impact fund, a non-profit to support Inclusive growth Initiatives.

⁸⁸ MasterCard Social Newroom. (2020). Mastercard Acquires Oltio to Accelerate Digital Payments Adoption in Middle East and Africa. [online] Avail. at: <https://newsroom.mastercard.com/press-releases/mastercard-acquires-oltio-to-accelerate-digital-payments-adoption-in-middle-east-and-africa/> [Acc 13 Jan. 2020].

⁸⁹ New Europe. (2019). Reducing the cash economy in Latin America is key for its growth. [online] Avail. at: <https://www.neweurope.eu/article/reducing-cash-economy-latin-america-key-growth/> [Acc. 30 Dec. 2019]

⁹⁰ The Dialogue. (2019). Why Does Cash Remain King in Latin America and the Caribbean? - The Dialogue. [online] Avail. at: <https://www.thedialogue.org/analysis/why-does-cash-remain-king-in-latin-america-and-the-caribbean/> [Acc. 30 Dec. 2019].

⁹¹ Forbes.com. (2019). Countries With The Most Card Fraud: U.S. And Mexico. [online] Avail. at: <https://www.forbes.com/sites/halahtouryalai/2012/10/22/countries-with-the-most-card-fraud-u-s-and-mexico/> [Acc. 10 Dec. 2019].

⁹² Statista. (2019). Avail. at: <https://fesrvsd.fe.unl.pt:2099/statistics/934766/penetration-rate-mobile-internet-latin-america-region/> [Acc. 2 Dec. 2019].

Regarding competition, Mastercard held 13.02% of the cards in the market, as of 2018. The company held significant amounts of cards volume in Argentina (59%), Brazil (45%), and Colombia (51%)⁹³. It mainly competes with other processing networks and few large local players, such as Elo in Brazil and Transbank in Chile. The competitive scenario is expected to change in the future mainly due to regulation and new entrants. Regarding regulation, Brazil, Mexico and Chile plan on implementing open banking directives. Regarding new entrants, the high rate of mobile penetration in Latin America attracts Super Apps: the Colombian Rappi (launched in 2015, market capitalization of \$3.5 billion in 2018), for example, offers a wide range of services, from food delivery to payment solutions, and already operates in 7 countries. Another example is the Argentinian startup, Mercado Libre (launched in 2016, market capitalization of \$30.5 billion in 2019) provides an online platform, Mercado Pago, offering a wide variety of financial services, already processing 400 million transactions⁹⁴.

The overall outlook for the region is still highly vulnerable to the pending outcomes⁹⁵. Transactions are expected to grow at CAGR of 2.55% until 2024, mainly driven by the large population level and the gradual recovery of the economy. Expected growth in banked population will drive up total number of cards (3.88%, on average, from 2019 to 2024) and the consequent decline in cash transactions will be partially captured by card transactions (a growth 6.95% is expected). With cards still regarded as the most convenient way of paying online (expected to account for 55% of ecommerce volume)⁹⁶, growing ecommerce will positively impact card transactions. In some markets (Brazil, Argentina) mobile commerce is growing rapidly, and is forecasted to represent 32.5% of ecommerce by 2022⁹⁷, sustained by the large mobile penetration (as of 2017, 67%) and fast-growing ecommerce⁹⁸.

Mastercard in Latin America

Mastercard reported \$412 trillion for Latin America's GDV in 2018 (8.5% of its total GDV). The 3.5% CAGR for the period conceals significant year-on-year changes, for instance, from 2014 to 2015 the volume reported for the region fell significantly (-10.86%), mainly affected by the decline GDV per transaction, more notable from 2014 to 2015 (growth of -20.31%) attributable to the recession in the

	CAGR 2014-2018
Gross Dollar Volume (GDV)	3.50%
Number of cards	4.75%
Transaction per card	9.35%
Purchase transactions per card	10.39%
Cash transactions per card	2.32%
GDV per transaction	-9.64%

Fig. 56 GDV elements' in Latin America
CAGR of 2014 until 2018
Source: *Annual reports, Analyst estimate*

93 Worldpay (2018). Global Payments 2018 Report. Avail. at: https://www.paymentscardsandmobile.com/wp-content/uploads/2018/11/Global-Payments-Report_Digital-2018.pdf

94 Techcrunch.com. (2019). TechCrunch is now part of Verizon Media. [online] Avail. at: <https://techcrunch.com/2019/09/19/the-emergence-of-the-super-apps-in-latin-america/> [Acc. 30 Dec. 2019]

95 Including political reforms in Mexico, improvements in the labor market in Brazil or the crisis in Venezuela.

96 Worldpay (2018). Global Payments 2018 Report. Avail. https://www.paymentscardsandmobile.com/wp-content/uploads/2018/11/Global-Payments-Report_Digital-2018.pdf

97 eMarketer. (2019). Retail Mcommerce Sales in Latin America, 2017-2022 (billions, % change and % of retail ecommerce sales). Avail. at: <https://www.emarketer.com/chart/220855/retail-mcommerce-sales-latin-america-2017-2022-billions-change-of-retail-ecommerce-sales> [Acc. 30 Dec. 2019].

98 Statista (2019). Avail. at: <https://fesrdsd.fe.unl.pt:2099/statistics/218141/mobile-penetration-rate-in-latin-america-since-2007/> [Acc. 30 Dec. 2019].

Brazilian market⁹⁹. Transactions per card were rapidly increasing as well, resulting from the company's large investment in POS market and improving customer experience, as seen recently, with the launch of the Tap on Phone technology in Costa Rica¹⁰⁰.

Mastercard's strategy in the region includes the promotion of financial inclusion through its prepaid programs, that have resulted in significant market share gains at the expense of its rival, Visa, measured both in volume and transactions¹⁰¹. Regarding B2B, the company has partnered with SAP to provide automated account payables solution for B2B in Colombia and Chile¹⁰². There were no acquisitions announce, but the company opened offices in Puerto Rico and Jamaica (2019)¹⁰³, which previews a rise in operating costs but also potential market share gains.

Risks

When assessing the major risks the company faces, one must mention the impact of regulation. The payment industry is highly regulated due to not only its central role in today's economy but also the sensitive data it deals with. Therefore, governments and central banks are increasing their oversight on the industry. For instance, in 2015, EU enforced changes on Interchange Fees, by imposing a cap on these fees, aiming to reduce the costs with card payments for merchants and consumers¹⁰⁴. If this were to be replicated in other jurisdictions, it could negatively impact the company's revenues worldwide. If the company fails to comply with the increasing regulation, it will suffer penalties which can significantly impact its results and brand value. On the other hand, regulators are also pushing towards real-time payments and even though Mastercard has presented some solutions, with Mastercard Send for P2P¹⁰⁵, this trend will impact the company future business model.

There has been some talks about a possible Pan European Payment System Initiative (PEPSI), which would target the dominance of Mastercard and Visa in Europe¹⁰⁶. PEPSI appears as a response to a European sentiment of dependency regarding American players, such as Visa and Mastercard, and new

99 In the 2015 annual report the company evaluates a loss of \$230 million in net income due to devaluation of euro and Brazilian real.

100 Finextra Research. (2019). Mastercard's Tap on Phone tech makes debut in Latin America. [online] Avail. at: <https://www.finextra.com/pressarticle/80058/mastercards-tap-on-phone-tech-makes-debut-in-latin-america> [Acc. 3 Dec. 2019].

101 McKinley, R. (2020). Mastercard Latin America Nibbles at Visa's Q1 Marketshare • 06/12/2019. [online] CardFlash® - Payment Card Industry News. Available at: <https://cardflash.com/news/2019/06/mastercard-latin-america-nibbles-at-visas-q1-marketshare/> [Accessed 13 Jan. 2020].

102 MasterCard Social Newsroom. (2019). Fueling the future of payments: Mastercard & SAP Partner to Advance B2B Payments in Colombia and Chile. [online] Avail. at: <https://newsroom.mastercard.com/latin-america/press-releases/fueling-the-future-of-payments-mastercard-sap-partner-to-advance-b2b-payments-in-colombia-and-chile/> [Acc. 30 Dec. 2019].

103 MasterCard Social Newsroom. (2019). Mastercard Grows Stronger in the Caribbean, Announces Changes and Opens New Offices. Available at: <https://newsroom.mastercard.com/latin-america/press-releases/mastercard-grows-stronger-in-the-caribbean-announces-changes-and-opens-new-offices/>

104 European Commission - European Commission. (2019). Antitrust: Regulation on Interchange Fees. Avail. at: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_2162 [Acc. 20 Nov. 2019].

105 Further details provided in products and value-added services in the Company overview section.

106 MbS News. (2019). PEPSI, this initiative of European banks to counter Visa and MasterCard. Avail. at: <https://www.mbs.news/2019/11/pepsi-this-initiative-of-european-banks-to-counter-visa-and-mastercard.html> [Acc. 18 Nov. 2019].

tech players, Even though it has not been officially confirmed, if PEPSI goes through it may compromise the leading position of Mastercard in Europe.

One important risk to assess are changes in no-surcharge rules¹⁰⁷. There is a trend for authorities to limit these rules, which can negatively affect Mastercard's volume if merchants charge higher price for their products.

Open banking may simultaneously represent an opportunity for Mastercard to grow through partnerships with new players but may also contribute to the slower growth of card transactions. With third-party having access to consumers' accounts and being able to initiate automated payments without needing bank card information, may make consumers move from cards towards ACH.

On another note, it is relevant to look at the preferential treatment for domestic providers, which compromises Mastercard ability to grow in certain geographies, namely in China, where transaction switching, data collection and processing is limited to national companies. If due to geopolitical tensions, there is an increase in this movement it may compromise the forecasted growth of the company.

Cyberattacks are now a reality in several industries, but they are especially relevant in the banking one due to the sensitive data it deals with. Data breaches represent an extremely relevant risk for Mastercard that threat to damage its brand and may compromise the company's profitability. Mastercard has reduced significantly its exposure through recent acquired RiskRecon (2019)¹⁰⁸.

Forecast

Gross revenues were forecasted to grow at a CAGR of 9.07%, from 2019 to 2034. While volume-based revenues will keep growing at 8.05%, a deacceleration is expected in other revenues growth, as the basis keeps increasing in absolute terms. Transaction processing revenues is forecasted to account for 40% of gross revenues by 2034. Net revenues CAGR of 8.58% results from expected increases in rebates and incentives (CAGR of 9.50%).

Regarding volume-based revenues, the main drivers for growths will be number of cards and transactions per card. The number of cards was estimated following a top-down approach, that is, depending both on the total number of cards and on Mastercard's market share in each market. Mastercard is forecasted to obtain market share gains (measured by number of cards) in the following markets:

Europe: in 2018, Mastercard-branded cards accounted for 23.38% of all cards in circulation, and it is forecasted to rise to 28.38%, by 2034. The company's

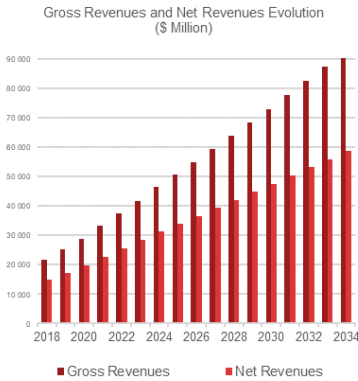


Fig. 57 Gross Revenues and Net Revenues evolution from 2019 until 2034
Source: Analyst estimate

	CAGR 2019-2034
Volume-based Revenues	8.05%
Transaction Revenues	10.40%
Other Revenues	9.01%
Gross Revenues	9.07%
Rebates and Incentives	9.50%
Net Revenues	8.58%

Fig. 58 Net revenues elements' CAGR of 2019 until 2034
Source: Analyst estimates

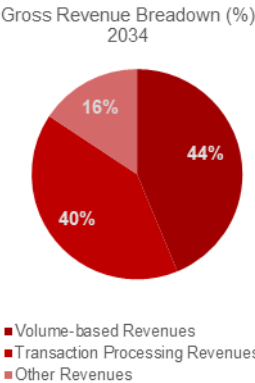


Fig. 59 Gross Revenue Breakdown – 2034
Source: Analyst estimates

107 No-surcharge rules: require that merchants charge customers the same amount regardless of the payment method used. Ecb.europa.eu. (2019). Avail. at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1388.pdf> [Acc. 19 Oct. 2019].

108 Further details provided in the Acquisitions table in Company overview section.

CAGR 2019-2034

Gross Dollar Volume (GDV)	8.05%
Number of cards	4.15%
Transaction per card	5.00%
Purchase transactions per card	5.50%
Cash transactions per card	-0.62%
GDV per transaction	-1.20%

Fig. 60 GDV elements' CAGR of 2019 until 2034

Source: Analyst estimate

favorable position, due to its vast experience, scale and global acceptance, makes it a preferred partner compared to local card schemes for the new players as fintech (as seen with .sync or SumUp) that are expected to arise in the region due to regulatory changes, such as PSD2.

APMEA: in 2018, it accounted for 3.48% of all cards in circulation, and it is forecasted to rise to 4.88%, by 2034. Despite the company's effort to strengthen its position through its inclusive fund's investment in digitalization, the local players, especially in Asia Pacific, are expected to keep dominating, even expanding within the region, compromising the company's expansion. However, the company is expected to keep leveraging from its international card network and increasing openness of the Middle East and Africa region, thus, increasing its card presence in the area.

US: in 2018, it accounted for 10.06% of all cards in circulation, and it is forecasted to rise to 13.26%, by 2034. The increasing relevance of mobile payments and non-physical cards allow Mastercard to leverage from its extensive offer in the segment, such as Click to Pay or MasterPass. Moreover, it will benefit from the rise of fintech, continuing its partnership policy regarding its card rail, such as with Revolut.

Latin America: in 2018, it accounted for 13.02% of all cards in circulation, and it is forecasted to rise to 16.52%, by 2034. The company's effort in promoting financial inclusion in the region through prepaid cards is expected to keep fostering this growth. Additionally, the new offices in the Caribbean will potentially facilitate local partnerships and positively impact the number of cards.

The forecasted number of cards is presented in the table below. Note that in Canada, while no market share gains are expected, Mastercard will follow market growth, which is forecasted to have a CAGR of 1.98% from 2019 until 2034.

In Million	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Number of cards	2 179	2 348	2 522	2 649	2 769	2 890	3 006	3 113	3 223	3 333	3 440	3 548	3 659	3 773	3 890	4 011
APMEA	864	938	1 016	1 070	1 121	1 172	1 214	1 257	1 302	1 348	1 396	1 445	1 495	1 547	1 601	1 657
Canada	65	66	67	68	70	71	73	74	75	77	79	80	82	83	85	87
Europe	574	617	660	689	717	744	774	791	809	826	844	863	882	901	921	941
Latin America	204	219	235	252	266	280	295	311	327	340	353	364	375	386	398	410
USA	472	507	544	570	596	622	650	680	710	742	769	796	825	855	885	917

The number of transactions per card will be increasing over the forecasted period, mainly driven by purchase transactions per card.

Still regarding volume-based revenues' growth, it will be restrained by cash transactions per card, which are expected to decrease due to the global trend of digitalization (with an estimated CAGR of -0.62%, from 2019 to 2034), and by GDV per transaction that will continue to decline at an estimated CAGR of -1.20%, as a result of the massification effect of the global usage of cards.

As there are no foreseen increase in fees, revenue per dollar of GDV, expressed in real terms, was kept constant.

Regarding transaction processing, revenue will be driven by the number of transactions processed derived from Mastercard's market share on the world transactions. Thus, the company is expected to leverage from its strategic acquisitions of processors¹⁰⁹ and partnerships, such as the partnership with R3 to launch Corda cross-border services¹¹⁰, so it is expected to be able to increase its revenues at a CAGR of 10.40%, from 2019 until 2034.

Furthermore, other revenues have a forecasted growth of 9.01% (CAGR between 2019 and 2034), taking into account not only the company's effort to differentiate itself through its value-added services, as seen with the strong investment in data and services and cybersecurity and intelligence solutions, illustrated by the partnership with Elavon to improve security and fight digital fraud¹¹¹, but also its expansion to real-time payments, with several recent acquisitions.

Finally, rebates and incentives will reflect the increasing competition, coming not only from traditional competitors, such as Visa, but also from the new players previously described. In order to stay competitive without needing to decrease its revenue per dollar of GDV, the company is expected to reinforce its rebates and incentives. Therefore Rebates will represent 36.42% of gross revenues, in 2034.

Mastercard's main operating costs include Personnel costs (14.7% of gross revenues, in 2018), Advertising and Marketing (4.2% of gross revenues, in 2018) and Other general and administrative¹¹² (3.7% of gross revenues, in 2018). Personnel costs have increased significantly (CAGR 2015-2018 of 16.7%), due to headcount and cost per employee. While headcount increased mainly in years of acquisitions (from 2016 to 2017, the number of employees grew 12.6% due to the acquisition of Vocalink), the cost per employee has increased constantly since 2015 (CAGR 2015-2018 of 6.67%). Within the next couple of periods, a significant increase is expected in headcount (CAGR 2019-2021 of 8.47%), due to the announced acquisitions and to the previously mentioned expansion in the Caribbean region. By 2023, personnel cost will represent 15.2% of gross revenues. Advertising and marketing expenses become increasingly important as competition arises to consolidate brand value and market position. This caption grew moderately (CAGR 2015-2018 of 3.38%) and is forecasted at 4.7% of gross revenues by 2034. Other general and administrative costs have grown

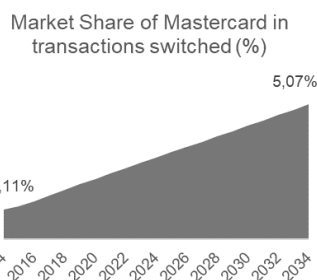


Fig. 61 Market Share of Mastercard in transactions switched from 2014 until 2034
Source: Analyst estimate

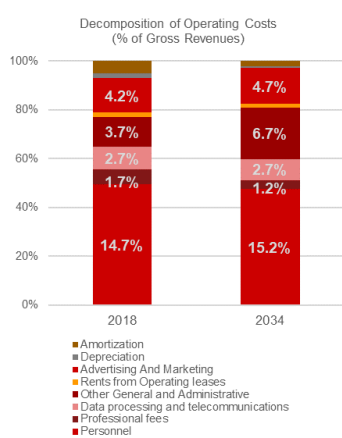


Fig. 62 Decomposition of Operating Costs (as % of Gross Revenues) in 2018 and 2034
Source: Analyst estimate

¹⁰⁹ Further details are provided in the Acquisitions table in Company overview section.

¹¹⁰ Further details are provided in the Value-added products and services table in Company overview section.

¹¹¹ MasterCard Social Newsroom. (2019). Brighterion and Elavon to Fight Fraud with Artificial Intelligence. Avail. at: <https://newsroom.mastercard.com/press-releases/brighterion-and-elavon-to-fight-fraud-with-artificial-intelligence-2/> [Acc. 12 Nov. 2019].

¹¹² Other general and administrative costs comprise costs to support strategic development effort, loyalty and rewards programs, travelling, meeting expenses

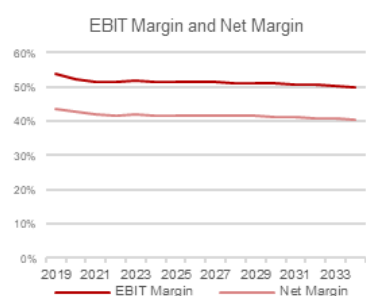


Fig. 63 EBIT Margin and Net Margin evolution from 2018 until 2034
Source: Analyst estimate

significantly (CAGR 2015-2018 of 11.74%) due to the previously mentioned focus on loyalty programs and cross-industries partnerships. The caption is expected to represent 6.7% of gross revenues by 2034. In order to remain competitive, Customer and Merchant incentives accounts are expected to grow significantly over the period, as the company strategically invests in loyalty programs and partnerships as a way of improving customer experience.

Margin performance is expected to recover after last year's decline due to litigation costs, but increasing costs prevent significant rises in margins within the next periods. Margins will stabilize at around 50% (EBIT margin) and 40% (net margin) in steady-state. The forecasted value for net income (\$23 821) and total equity value (\$15 134) will yield a return on equity of 157% by 2034.

Valuation

Discounted Cash Flow

The Discounted Cash Flow model was used to estimate the Enterprise Value (EV) of Mastercard as of December 31, 2020. Using a weighted average cost of capital (WACC) of 7.79%, an EV of around \$336 831 million was estimated, resulting in Stockholders Equity of \$336 739 million. When accounting for the shares outstanding, a price of \$333.85 is reached, yielding a total expected return of 12.67%, where 10.04% are originated from capital gains, and the remaining 2.63%, from dividend yield. Therefore, this report issues a BUY recommendation.

In order to estimate EV, it was considered that Mastercard's growth will stabilize in 2033 and 2034, with a nominal growth of FCF of 4.7% and with around 40% of economic profit as a percentage of revenues. From then onwards, a growing perpetuity was estimated. The perpetual growth rate was computed considering the expected long-term inflation rate implicitly applied along the valuation model (1.72%) and the long-term growth of real GDP (2%)¹¹³.

Discount rates

To estimate WACC, r_e and r_d were calculated. To compute r_e , the capital asset pricing model was used, with US 10-year government bond seen as a proxy for the risk free rate, better matching the long-term analysis of the company, it is headquartered in the US and its accounts are reported in USD. To compute a forward-looking equity beta, the company excess returns were regressed against a proxy for the market excess return, S&P 500 Index, using monthly return for the

¹¹³ According to the OECD estimation for world GDP long-term real growth – Guillemette, Y. and D. Turner (2018), "The Long View: Scenarios for the World Economy to 2060", *OECD Economic Policy Papers*, No. 22, OECD Publishing, Paris, <https://doi.org/10.1787/b4f4e03e-en>

Discount Rate Assumptions	
Risk-free	1.82%
Expected Long-term Inflation	1.72%
Market Risk Premium	6.00%
Cost of debt (Rd)	3.35%
Yield (YTM)	3.35%
Recovery Rate	53.85%
Annualized Probability of Default	0.01%
Loss given default	46.15%
Beta of debt	0.26
Income tax rate	21.00%
Industry average unlevered beta	1.00
Beta of equity (levered)	1.01
Cost of levered equity (Re)	7.88%
Forward looking target D/E	0.01
WACC	7.79%

Fig. 64 List of assumptions used to compute discount rates

Comparables used in beta's estimation
Mastercard Incorporated.
Visa Inc.
Paypal Holdings, Inc.
American Express Company
Discover Financial Services
Global Payments Inc.
Worldpay, Inc
Fidelity National Information Services, Inc.
Fiserv (Fisv)
Fleetcor Technologies Inc

Fig. 65 List of comparables used to compute average unlevered beta

last 3 years. Besides Mastercard's, the unlevered beta for nine other companies that compete with Mastercard, not only in the US but also worldwide in the company's wide range of products, were calculated, and an industry average unlevered beta was estimated as 1. The forward-looking target D/E was estimated with the average of 56 comparables' D/E from both the technological and payments industry aligned with the company's ambition to migrate to a more standardized capital structure. Then, using the forward-looking D/E target, relevered beta was estimated as 1.01, meaning that the stock return tend to vary with the market. The market risk premium of 6% was estimated based on literature of Ferreira, M. and Santa-Clara, P. working paper¹¹⁴.

The rd was estimated using the yield-to-maturity on an outstanding bond, issued in February 2018, with 30 years maturity. Knowing Mastercard has a credit rating of A1 and an unsecured bond, the annualized probability of default and the loss given default were estimated from Moody's Investors Service, Annual Default Study: Corporate Default and Recovery Rates from 1998 to 2017 and then subtracted from the yield-to-maturity. The US 2018 corporate tax rate (21%) was assumed as the marginal tax rate, as Mastercard is headquartered in the US.

Scenario analysis¹¹⁵

As described in the risk section, Mastercard's value can suffer from external shocks. One of those risks is the creation of PEPSI. Therefore, in order to assess how the company's share price varies if a European payment system is implemented, a scenario analysis was conducted. Bearing in mind that Russia introduced its own domestic payments solution to fight international players at the end of 2015, the impact that such shock had on the annual growth of Mastercard's market share, in the country, was used as a proxy to measure the possible impact of PEPSI in the company's market share in Europe and, as a result, on its GDV. Three scenarios were computed: scenario A replicated the Russian's decline in Mastercard's market share; B were it only declined 50% of what it did in Russia; C with only a 25% decline. When assessing the probabilities of each scenario, a share price of \$319.28 was achieved, yielding a HOLD recommendation.

It was also assessed whether the risk of data breach resulting from a cyberattack would significantly impact share price. Previous studies found that attacked companies ended up having losses in profitability in the medium-term, translated into additional operating costs and decline in revenues. Additionally, research supports that scale of the event significantly impacts the loss incurred. Hence, a

¹¹⁴ Nber.org. (2019). Avail. at: <https://www.nber.org/papers/w14571.pdf> [Acc. 28 Oct. 2019].

¹¹⁵ Further details regarding PEPSI and Data breach scenario analysis are provided in the individual reports.

Market Risk Premium	Risk-free				
	1.80%	1.81%	1.82%	1.83%	1.84%
5.00%	444.16	442.90	441.64	440.40	439.16
5.50%	382.33	381.38	380.45	379.52	378.59
6.00%	335.30	334.57	333.85	333.12	332.40
6.50%	298.36	297.78	297.20	296.62	296.04
7.00%	268.58	268.11	267.63	267.16	266.69

Fig. 66 Sensitivity Analysis on market risk premium and risk free

Source: Analyst estimate

Forward looking target D/E	-0.03	323.44
	-0.02	326.06
	-0.01	328.66
	0.00	331.26
	0.01	333.85
	0.02	336.42
	0.03	338.99
	0.04	341.54

Fig. 67 Sensitivity Analysis on forward looking target D/E

Source: Analyst estimate

Annualized Probability of Default	0.01%	333.85
	0.05%	333.83
	0.09%	333.82
	0.08%	333.82

Fig. 68 Sensitivity Analysis on credit risk and corresponding probability of default

Source: Analyst estimate

Unlevered Beta	0.99	340.44
	1.11	333.85
	1.24	327.50

Fig. 69 Sensitivity Analysis on unlevered beta

Source: Analyst estimate

Expected Long-term Inflation	Expected Real Long-term Growth				
	1.60%	1.70%	1.80%	1.90%	2.00%
1.62%	310.68	314.90	319.31	323.93	328.77
1.67%	312.76	317.08	321.59	326.32	331.28
1.72%	314.90	319.31	323.93	328.77	333.85
1.77%	317.08	321.59	326.32	331.28	336.48
1.82%	319.31	323.93	328.77	333.85	339.18

Fig. 70 Sensitivity Analysis on expected real long term growth and inflation

Source: Analyst estimate

Peer Group	EV/EBITDA	EV/Sales	P/E
Mastercard Inc	31.88x	17.80x	41.03x
Visa Inc.	25.50x	17.82x	36.28x
Paypal Holdings, Inc.	33.53x	7.10x	50.83x
American Express Company	24.99x	5.28x	16.23x
Global Payments Inc.	38.87x	16.14x	76.49x
Fidelity National Info. Services	28.32x	10.96x	65.04x
Fiserv (Fisv)	38.07x	13.26x	54.06x
Fleetcor Technologies Inc	22.52x	11.51x	28.53x
Amazon.Com Inc.	25.33x	3.28x	79.01x
Max	38.87x	17.82x	54.06x
Min	22.52x	13.26x	28.53x
Median	28.32x	16.63x	40.09x
Average	29.80x	16.09x	41.96x
Implied Price (Median)	\$303.98	\$324.26	\$333.85
Implied Price (Average)	\$319.93	\$313.65	\$349.39

Fig. 71 Industry relative valuation

Source: Bloomberg, Analyst estimate



Fig. 72 Football Field

Source: Bloomberg, Analyst estimate

scenario analysis was conducted in which a data breach took place during 2020 in the US, and four scenarios were analysed, depending on the number of cards affected: in the first, 5% of the cards were targeted, in the second, 10%, in the third 25%, and lastly 100%. When assessing the probabilities of each scenario, a share price of \$329.04 was achieved, yielding a BUY recommendation.

Sensitivity analysis

The main assumptions were tested to assess the price sensitivity to changes in the inputs of the WACC of the DCF model including risk free rate, market risk premium, annualized probability of default, forward looking D/E ratio and 95% confidence interval for beta levered. Moreover, given that the perpetuity accounts for around 60% of the EV, a sensitivity analysis on both long-term growth and inflation was conducted. When assessing the share price response to changes in assumptions used to compute WACC, it is possible to observe that: if the risk free and market risk premium falls, the share price will increase; if the target forward looking D/E rises, the share price is expected to rise too; if the company's credit ranking is downgraded for Aa, A, Baa or Ba, the share price will not react aggressively; if, considering a 95% confidence interval for unlevered beta, the beta rises, the share price will decrease. Furthermore, the share price reveals to be sensitive to changes in both expected long-term real growth and inflation, as predicted due to the relevancy of the perpetuity in EV. Thus, if both elements increase, the share price will follow the positive evolution too.

Relative Valuation

In order to complement Mastercard's valuation, a peer's analysis was conducted, based on Enterprise Value to EBITDA, Enterprise Value to Sales and Price to Earnings. A list of comparables, including companies that operate in the payments industry, not only in the US but also worldwide, was used. However, one must notice that a relative valuation approach does not consider forecasted growth as the Discount Cash Flow method.

Due to extensive spread, outliers were excluded from the sample. Regarding Enterprise Value to EBITDA, an average multiple of 29.80x resulting a price per share of \$319.93, above current market price. Focusing on Enterprise Value to Sales, an average multiple of 16.09x resulting a price per share of \$313.65, above current market price. Focusing on Price to Earnings, an average multiple of 41.96x resulting a price per share of \$349.39, above current market price.

Appendix

In Million \$ (Except %)	FY 2017	FY 2018	2019	2020	2021	2022	2023	2024
Cards								
Growth rates of number of cards per region								
APMEA	13.50%	14.18%	8.41%	8.54%	8.38%	5.25%	4.79%	4.54%
Canada	8.33%	17.31%	6.00%	2.25%	1.34%	1.61%	2.31%	2.10%
Europe	9.95%	11.37%	8.57%	7.50%	6.88%	4.42%	4.03%	3.83%
Latin America	6.67%	3.98%	11.54%	7.40%	7.32%	7.27%	5.30%	5.48%
USA	4.86%	6.59%	7.98%	7.53%	7.17%	4.78%	4.59%	4.41%
Revenues								
Volume-based Revenues								
Number of cards	1 811	2 007	2 179	2 348	2 522	2 649	2 769	2 890
Transactions per Card	48	51	55	60	65	71	76	81
GDV per transaction	60	57	56	55	54	53	52	51
Volume-based Revenues per dollar of GDV	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Volume-based Revenues	9 304	11 092	12 687	14 518	16 697	18 655	20 606	22 565
Transaction-based Revenues								
Number of Transactions Switched	65 304	73 791	81 985	90 327	99 084	107 438	115 623	124 247
Revenue per transaction	0.095	0.100	0.104	0.108	0.112	0.116	0.120	0.124
Transaction-based Revenues	6 188	7 391	8 512	9 721	11 053	12 422	13 857	15 435
Other Revenues								
% growth	17.4%	17.4%	18.9%	17.9%	16.9%	15.0%	15.0%	15.0%
Other Revenues	2 853	3 348	3 982	4 696	5 492	6 315	7 263	8 352
Gross Revenues	18 345	21 831	25 181	28 934	33 241	37 392	41 727	46 353
Rebates and Incentives (contra-revenue)								
% Gross Revenues	-31.9%	-31.5%	-32.0%	-32.0%	-32.0%	-32.0%	-32.0%	-32.4%
Rebates and Incentives (contra-revenue)	-5 848	-6 881	-8 063	-9 265	-10 644	-11 973	-13 361	-15 027
Net Revenues	12 497	14 950	17 118	19 670	22 598	25 420	28 366	31 325
Consolidated Income Statement								
Gross Revenues	18 345	21 831	25 181	28 934	33 241	37 392	41 727	46 353
Rebates and Incentives	-5 848	-6 881	-8 063	-9 265	-10 644	-11 973	-13 361	-15 027
Net Revenues	12 497	14 950	17 118	19 670	22 598	25 420	28 366	31 325
General and Administrative	4 475	4 962	6 124	7 348	8 715	9 820	10 848	12 088
Advertising and Marketing	771	907	1 172	1 347	1 547	1 740	1 942	2 158
Rents from Operating Leases	96	110	127	146	168	189	211	234
Pension and Postretirement Plans	79	106	0	0	0	0	0	0
Adjustment	79	106	0	0	0	0	0	0
Provision for Litigation	15	1 128	0	0	0	0	0	0
EBITDA	7 061	7 737	9 695	10 829	12 168	13 670	15 365	16 846
Depreciation	185	133	147	142	141	143	149	157
Amortization	251	326	349	367	399	444	496	554
EBIT	6 625	7 278	9 200	10 321	11 628	13 083	14 720	16 135
Interest Expense	157	190	2	2	2	2	3	3
Investment income	56	122	74	74	74	74	74	74
Other Income (Expense)	-2	-6	0	0	0	0	0	0
Profit before taxes	6 522	7 204	9 272	10 392	11 699	13 154	14 791	16 205
Taxes	2 607	1 345	1 779	1 994	2 244	2 524	2 839	3 111
Net profit of operations	3 915	5 859	7 493	8 399	9 455	10 630	11 952	13 095

In Million \$	FY 2017	FY 2018	2019	2020	2021	2022	2023	2024
Consolidated Balance Sheet								
Operating Assets:								
Operating cash	367	437	504	579	665	748	835	927
Accounts Receivable	1 969	2 276	2 583	2 941	3 347	3 731	4 124	4 512
Settlement Due From Customers	1 375	2 452	2 017	2 223	2 438	2 644	2 845	3 057
Restricted Security Deposits Held for Customers - Asset	1 085	1 080	1 080	1 080	1 080	1 080	1 080	1 080
Prepaid Expenses and Other Current Assets	473	511	589	677	778	875	977	1 085
Operating Current Assets	5 269	6 756	6 773	7 499	8 309	9 077	9 861	10 661
Net PP&E	746	824	795	789	805	837	883	943
Net Intangible Assets	969	1 036	1 090	1 186	1 319	1 474	1 645	1 787
Core Deferred Tax Assets	171	309	309	309	309	309	309	309
Capitalized Operating Leases	201	676	453	521	598	673	751	834
Customer and Merchant Incentives, Assets	1 898	3 236	3 701	4 235	4 871	5 442	6 012	6 583
Other Assets	615	508	1 233	1 417	1 628	1 831	2 044	2 270
Goodwill	3 035	2 904	2 904	2 904	2 904	2 904	2 904	2 904
Total Operating Assets	12 904	16 249	17 260	18 862	20 743	22 548	24 409	26 293
Operating Liabilities:								
Accounts Payable	933	537	983	1 071	1 150	1 172	1 170	1 151
Settlement due to customers	1 343	2 189	1 835	2 022	2 218	2 404	2 588	2 781
Restricted Security Deposits Held For Customers - Liability	1 085	1 080	1 080	1 080	1 080	1 080	1 080	1 080
Accrued Expenses	1 125	1 175	1 410	1 622	1 852	2 024	2 189	2 360
Other Current Liabilities	737	946	1 066	1 196	1 341	1 471	1 599	1 730
Operating Current Liabilities	5 223	5 927	6 374	6 990	7 640	8 151	8 626	9 103
Core Deferred Tax Liabilities	0	0	0	0	0	0	0	0
Customer and Merchant Incentives - Liability	2 648	3 275	3 746	4 286	4 930	5 508	6 084	6 663
Other Liabilities	708	1 232	1 043	1 199	1 377	1 549	1 729	1 921
Total Operating Liabilities	8 579	10 434	11 164	12 476	13 947	15 208	16 439	17 686
Net Operating Assets	4 325	5 815	6 151	6 524	7 031	7 676	8 413	9 147
Non-operating Assets:								
Restricted Cash for litigation settlement	546	553	553	553	553	553	553	0
Prepaid Expenses And Other Current Assets	0	0	0	0	0	0	0	0
Nonmarketable equity Investments	249	337	337	337	337	337	337	337
Tax Loss Carryforward	14	10	10	10	10	10	5	5
Non Core Deferred Tax Assets	83	28	28	28	28	28	14	7
Total Non-Operating Assets	892	928	928	928	928	928	909	349
Non-operating Liabilities:								
Accrued Litigation	709	1 591	1 591	1 591	1 591	1 591	1 591	0
Transition Tax	629	509	509	509	462	462	306	306
Non Core Deferred Tax Liabilities	0	0	0	0	0	0	0	0
Tax Gain Carryforward	0	0	0	0	0	0	0	0
Unfunded Pension, Postretirement and Deferred Compensation Plans	101	85	85	85	85	85	85	85
Total Non-Operating Liabilities	1 439	2 185	2 185	2 185	2 138	2 138	1 982	391
Net Non-Operating Assets	-547	-1 257	-1 257	-1 257	-1 210	-1 210	-1 073	-42
Net Debt	-1 790	-931	59	62	68	74	83	104
Non Controlling Interest	29	23	29	32	36	41	46	50
Stockholder's Equity	5 539	5 466	4 751	5 034	5 482	6 014	6 768	8 411
Total Equity	5 568	5 489	4 780	5 067	5 518	6 055	6 813	8 461
In Million \$	FY 2017	FY 2018	2019	2020	2021	2022	2023	2024
Free Cash Flow Map								
+EBIT	6 625	7 278	9 200	10 321	11 628	13 083	14 720	16 135
+Adjustment for non operating expense	261	1 334	100	100	100	100	0	0
= Adjusted EBIT	6 886	8 612	9 300	10 421	11 728	13 183	14 720	16 135
-Recurrent taxes	-2 607	-1 345	-1 779	-1 994	-2 244	-2 524	-2 839	-3 111
-Adjustment in taxes	561	-307	-6	-6	-6	-6	15	15
= NOPLAT	4 840	6 959	7 515	8 421	9 478	10 653	11 896	13 039
+Depreciation and Amortization	436	459	495	509	540	587	645	711
= Gross Cash Flow	5 276	7 418	8 011	8 930	10 017	11 240	12 541	13 750
- Change in Net PP&E	-353	-211	-118	-136	-156	-176	-196	-218
- Change in NWC	69	-783	430	-110	-160	-258	-308	-324
-Change in Net Intangible Assets	-603	-393	-403	-463	-532	-598	-668	-695
-Other Changes	-669	-562	-686	-89	-102	-99	-104	-111
= Unlevered Free Cash Flow	3 720	5 470	7 234	8 131	9 068	10 109	11 265	12 402
= Non operating Free Cash Flow	33	-461	-21	-21	-68	-21	-79	-973
= Cash flow available to investors	3 753	5 008	7 213	8 110	9 000	10 089	11 187	11 429
+Tax Shields	55	40	0	0	0	1	1	1
-Interests	-157	-190	-2	-2	-2	-2	-3	-3
+Change in Net Debt	807	859	990	4	6	7	9	20
= Flow to Debt holders	705	709	988	2	4	5	7	17
Cash Transactions with Shareholders	-4 530	-5 711	-8 208	-8 045	-9 007	-10 098	-11 198	-11 451
Changes in Redeemable NCI	71	0	0	-71	0	0	0	0
Changes in NCI	1	-6	6	3	4	4	5	4
= Flow to Equity holders	-4 458	-5 717	-8 202	-8 112	-9 003	-10 093	-11 194	-11 447
= Financing Free Cash Flow	-3 753	-5 008	-7 213	-8 110	-9 000	-10 089	-11 187	-11 429

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Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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MASTERCARD UNDER THREAT:
MEASURING THE RISK OF A DATA
BREACH

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A Project carried out on the Master in Finance Program, under the supervision of:

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Abstract

Data breaches are increasingly a threat to companies operating in the financial services industry as these have become more frequent and accounting for larger losses. Data sustains that two effects should be accounted with regards to losses: rises in costs after the incident and potential decline in revenues, ultimately affecting the stock performance. In order to measure the impact of a data breach to Mastercard, a scenario analysis was conducted. Results show that a data breach could significantly affect the company' stock price under scenarios of large magnitude with small likelihood. Recommendation remains a BUY when accounting for this risk.

Keywords: Payments, Mastercard Inc, Data Breach, Risk

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According to the General Data Protection Regulation (GDPR) from the European Commission, data breach designates an incident in which a breach in security results in confidential and protected information becoming exposed to be accessed, altered, destroyed, lost, or disclosed without permission. Data breaches could result from a mistake within the company, but usually result from external threats, such as intentional cyberattacks.

Recent data figures show that the number of data breaches is increasing over time, as well as the proportion of breaches attributable to cyberattacks, from 42% to 51%, between 2014 and 2019 (IBM, 2019). In 2018, there were 1244 million data breaches disclosed in the United States, comprising more than 446.5 million records exposed. Of this total number of incidents, 135 million were in the Banking/Credit/Financial, making it the second industry most affected by data breaches, after healthcare (ITRC, 2018). The frequency of these incidents strongly depends on the sensitivity of the data transmitted within the sector. Indeed, it was found that the chance of an attack increases significantly for a company in the financial industry: it is about 300 times more vulnerable to attacks given the nature of data that is being held (Generali, 2018).

One should consider that a data breach not only has an impact on costs but also in potential revenues. Regarding costs, the data breach results in direct costs related to finding the breach and re-establishing security (detection and escalation), costs to notify those affected by the incident (notification), and lastly regulatory costs and compensation costs (post data breach). With regards to revenues, the company may lose potential revenue as consumers trust in the company could fade after the attack. In a survey conducted in 2017 by Centrifly, 65% of respondents found their trust in the company affected after a data breach, and 31% shifted to a competitor. According to Statista, 86% of surveyed consumers revealed they would switch company in case of data breach. Additionally, the impact on revenue was found to depend on the churn rate, given that companies with 1% churn rates had losses in

revenue of \$5.3 million after a data breach, whereas the loss would rise up to \$10.1 million for a company with 4% churn (Generali, 2018). The cost effect, given by the rise in operating costs, accounted for 64% of the loss whereas the revenue effect, given by the decline in revenues, accounted for 36%, in 2018 (Accenture, 2019). When comparing industries, on average, a financial institution loss was higher than that of a non-financial (330\$ per record lost vs 200\$) (IBM, 2019). However, average loss was found to depend on the records lost: for less than 1 million records, the average cost is \$230, but losses per record amount to \$388 for more than 1 million stolen records (IBM, 2019). In what regards to time span, the direct impact from data breaches can extend up to 4 years, but it is in the first year that the company accounts most of loss (IBM, 2019). Regulation will affect the distribution of the loss across time, as depending on the level of compliance of the industry, the firm could extend for future heavier losses: in a highly regulated market such as the payments industry, the loss amount in the first represents 53% and 32% in the second, whereas a regular firm would incur 67% of the loss in the first year and 22% in the second (IBM, 2019).

To measure the impact of this risk to Mastercard’s stock price, scenarios were defined depending on the number of cards affected. Two assumptions were established: firstly, the cyberattack took place in 2020 in the US, where the company is headquartered and centralizes majority of its costs; secondly, records were as many as number of cards affected, so that cards could be used as a proxy for records. Other assumptions were according to literature:

Loss	Loss per record of \$388 multiplied by the number of records
Time	4-year time span: 53% of the total loss in Y1, 32% in Y2, 7,5% for Y3 and Y4
Impact	Two-effect model: Gross revenues reduction (36%), Increase in operating costs (64%)

Fig. 1 – Main assumptions of the model according to literature

Regarding scenarios, the 5% scenario represents a loss of \$9 843.31 million due to the loss of 25 million records, and the 10% scenario represents twice of that. Then, to account for a larger scale attack, an estimated loss of \$49 216.53 million for 25% scenario, in which 127

million cards were affected, which approximates the size of some of the largest data breaches in the payments industry (more than 100 million records lost), namely, Equifax in 2017 (143 million records breached), Capital One in 2019 (106 million), and Mastercard's single disclosed data breach in 2008 (100 million). Finally, to present the worst case scenario a rather extreme scenario was performed where all cards in the US as of 2020 are breached. No attack of this magnitude has ever happened in the payments industry, but it did in other markets, as in the Marriot case (543 million records breached).

Scenario	Description	Cards affected (millions)	Loss (million \$)
Scenario 5%	Data breach affects 5% of cards	25	9843,31
Scenario 10%	Data breach affects 10% of cards	51	19686,61
Scenario 25%	Data breach affects 25% of cards	127	49216,53
Scenario 100%	Data breach affects 100% of cards	507	196866,13

Fig. 2. Scenarios considered for the analysis

Scenario	Share Price	% change	likelihood
Base Scenario	333,85	0,00%	52,7%
Scenario 5%	327,81	-1,81%	29,6%
Scenario 10%	321,78	-3,61%	14,8%
Scenario 25%	303,69	-9,03%	2,5%
Scenario 100%	213,20	-36,14%	0,4%

Fig. 3. Impact of each scenario on target share price 2020

When looking at results, in the 5% and 10% Scenarios, investor would still achieve a gain (price would still be above current market price), but stock return would be lower than 10%. Changes in price are rather proportionate, in the sense that an attack with twice the magnitude will approximately reflect in a duplicated fall in price (-1.81% and -3.61%). This can be attributed to the model assumption of losses depending on cards, but one could expect it is not observed in reality. Still, changes in stock price were below the historical average of -4.1% for data breaches with stolen records between 10 and 99 million records (Comparitech, 2019). Concerning the 25% Scenario, a decline of -9.03% from its current base scenario is expected, thus placing the stock valuation below its current market price. The fall is stronger than the average of -5.59% estimated for mega breaches (above 100 million records)

(Comparitech, 2019). Finally, severe losses are expected in the worst-case scenario where 100% of cards are affected, reaching up to \$196.9 billion total loss. Consequently, worst case scenario results in a stock price return decline of -36.14% from base scenario, for which there is no record when looking back at Mastercard's stock price evolution. The model indeed proves that losses increase with magnitude, confirming that Mastercard's stock price strongly depends on its performance, as shortfalls in profitability significantly affect the company valuation. One limitation of this approach worth mentioning is that it lacks accounting for more long-term impacts. In fact, data breaches can generate loss in competitive advantage and decline in employees productivity that are observable in the long-term and thus are not being accounted in the model (Centrify, 2017). Perhaps when accounting for all losses correctly, one would expect less proportion regarding the impact, but rather losses aggravating assymmetrically with magnitude.

One must account for the likelihood of each scenario. According to the International Monetary Fund, more regulation lowers significantly the risk of cyberattack by enforcing companies to keep record of data and by establishing minimal standards of security and data protection, under the threat of penalties. The payments industry is considered highly regulated, and Mastercard must comply to different regulatory frameworks of the regions in which it operates: in the United States it is subject to the California Consumer Privacy Act (CCPA) and General Data Protection Regulation (GDPR) in the European Union, for instance. The likelihood of a firm to suffer from a data breach within the next two years is, on average, 29.6% (IBM, 2019). This probability, however, depends on the number of records affected, so one should expect that in scenarios where more cards are affected, a lower probability is attributed. One could argue that Mastercard is attributed a lower than the average probability for these attacks in the light of recent investments regarding cybersecurity. Namely, in December 2019, Mastercard announced the acquisition of

RiskRecon (expected to be closed in 2020), providing the company to extend its capabilities in solutions for managing cyberrisks. Still, the literature approach was followed, and a 29.6% likelihood to the first scenario, with decreasing likelihood as the number of cards becomes larger. When accounting for the data breach risk, the average target price for 2020 is \$329.04, which still represents a BUY recommendation, with a capital gain of 8.45% and dividend yield of 2.01%.

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